Annex A (normative):  
Test Cases

# A.1 Purpose of annex

This Annex specifies test specific parameters for some of the functional requirements in sections 4 to 9. The tests provide additional information to how the requirements should be interpreted for the purpose of conformance testing. The tests in this Annex are described such that one functional requirement may be tested in one or several test and one test may verify several requirements. Some requirements may lack a test.

The conformance tests are specified in TS 36.521-3 [23]. Statistical interpretation of the requirements is described in Annex A.2.

# A.2 Requirement classification for statistical testing

Requirements in this specification are either expressed as absolute requirements with a single value stating the requirement, or expressed as a success rate. There are no provisions for the statistical variations that will occur when the parameter is tested.

Annex A outlines the tests in more detail and lists the test parameters needed. The test will result in an outcome of a test variable value for the device under test (DUT) inside or outside the test limit. Overall, the probability of a "good" DUT being inside the test limit(s) and the probability of a "bad" DUT being outside the test limit(s) should be as high as possible. For this reason, when selecting the test variable and the test limit(s), the statistical nature of the test is accounted for.

The statistical nature depends on the type of requirement. Some have large statistical variations, while others are not statistical in nature at all. When testing a parameter with a statistical nature, a confidence level is set. This establishes the probability that a DUT passing the test actually meets the requirements and determines how many times a test has to be repeated and what the pass and fail criteria are. Those aspects are not covered by TS 36.133. The details of the tests on how many times to run it and how to establish confidence in the tests are described in TS 36.521-3 [23]. This Annex establishes the variable to be used in the test and whether it can be viewed as statistical in nature or not.

## A.2.1 Types of requirements in TS 36.133

### A.2.1.1 Time and delay requirements on UE higher layer actions

A very large part of the RRM requirements are delay requirements:

- In E-UTRAN RRC\_IDLE state mobility (clause A.4) there is cell re-selection delay.

- In E-UTRAN RRC\_CONNECTED state mobility (clauses A.5 and A.8) there is handover delay, cell search delay and measurement reporting delay.

- In RRC Connection Control (clause A.6) there is RRC re-establishment delay.

All have in common that the UE is required to perform an action observable in higher layers (e.g. camp on the correct cell) within a certain time after a specific event (e.g. when a new strong pilot or reference signal appears). The delay time is statistical in nature for several reasons, among others that several of the measurements are performed by the UE in a fading radio environment.

The variations make a strict limit unsuitable for a test. Instead there is a condition set for a correct action by the UE, e.g. that the UE shall camp on the correct cell within X seconds. Then the rate of correct events is observed during repeated tests and a limit is set on the rate of correct events, usually 90% correct events are required. How the limit is applied in the test depends on the confidence required, further detailed are in TS 36.521-3 [23].

### A.2.1.2 Measurements of power levels, relative powers and time

A very large number of requirements are on measurements that the UE performs:

- In E-UTRAN RRC\_CONNECTED state mobility (clause A.5) there are measurement reports.

- In Measurement Performance Requirements (clause A.9) there are requirements for all type of measurements.

The accuracy requirements on measurements are expressed in this specification as a fixed limit (e.g. +/-X dB), but the measurement error will have a distribution that is not easily confined in fixed limits. Assuming a Gaussian distribution of the error, the limits will have to be set at +/-3.29σ if the probability of failing a "good DUT" in a single test is to be kept at 0.1%. It is more reasonable to set the limit tighter and test the DUT by counting the rate of measurements that are within the limits, in a way similar to the requirements on delay.

### A.2.1.3 Implementation requirements

A few requirements are strict actions the UE should take or capabilities the UE should have, without any allowance for deviations. These requirements are absolute and should be tested as such. Examples are:

- "Event triggered report rate" in E-UTRAN RRC\_CONNECTED state mobility (clauses A.5 and A.8)

- "Correct behaviour at time-out" in RRC connection control (clause A.6)

### A.2.1.4 Physical layer timing requirements

There are requirements on Timing and Signaling Characteristics (clauses A.7). There are both absolute and relative limits on timing accuracy depending upon the type of requirement. Examples are:

- Initial Transmit Timing (clause A.7.1) has an absolute limit on timing accuracy.

- Timing Advance (clause A.7.2) has a relative limit on timing accuracy.

# A.3 RRM test configurations

## A.3.1 Reference Measurement Channels

### A.3.1.1 PDSCH

#### A.3.1.1.1 FDD

Table A.3.1.1.1-1: PDSCH Reference Measurement Channels for FDD

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | | | |
| Reference channel |  | R.2 FDD |  | R.5 FDD | R.7 FDD | R.0 FDD | R.1 FDD | R.3 FDD | R.4 FDD | R.6 FDD |
| Channel bandwidth | MHz | 1.4 | 3 | 5 | 5 | 10 | 10 | 10 | 20 | 20 |
| Number of transmitter antennas |  | 1 |  | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| Allocated resource blocks (Note 4) |  | 2 |  | 11 | 11 | 24 | 24 | 24 | 24 | 24 |
| Allocated subframes per Radio Frame |  | 10 |  | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Modulation |  | QPSK |  | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Target Coding Rate |  | 1/3 |  | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload |  |  |  |  |  |  |  |  |  |  |
| For Sub-Frames 4, 9 | Bits | 120 |  | 968 | 968 | 2088 | 2088 | 2088 | 2088 | 2088 |
| For Sub-Frame 5 | Bits | 104 |  | 776 | 776 | 2088 | 1736 | 2088 | 2088 | 2088 |
| For Sub-Frame 0 | Bits | 32 |  | 616 | 616 | 1736 | 1736 | 1736 | 1736 | 1736 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 0 |  | 0 | 968 | 0 | 0 | 2088 | 0 | 2088 |
| Number of Code Blocks per Sub-Frame  (Note 5) |  |  |  |  |  |  |  |  |  |  |
| For Sub-Frames 4, 9 |  | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| For Sub-Frame 5 |  | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| For Sub-Frame 0 |  | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 |  | 0 |  | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| Binary Channel Bits Per Sub-Frame |  |  |  |  |  |  |  |  |  |  |
| For Sub-Frames 4, 9 | Bits | 456 |  | 2772 | 2772 | 6624 | 6336 | 6624 | 6624 | 6624 |
| For Sub-Frame 5 | Bits | 360 |  | 2484 | 2484 | 6336 | 6048 | 6336 | 6336 | 6336 |
| For Sub-Frame 0 | Bits | 176 |  | 1932 | 1932 | 5784 | 5520 | 5784 | 5784 | 5784 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 0 |  | 0 | 2772 | 0 | 0 | 6624 | 0 | 6624 |
| Max. Throughput averaged over 1 frame | kbps | 37.6 |  | 332.8 | 913.6 | 800 | 765 | 2053 | 800 | 2053 |
| Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5 MHz channel BW.  Note 2: Reference signal, synchronization signals and PBCH allocated as defined in 3GPP TS 36.211 [16].  Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in 3GPP TS 36.213 [3].  Note 4: Allocation is located in the middle of bandwidth.  Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  Note 6: PDSCH allocation applies only to subframes not configured as PRS subframes. | | | | | | | | | | |

Table A.3.1.1.1-2: PDSCH Reference Measurement Channels for FDD with slot duration TTI

|  |  |  |
| --- | --- | --- |
|  | Unit | R.8 FDD |
| Bandwidth | MHz | 10 |
| Number of transmit antennas |  | 1 |
| Allocated resource blocks(Note 4) |  | 24 |
| Allocated subframes per Radio Frame |  | 10 |
| Modulation |  | QPSK |
| Target coding rate |  | 1/3 |
| Information Bit Payload |  |  |
| For Sub-Frame 4, 9 |  |  |
| Slot index 0 | Bits | 872 |
| Slot index 1 | Bits | 1224 |
| For Sub-Frame 5 |  |  |
| Slot index 0 | Bits | 872 |
| Slot index 1 | Bits | 1224 |
| For Sub-Frame 0 |  |  |
| Slot index 0 | Bits | 872 |
| Slot index 1 | Bits | 1032 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 |  |  |
| Slot index 0 | Bits | 0 |
| Slot index 1 | Bits | 0 |
| Number of Code Blocks per slot (Note 5) |  |  |
| For Sub-Frame 4, 9 |  |  |
| Slot index 0 |  | 1 |
| Slot index 1 |  | 1 |
| For Sub-Frame 5 |  |  |
| Slot index 0 |  | 1 |
| Slot index 1 |  | 1 |
| For Sub-Frame 0 |  |  |
| Slot index 0 |  | 1 |
| Slot index 1 |  | 1 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 |  |  |
| Slot index 0 |  | 0 |
| Slot index 1 |  | 0 |
| Binary Channel Bits per slot |  |  |
| For Sub-Frame 4, 9 | Bits |  |
| Slot index 0 | Bits | 2784 |
| Slot index 1 | Bits | 3840 |
| For Sub-Frame 5 | Bits |  |
| Slot index 0 | Bits | 2496 |
| Slot index 1 | Bits | 3840 |
| For Sub-Frame 0 | Bits |  |
| Slot index 0 | Bits | 2496 |
| Slot index 1 | Bits | 3288 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits |  |
| Slot index 0 | Bits | 0 |
| Slot index 1 | Bits | 0 |
| Max. Throughput averaged over 1 frame | kbps | 819.2 |
| Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5 MHz channel BW.  Note 2: Reference signal, synchronization signals and PBCH allocated as defined in 3GPP TS 36.211 [16].  Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in 3GPP TS 36.213 [3].  Note 4: Allocation is located in the middle of bandwidth.  Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  Note 6: PDSCH allocation applies only to subframes not configured as PRS subframes.  Note 7: Note SPDCCH is transmitted outside allocated resource blocks | | |

Table A.3.1.1.1-3: PDSCH Reference Measurement Channels for FDD with subslot duration TTI

|  |  |  |
| --- | --- | --- |
|  | Unit | R.9 FDD |
| Bandwidth | MHz | 10 |
| Number of transmit antennas |  | 1 |
| Allocated resource blocks(Note 4) |  | 24 |
| Allocated subframes per Radio Frame |  | 10 |
| Modulation |  | QPSK |
| Target coding rate |  | 1/3 |
| Information Bit Payload |  |  |
| For Sub-Frame 4, 9 |  |  |
| Subslot index 1 | Bits | 504 |
| Subslot index 2 | Bits | 344 |
| Subslot index 3 | Bits | 344 |
| Subslot index 4 | Bits | 344 |
| Subslot index 5 | Bits | 504 |
| For Sub-Frame 5 |  |  |
| Subslot index 1 | Bits | 504 |
| Subslot index 2 | Bits | 288 |
| Subslot index 3 | Bits | 344 |
| Subslot index 4 | Bits | 344 |
| Subslot index 5 | Bits | 504 |
| For Sub-Frame 0 |  |  |
| Subslot index 1 | Bits | 504 |
| Subslot index 2 | Bits | 288 |
| Subslot index 3 | Bits | 224 |
| Subslot index 4 | Bits | 288 |
| Subslot index 5 |  | 504 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 |  |  |
| Subslot index 1 | Bits | 0 |
| Subslot index 2 | Bits | 0 |
| Subslot index 3 | Bits | 0 |
| Subslot index 4 | Bits | 0 |
| Subslot index 5 | Bits | 0 |
| Number of Code Blocks per Sub-Frame(Note 5) |  |  |
| For Sub-Frame 4, 9 |  |  |
| Subslot index 1 |  | 1 |
| Subslot index 2 |  | 1 |
| Subslot index 3 |  | 1 |
| Subslot index 4 |  | 1 |
| Subslot index 5 |  | 1 |
| For Sub-Frame 5 |  |  |
| Subslot index 1 |  | 1 |
| Subslot index 2 |  | 1 |
| Subslot index 3 |  | 1 |
| Subslot index 4 |  | 1 |
| Subslot index 5 |  | 1 |
| For Sub-Frame 0 |  |  |
| Subslot index 1 |  | 1 |
| Subslot index 2 |  | 1 |
| Subslot index 3 |  | 1 |
| Subslot index 4 |  | 1 |
| Subslot index 5 |  | 1 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 |  |  |
| Subslot index 1 |  | 0 |
| Subslot index 2 |  | 0 |
| Subslot index 3 |  | 0 |
| Subslot index 4 |  | 0 |
| Subslot index 5 |  | 0 |
| Binary Channel Bits per subslot |  |  |
| For Sub-Frame 4, 9 | Bits |  |
| Subslot index 1 | Bits | 1632 |
| Subslot index 2 | Bits | 1152 |
| Subslot index 3 | Bits | 1056 |
| Subslot index 4 | Bits | 1152 |
| Subslot index 5 | Bits | 1632 |
| For Sub-Frame 5 | Bits |  |
| Subslot index 1 | Bits | 1632 |
| Subslot index 2 | Bits | 864 |
| Subslot index 3 | Bits | 1056 |
| Subslot index 4 | Bits | 1152 |
| Subslot index 5 | Bits | 1632 |
| For Sub-Frame 0 | Bits |  |
| Subslot index 1 | Bits | 1632 |
| Subslot index 2 | Bits | 864 |
| Subslot index 3 | Bits | 792 |
| Subslot index 4 | Bits | 864 |
| Subslot index 5 | Bits | 1632 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits |  |
| Subslot index 1 | Bits | 0 |
| Subslot index 2 | Bits | 0 |
| Subslot index 3 | Bits | 0 |
| Subslot index 4 | Bits | 0 |
| Subslot index 5 | Bits | 0 |
| Max. Throughput averaged over 1 frame | kbps | 787.2 |
| Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5 MHz channel BW.  Note 2: Reference signal, synchronization signals and PBCH allocated as defined in 3GPP TS 36.211 [16].  Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in 3GPP TS 36.213 [3].  Note 4: Allocation is located in the middle of bandwidth.  Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  Note 6: PDSCH allocation applies only to subframes not configured as PRS subframes.  Note 7: Note SPDCCH is transmitted outside allocated resource blocks | | |

#### A.3.1.1.2 TDD

Table A.3.1.1.2-1: PDSCH Reference Measurement Channels for TDD UL/DL configuration1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | |
| Reference channel |  | R.2 TDD |  | R.4  TDD | R.0 TDD | R.1 TDD | R.3 TDD |
| Channel bandwidth | MHz | 1.4 | 3 | 5 | 10 | 10 | 20 |
| Number of transmitter antennas |  | 1 |  | 1 | 1 | 2 | 1 |
| Allocated resource blocks (Note 4) |  | 2 |  | 11 | 24 | 24 | 24 |
| Uplink-Downlink Configuration (Note 5) |  | 1 |  | 1 | 1 | 1 | 1 |
| Special Subframe Configuration (Note 6) |  | 6 |  | 6 | 6 | 6 | 6 |
| Allocated subframes per Radio Frame |  | 6 |  | 6 | 6 | 6 | 6 |
| Modulation |  | QPSK |  | QPSK | QPSK | QPSK | QPSK |
| Target Coding Rate |  | 1/3 |  | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload |  |  |  |  |  |  |  |
| For Sub-Frames 4,9 | Bits | 120 |  | 968 | 2088 | 2088 | 2088 |
| For Sub-Frame 5 | Bits | 104 |  | 968 | 2088 | 2088 | 2088 |
| For Sub-Frame 0 | Bits | 56 |  | 616 | 2088 | 1736 | 2088 |
| For Sub-Frame 1, 6 (DwPTS) | Bits | 56 |  | 552 | 1032 | 1032 | 1032 |
| Number of Code Blocks per Sub-Frame  (Note 7) |  | 1 |  | 1 | 1 | 1 | 1 |
| For Sub-Frames 4,9 |  | 1 |  | 1 | 1 | 1 | 1 |
| For Sub-Frame 5 |  | 1 |  | 1 | 1 | 1 | 1 |
| For Sub-Frame 0 |  | 1 |  | 1 | 1 | 1 | 1 |
| For Sub-Frame 1, 6 (DwPTS) |  | 1 |  | 1 | 1 | 1 | 1 |
| Binary Channel Bits Per Sub-Frame |  |  |  |  |  |  |  |
| For Sub-Frames 4,9 | Bits | 456 |  | 2772 | 6624 | 6336 | 6624 |
| For Sub-Frame 5 | Bits | 408 |  | 2628 | 6480 | 6192 | 6480 |
| For Sub-Frame 0 | Bits | 224 |  | 2076 | 5928 | 5664 | 5928 |
| For Sub-Frame 1, 6 (DwPTS) | Bits | 272 |  | 1616 | 3696 | 3504 | 3696 |
| Max. Throughput averaged over 1 frame | Mbps | 0.0512 |  | 0.4624 | 1.0416 | 1.0064 | 1.0416 |
| Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. For special subframe (1 & 6) only 2 OFDM symbols are allocated to PDCCH for all bandwidths.  Note 2: Reference signal, synchronization signals and PBCH allocated as defined in TS 36.211 [16].  Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 36.213 [3].  Note 4: Allocation is located in the middle of bandwidth.  Note 5: As per Table 4.2-2 in TS 36.211 [16]  Note 6: As per Table 4.2-1 in TS 36.211 [16]  Note 7: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  Note 8: PDSCH allocation applies only to subframes not configured as PRS subframes. | | | | | | | |

Table A.3.1.1.2-2: PDSCH Reference Measurement Channels for TDD UL/DL configuration0

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | |
| Reference channel |  |  |  |  | R.5 TDD |  |  |
| Channel bandwidth | MHz | 1.4 | 3 | 5 | 10 | 10 | 20 |
| Number of transmitter antennas |  |  |  |  | 1 |  |  |
| Allocated resource blocks (Note 4) |  |  |  |  | 24 |  |  |
| Uplink-Downlink Configuration (Note 5) |  |  |  |  | 0 |  |  |
| Special Subframe Configuration (Note 6) |  |  |  |  | 6 |  |  |
| Allocated subframes per Radio Frame |  |  |  |  | 4 |  |  |
| Modulation |  |  |  |  | QPSK |  |  |
| Target Coding Rate |  |  |  |  | 1/3 |  |  |
| Information Bit Payload |  |  |  |  |  |  |  |
| For Sub-Frames 4,9 | Bits |  |  |  | N/A |  |  |
| For Sub-Frame 5 | Bits |  |  |  | 2088 |  |  |
| For Sub-Frame 0 | Bits |  |  |  | 2088 |  |  |
| For Sub-Frame 1, 6 (DwPTS) | Bits |  |  |  | 1032 |  |  |
| Number of Code Blocks per Sub-Frame  (Note 7) |  |  |  |  | 1 |  |  |
| For Sub-Frames 4,9 |  |  |  |  | N/A |  |  |
| For Sub-Frame 5 |  |  |  |  | 1 |  |  |
| For Sub-Frame 0 |  |  |  |  | 1 |  |  |
| For Sub-Frame 1, 6 (DwPTS) |  |  |  |  | 1 |  |  |
| Binary Channel Bits Per Sub-Frame |  |  |  |  |  |  |  |
| For Sub-Frames 4,9 | Bits |  |  |  | N/A |  |  |
| For Sub-Frame 5 | Bits |  |  |  | 6480 |  |  |
| For Sub-Frame 0 | Bits |  |  |  | 5928 |  |  |
| For Sub-Frame 1, 6 (DwPTS) | Bits |  |  |  | 3696 |  |  |
| Max. Throughput averaged over 1 frame | Mbps |  |  |  | 0.624 |  |  |
| Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. For special subframe (1 & 6) only 2 OFDM symbols are allocated to PDCCH for all bandwidths.  Note 2: Reference signal, synchronization signals and PBCH allocated as defined in TS 36.211 [16].  Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 36.213 [3].  Note 4: Allocation is located in the middle of bandwidth.  Note 5: As per Table 4.2-2 in TS 36.211 [16]  Note 6: As per Table 4.2-1 in TS 36.211 [16]  Note 7: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  Note 8: PDSCH allocation applies only to subframes not configured as PRS subframes. | | | | | | | |

Table A.3.1.1.2-3: PDSCH Reference Measurement Channels for TDD slot duration TTI

|  |  |  |
| --- | --- | --- |
|  | Unit | R.6 TDD |
| Bandwidth | MHz | 10 |
| Number of transmit antennas |  | 1 |
| Allocated resource blocks(Note 4) |  | 24 |
| Uplink-Downlink Configuration (Note 5) |  | 1 |
| Special Subframe Configuration (Note 6) |  | 6 |
| Allocated subframes per Radio Frame |  | 6 |
| Modulation |  | QPSK |
| Target coding rate |  | 1/3 |
| Information Bit Payload |  |  |
| For Sub-Frame 4, 9 |  |  |
| Slot index 0 | Bits | 872 |
| Slot index 1 | Bits | 1224 |
| For Sub-Frame 5 |  |  |
| Slot index 0 | Bits | 872 |
| Slot index 1 | Bits | 1224 |
| For Sub-Frame 0 |  |  |
| Slot index 0 | Bits | 872 |
| Slot index 1 | Bits | 1032 |
| For Sub-Frame 1, 6 (DwPTS) |  | (1032) |
| Slot index 0 | Bits | 872 |
| Slot index 1 | Bits | N/A |
| Number of Code Blocks per Sub-Frame |  |  |
| For Sub-Frame 4, 9 |  |  |
| Slot index 0 |  | 1 |
| Slot index 1 |  | 1 |
| For Sub-Frame 5 |  |  |
| Slot index 0 |  | 1 |
| Slot index 1 |  | 1 |
| For Sub-Frame 0 |  |  |
| Slot index 0 |  | 1 |
| Slot index 1 |  | 1 |
| For Sub-Frame 1, 6 (DwPTS) |  |  |
| Slot index 0 |  | 1 |
| Slot index 1 |  | N/A |
| Binary Channel Bits per slot |  |  |
| For Sub-Frame 4, 9 | Bits |  |
| Slot index 0 | Bits | 2784 |
| Slot index 1 | Bits | 3840 |
| For Sub-Frame 5 | Bits |  |
| Slot index 0 | Bits | 2784 |
| Slot index 1 | Bits | 3696 |
| For Sub-Frame 0 | Bits |  |
| Slot index 0 | Bits | 2640 |
| Slot index 1 | Bits | 3288 |
| For Sub-Frame 1, 6 (DwPTS) | Bits |  |
| Slot index 0 | Bits | 2640 |
| Slot index 1 | Bits | N/A |
| Max. Throughput averaged over 1 frame | kbps | 999.6 |
| Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. For special subframe (1 & 6) only 2 OFDM symbols are allocated to PDCCH for all bandwidths.  Note 2: Reference signal, synchronization signals and PBCH allocated as defined in TS 36.211 [16].  Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 36.213 [3].  Note 4: Allocation is located in the middle of bandwidth.  Note 5: As per Table 4.2-2 in TS 36.211 [16]  Note 6: As per Table 4.2-1 in TS 36.211 [16]  Note 7: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  Note 8: PDSCH allocation applies only to subframes not configured as PRS subframes.  Note 9: SPDCCH is transmitted outside allocated resource blocks | | |

#### A.3.1.1.3 FDD for UE category 0

Table A.3.1.1.3-1: PDSCH Reference Measurement Channels for FDD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | |
| Reference channel |  | R.13 FDD | R.14 FDD | R.15 FDD |
| Channel bandwidth | MHz | 10 | 10 | 10 |
| Number of transmitter antennas |  | 1 | 2 | 2 |
| Allocated resource blocks (Note 4) |  | 24 | 24 | 24 |
| Allocated subframes per Radio Frame |  | 10 | 10 | 10 |
| Modulation |  | QPSK | QPSK | QPSK |
| Target Coding Rate |  | 1/10 | 1/10 | 1/10 |
| Information Bit Payload |  |  |  |  |
| For Sub-Frames 4, 9 | Bits | 648 | 648 | 648 |
| For Sub-Frame 5 | Bits | 648 | 648 | 648 |
| For Sub-Frame 0 | Bits | 648 | 648 | 648 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 0 | 0 | 648 |
| Number of Code Blocks per Sub-Frame  (Note 5) |  |  |  |  |
| For Sub-Frames 4, 9 |  | 1 | 1 | 1 |
| For Sub-Frame 5 |  | 1 | 1 | 1 |
| For Sub-Frame 0 |  | 1 | 1 | 1 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 |  | 0 | 0 | 1 |
| Binary Channel Bits Per Sub-Frame |  |  |  |  |
| For Sub-Frames 4, 9 | Bits | 6624 | 6336 | 6636 |
| For Sub-Frame 5 | Bits | 6336 | 6048 | 6408 |
| For Sub-Frame 0 | Bits | 5784 | 5520 | 5520 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 0 | 0 | 6636 |
| Max. Throughput averaged over 1 frame | kbps | 259.2 | 259.2 | 648 |
| Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5 MHz channel BW.  Note 2: Reference signal, synchronization signals and PBCH allocated as defined in 3GPP TS 36.211 [16].  Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in 3GPP TS 36.213 [3].  Note 4: Allocation is located in the middle of bandwidth.  Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  Note 6: PDSCH allocation applies only to subframes not configured as PRS subframes. | | | | |

#### A.3.1.1.4 HD-FDD for UE category 0

Table A.3.1.1.4-1: PDSCH Reference Measurement Channels for HD-FDD

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit |  | Value |
| Reference channel |  | R.1 HD-FDD | R.2 HD-FDD |
| Channel bandwidth | MHz | 10 | 10 |
| Number of transmitter antennas |  | 1 | 2 |
| Allocated resource blocks (Note 4) |  | 24 | 24 |
| Allocated subframes per Radio Frame |  | 10 | 10 |
| Modulation |  | QPSK | QPSK |
| Target Coding Rate |  | 1/10 | 1/10 |
| Information Bit Payload |  |  |  |
| For Sub-Frames 4, 9, | Bits | 0 | 0 |
| For Sub-Frame 5 (Note 7) | Bits | 424 | 424 |
| For Sub-Frame 0 (Note 7) | Bits | 648 | 648 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 0 | 0 |
| Number of Code Blocks per Sub-Frame  (Note 5) |  |  |  |
| For Sub-Frames 4, 9 |  | 0 | 0 |
| For Sub-Frame 5 |  | 1 | 1 |
| For Sub-Frame 0 |  | 1 | 1 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 |  | 0 | 0 |
| Binary Channel Bits Per Sub-Frame |  |  |  |
| For Sub-Frames 4, 9 | Bits | 0 | 0 |
| For Sub-Frame 5 | Bits | 6336 | 6048 |
| For Sub-Frame 0 | Bits | 5784 | 5520 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 0 | 0 |
| Max. Throughput averaged over 1 frame | kbps | - | - |
| Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5 MHz channel BW.  Note 2: Reference signal, synchronization signals and PBCH allocated as defined in 3GPP TS 36.211 [16].  Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in 3GPP TS 36.213 [3].  Note 4: Allocation is located in the middle of bandwidth.  Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  Note 6: PDSCH allocation applies only to subframes not configured as PRS subframes.  Note 7: Sub-frame 0 or sub-frame 5 is randomly scheduled in downlink. | | | |

#### A.3.1.1.5 TDD for UE category 0

Table A.3.1.1.5-1: PDSCH Reference Measurement Channels for TDD UL/DL configuration1

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | |
| Reference channel |  | R.12 TDD | R.13 TDD |
| Channel bandwidth | MHz | 10 | 10 |
| Number of transmitter antennas |  | 1 | 2 |
| Allocated resource blocks (Note 4) |  | 24 | 24 |
| Uplink-Downlink Configuration (Note 5) |  | 1 | 1 |
| Special Subframe Configuration (Note 6) |  | 6 | 6 |
| Allocated subframes per Radio Frame |  | 6 | 6 |
| Modulation |  | QPSK | QPSK |
| Target Coding Rate |  | 1/10 | 1/10 |
| Information Bit Payload |  |  |  |
| For Sub-Frames 4,9 | Bits | 648 | 648 |
| For Sub-Frame 5 | Bits | 648 | 648 |
| For Sub-Frame 0 | Bits | 648 | 648 |
| For Sub-Frame 1, 6 (DwPTS) | Bits | 488 | 488 |
| Number of Code Blocks per Sub-Frame  (Note 7) |  | 1 | 1 |
| For Sub-Frames 4,9 |  | 1 | 1 |
| For Sub-Frame 5 |  | 1 | 1 |
| For Sub-Frame 0 |  | 1 | 1 |
| For Sub-Frame 1, 6 (DwPTS) |  | 1 | 1 |
| Binary Channel Bits Per Sub-Frame |  |  |  |
| For Sub-Frames 4,9 | Bits | 6624 | 6336 |
| For Sub-Frame 5 | Bits | 6580 | 6192 |
| For Sub-Frame 0 | Bits | 5928 | 5664 |
| For Sub-Frame 1, 6 (DwPTS) | Bits | 3696 | 3408 |
| Max. Throughput averaged over 1 frame | Mbps | 0.3552 | 0.3552 |
| Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. For special subframe (1 & 6) only 2 OFDM symbols are allocated to PDCCH for all bandwidths.  Note 2: Reference signal, synchronization signals and PBCH allocated as defined in TS 36.211 [16].  Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 36.213 [3].  Note 4: Allocation is located in the middle of bandwidth.  Note 5: As per Table 4.2-2 in TS 36.211 [16]  Note 6: As per Table 4.2-1 in TS 36.211 [16]  Note 7: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  Note 8: PDSCH allocation applies only to subframes not configured as PRS subframes. | | | |

#### A.3.1.1.6 Frame Structure 3

Table A.3.1.1.6-1: PDSCH Reference Measurement Channels for FS 3

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | |
| Reference channel |  |  |  |  | R.0 FS3 | R.1 FS3 |
| Channel bandwidth | MHz |  |  |  | 20 | 20 |
| Number of transmitter antennas |  |  |  |  | 1 | 1 |
| Allocated resource blocks (Note 4) |  |  |  |  | 24 | 24 |
| Allocated subframes per Radio Frame |  |  |  |  | 10 | 10 |
| Modulation |  |  |  |  | QPSK | QPSK |
| Target Coding Rate |  |  |  |  | 1/3 | 1/3 |
| Information Bit Payload |  |  |  |  |  |  |
| For Sub-Frames 4, 9 | Bits |  |  |  | 2088 | 2088 |
| For Sub-Frame 5 | Bits |  |  |  | 2088 | 2088 |
| For Sub-Frame 0 | Bits |  |  |  | 2088 | 2088  (Note 7) |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits |  |  |  | 2088 | 0 |
| Number of Code Blocks per Sub-Frame  (Note 5) |  |  |  |  |  |  |
| For Sub-Frames 4, 9 |  |  |  |  | 1 | 1 |
| For Sub-Frame 5 |  |  |  |  | 1 | 1 |
| For Sub-Frame 0 |  |  |  |  | 1 | 1 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 |  |  |  |  | 1 | 1 |
| Binary Channel Bits Per Sub-Frame |  |  |  |  |  |  |
| For Sub-Frames 4, 9 | Bits |  |  |  | 6624 | 6624 |
| For Sub-Frame 5 | Bits |  |  |  | 6336 | 6336 |
| For Sub-Frame 0 | Bits |  |  |  | 6336 | 6336 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits |  |  |  | 6624 | 0 |
| Max. Throughput averaged over 1 frame | kbps |  |  |  | 2088 | 2088 |
| Note 1: 2 symbols allocated to PDCCH for 20 MHz channel BW.  Note 2: Reference signal, synchronization signals allocated as defined in 3GPP TS 36.211 [16].  Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in 3GPP TS 36.213 [3].  Note 4: Allocation is located in the middle of bandwidth.  Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  Note 6: PDSCH allocation applies only to subframes not configured as PRS subframes.  Note 7: PDSCH allocation applies only to subframes where there is no DRS transmission  Note 8: PDSCH is not transmitted in subframes where it is determined that transmission should not occur according to the listen before talk (LBT model).  Note 9: Max throughput averaged over 1 frame does not account for missed PDSCH transmission due to LBT or DRS transmission | | | | | | |

### A.3.1.2 PCFICH/PDCCH/PHICH

#### A.3.1.2.1 FDD

Table A.3.1.2.1-1: PCFICH/PDCCH/PHICH Reference Channel for FDD

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value | | | | | | | | |
| Reference channel | | |  | R.8 FDD | R.14 FDD | R.11 FDD | R.12 FDD | R.10 FDD | R.13 FDD | R.6 FDD | R.7 FDD | R.9 FDD |
| Channel bandwidth | | | MHz | 1.4 | 1.4 | 5 | 5 | 20 | 20 | 10 | 10 | 10 |
| Number of transmitter antennas | | |  | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 |
| Control region OFDM symbolsNote1 | | | symbols | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 |
| Aggregation level | | | CCE | 2 (Note 6) | 2  (Note 6) | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| DCI Format | | |  | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 |
| Cell ID | | |  | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 |
| Payload (without CRC) | | | Bits | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 |
|  |  | Note 1: The control region consists of PCFICH, PHICH and PDCCH.  Note 2: DCI formats are defined in TS 36.212.  Note 3: DCI format shall depend upon the test configuration.  Note 4: Cell ID shall depend upon the test configuration.  Note 5: Payload size shall depend upon the test configuration.  Note 6: For PDCCH using SI/RA/P-RNTI, Aggregation level 4 is used. | | | | | | | | | | |

#### A.3.1.2.2 TDD

Table A.3.1.2.2-1: PCFICH/PDCCH/PHICH Reference Channel for TDD

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Value | | | | | | | | |
| Reference channel | | | |  | R.8 TDD | R.14 TDD | R.11  TDD | R.12 TDD | R.10 TDD | R.13 TDD | R.6 TDD | R.7 TDD | R.9 TDD |
| Channel bandwidth | | | | MHz | 1.4 | 1.4 | 5 | 5 | 20 | 20 | 10 | 10 | 10 |
| Number of transmitter antennas | | | |  | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 |
| Control region OFDM symbolsNote1 | | | | symbols | 4 (Note 6) | 3 (Note 6) | 3 | 3 | 2 | 2 | 2 | 2 | 3 |
| Aggregation level | | | | CCE | 2 (Note 7) | 2 (Note 7) | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| DCI Format | | | |  | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 |
| Cell ID | | | |  | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 |
| Payload (without CRC) | | | | Bits | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 |
|  |  |  | Note 1: The control region consists of PCFICH, PHICH and PDCCH.  Note 2: DCI formats are defined in TS 36.212.  Note 3: DCI format shall depend upon the test configuration.  Note 4: Cell ID shall depend upon the test configuration.  Note 5: Payload size shall depend upon the test configuration.  Note 6: Only 2 OFDM symbols for special subframes 1 and 6.  Note 7: For PDCCH using SI/RA/P-RNTI, Aggregation level 4 is used. | | | | | | | | | | |

#### A.3.1.2.3 HD-FDD for UE category 0

Table A.3.1.2.3-1: PCFICH/PDCCH/PHICH Reference Channel for HD-FDD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | |
| Reference channel |  | R.3 HD-FDD | R.4 HD-FDD | R.5 HD-FDD |
| Channel bandwidth | MHz | 10 | 10 | 10 |
| Number of transmitter antennas |  | 1 | 2 | 2 |
| Control region OFDM symbolsNote1 | symbols | 2 | 2 | 3 |
| Aggregation level | CCE | 8 | 8 | 8 |
| DCI Format |  | Note 3 | Note 3 | Note 3 |
| Cell ID |  | Note 4 | Note 4 | Note 4 |
| Payload (without CRC) | Bits | Note 5 | Note 5 | Note 5 |
| Note 1: The control region consists of PCFICH, PHICH and PDCCH.  Note 2: DCI formats are defined in TS 36.212.  Note 3: DCI format shall depend upon the test configuration.  Note 4: Cell ID shall depend upon the test configuration.  Note 5: Payload size shall depend upon the test configuration.  Note 6: For PDCCH using SI/RA/P-RNTI, Aggregation level 4 is used.  Note 7: Sub-frame 0 or sub-frame 5 is randomly scheduled in downlink. | | | | |

#### A.3.1.2.4 FS 3

Table A.3.1.2.4-1: PCFICH/PDCCH/PHICH Reference Channel for FS 3

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | |
| Reference channel |  |  |  |  | R.0 FS3 |  |
| Channel bandwidth | MHz | 10 | 10 | 10 | 20 |  |
| Number of transmitter antennas |  |  |  |  | 1 |  |
| Control region OFDM symbolsNote1 | symbols |  |  |  | 2 |  |
| Aggregation level | CCE |  |  |  | 8 |  |
| DCI Format |  |  |  |  | Note 3 |  |
| Cell ID |  |  |  |  | Note 4 |  |
| Payload (without CRC) | Bits |  |  |  | Note 5 |  |
| Note 1: The control region consists of PCFICH, PHICH and PDCCH.  Note 2: DCI formats are defined in TS 36.212.  Note 3: DCI format shall depend upon the test configuration.  Note 4: Cell ID shall depend upon the test configuration.  Note 5: Payload size shall depend upon the test configuration.  Note 6: For PDCCH using SI/RA/P-RNTI, Aggregation level 4 is used.  Note 7: PCFICH/PDCCH/PHICH allocation applies only to subframes where there is no DRS transmission  Note 8: PCFICH/PDCCH/PHICH are not transmitted in subframes where it is determined that transmission should not occur according to the listen before talk (LBT model). | | | | | | |

### A.3.1.3 MPDCCH Reference Channels for Cat-M1 UEs

MPDCCH reference measurement channels in this section can be used in tests for Cat-M2 UEs.

#### A.3.1.3.1 FDD in CEModeA

Table A.3.1.3.1-1: MPDCCH Reference Channel for Cat-M1 FDD UEs in CEModeA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| MPDCCH Reference channel | - | R.16 FDD | R.17 FDD | R.24 FDD | R.25 FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | 6-1A | 6-1A | 6-1A | 6-1A |
| Transmission Type | - | Distributed | Distributed | Distributed | Distributed |
| Number of PRB pairs per M-PDCCH set | - | 4 | 4 | 4 | 4 |
| Aggregation level | ECCE | 16 | 16 | 16 | 16 |
| Maximum number of repetitions | - | 8 | 8 | 8 | 8 |
| Frequency hopping | - | ON | ON | ON | ON |
| Number of narrowbands | - | 2 | 2 | 2 | 2 |
| MPDCCH Narrowband | - | 7th | 7th | 4th | 4th |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 |
| MPDCCH start subframe | subframes | 1 | 1 | 1 | 1 |
| MPDCCH start symbol | symbols | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 4 | 4 | 4 | 4 |
| Payload (without CRC) | Bits | Note 1 | Note 1 | Note 1 | Note 1 |
| Cell ID | - | Note 2 | Note 2 | Note 2 | Note 2 |
| Note 1: Payload size shall depend upon the test configuration.  Note 2: Cell ID shall depend upon the test configuration. | | | | | |

#### A.3.1.3.2 HD-FDD in CEModeA

Table A.3.1.3.2-1: MPDCCH Reference Channel for Cat-M1 HD-FDD UEs in CEModeA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| MPDCCH Reference channel | - | R.6 HD-FDD | R.7 HD-FDD | R.14 HD-FDD | R.15 HD-FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | 6-1A | 6-1A | 6-1A | 6-1A |
| Transmission Type | - | Distributed | Distributed | Distributed | Distributed |
| Number of PRB pairs per M-PDCCH set | - | 4 | 4 | 4 | 4 |
| Aggregation level | ECCE | 16 | 16 | 16 | 16 |
| Maximum number of repetitions | - | 8 | 8 | 8 | 8 |
| Frequency hopping | - | ON | ON | ON | ON |
| Number of narrowbands | - | 2 | 2 | 2 | 2 |
| MPDCCH Narrowband | - | 7th | 7th | 4th | 4th |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 |
| MPDCCH start subframe | subframes | 1 | 1 | 1 | 1 |
| MPDCCH start symbol | symbols | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 4 | 4 | 4 | 4 |
| Payload (without CRC) | Bits | Note 1 | Note 1 | Note 1 | Note 1 |
| Cell ID | - | Note 2 | Note 2 | Note 2 | Note 2 |
| Note 1: Payload size shall depend upon the test configuration.  Note 2: Cell ID shall depend upon the test configuration. | | | | | |

#### A.3.1.3.3 TDD in CEModeA

Table A.3.1.3.3-1: MPDCCH Reference Channel for Cat-M1 TDD UEs in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | |
| MPDCCH Reference channel | - | R.14 TDD | R.15 TDD |
| Carrier bandwidth | MHz | 10 | 10 |
| Number of transmitter antennas | - | 1 | 2 |
| DCI Format | - | 6-1A | 6-1A |
| Transmission Type | - | Distributed | Distributed |
| Number of PRB pairs per M-PDCCH set | - | 4 | 4 |
| Aggregation level | ECCE | 16 | 16 |
| Maximum number of repetitions | - | 8 | 8 |
| Frequency hopping | - | ON | ON |
| Number of narrowbands | - | 2 | 2 |
| MPDCCH Narrowband | - | 7th | 7th |
| Frequency HoppingOffset | narrowbands | 7 | 7 |
| MPDCCH start subframe | subframes | 1 | 1 |
| MPDCCH start symbol | symbols | 2 | 2 |
| Frequency hopping interval | subframes | 10 | 10 |
| Payload (without CRC) | Bits | Note 1 | Note 1 |
| Cell ID | - | Note 2 | Note 2 |
| Note 1: Payload size shall depend upon the test configuration.  Note 2: Cell ID shall depend upon the test configuration. | | | |

#### A.3.1.3.4 FDD in CEModeB

Table A.3.1.3.4-1: MPDCCH Reference Channel for Cat-M1 FDD UEs in CEModeB

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| MPDCCH Reference channel | - | R.18 FDD | R.19 FDD | R.26 FDD | R.27 FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | 6-1B | 6-1B | 6-1B | 6-1B |
| Transmission Type | - | Distributed | Distributed | Distributed | Distributed |
| Number of PRB pairs per M-PDCCH set | - | 6 | 6 | 6 | 6 |
| Aggregation level | ECCE | 24 | 24 | 24 | 24 |
| Maximum number of repetitions | - | 128 | 128 | 128 | 128 |
| Frequency hopping | - | ON | ON | ON | ON |
| Number of narrowbands | - | 2 | 2 | 2 | 2 |
| MPDCCH Narrowband | - | 7th | 7th | 4th | 4th |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 |
| MPDCCH start subframe | subframes | 1 | 1 | 1 | 1 |
| MPDCCH start symbol | symbols | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 8 | 8 | 8 | 8 |
| Payload (without CRC) | Bits | 18 | 18 | 17 | 17 |
| Cell ID | - | Note 1 | Note 1 | Note 1 | Note 1 |
| Note 1: Cell ID shall depend upon the test configuration. | | | | | |

#### A.3.1.3.5 HD-FDD in CEModeB

Table A.3.1.3.5-1: MPDCCH Reference Channel for Cat-M1 HD-FDD UEs in CEModeB

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| MPDCCH Reference channel | - | R.8 HD-FDD | R.9 HD-FDD | R.16 HD-FDD | R.17 HD-FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | 6-1B | 6-1B | 6-1B | 6-1B |
| Transmission Type | - | Distributed | Distributed | Distributed | Distributed |
| Number of PRB pairs per M-PDCCH set | - | 6 | 6 | 6 | 6 |
| Aggregation level | ECCE | 24 | 24 | 24 | 24 |
| Maximum number of repetitions | - | 128 | 128 | 128 | 128 |
| Frequency hopping | - | ON | ON | ON | ON |
| Number of narrowbands | - | 2 | 2 | 2 | 2 |
| MPDCCH Narrowband | - | 7th | 7th | 4th | 4th |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 |
| MPDCCH start subframe | subframes | 1 | 1 | 1 | 1 |
| MPDCCH start symbol | symbols | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 8 | 8 | 8 | 8 |
| Payload (without CRC) | Bits | 18 | 18 | 17 | 17 |
| Cell ID | - | Note 1 | Note 1 | Note 1 | Note 1 |
| Note 1: Cell ID shall depend upon the test configuration. | | | | | |

#### A.3.1.3.6 TDD in CEModeB

Table A.3.1.3.6-1: MPDCCH Reference Channel for Cat-M1 TDD UEs in CEModeB

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | |
| MPDCCH Reference channel | - | R.16 TDD | R.17 TDD |
| Carrier bandwidth | MHz | 10 | 10 |
| Number of transmitter antennas | - | 1 | 2 |
| DCI Format | - | 6-1B | 6-1B |
| Transmission Type | - | Distributed | Distributed |
| Number of PRB pairs per M-PDCCH set | - | 6 | 6 |
| Aggregation level | ECCE | 24 | 24 |
| Maximum number of repetitions | - | 128 | 128 |
| Frequency hopping | - | ON | ON |
| Number of narrowbands | - | 2 | 2 |
| MPDCCH Narrowband | - | 7th | 7th |
| Frequency HoppingOffset | narrowbands | 7 | 7 |
| MPDCCH start subframe | subframes | 1 | 1 |
| MPDCCH start symbol | symbols | 2 | 2 |
| Frequency hopping interval | subframes | 20 | 20 |
| Payload (without CRC) | Bits | 18 | 18 |
| Cell ID | - | Note 1 | Note 1 |
| Note 1: Cell ID shall depend upon the test configuration. | | | |

### A.3.1.4 PDSCH Reference Channel for Cat-M1 UEs

#### A.3.1.4.1 FDD in CEModeA

Table A.3.1.4.1-1: PDSCH Reference Channel for Cat-M1 FDD in CEModeA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | |
| PDSCH Reference channel |  | R.20 FDD | R.21 FDD | R.28 FDD | R.29 FDD | R.32 FDD | R.33 FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 | 10 | 10 |
| Number of transmitter antennas |  | 1 | 2 | 1 | 2 | 1 | 2 |
| Allocated resource blocksNote1 | PRBs | 2 | 2 | 2 | 2 | 2 | 2 |
| Allocated subframes per Radio Frame | subframes | 10 | 10 | 10 | 10 | 10 | 10 |
| Modulation |  | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Target coding rate |  | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload |  |  |  |  |  |  |  |
| Sub-Frames 0 ~ 9 | Bits | 32 | 32 | 32 | 32 | 32 | 32 |
| Number of Code Blocks per Sub-Frame |  |  |  |  |  |  |  |
| Sub-Frames 0 ~ 9 |  | 1 | 1 | 1 | 1 | 1 | 1 |
| Maximum number of repetitions |  | 16 | 16 | 16 | 16 | 1 | 1 |
| Frequency hopping |  | ON | ON | ON | ON | ON | ON |
| Number of narrowbands for frequency hopping | narrowbands | 2 | 2 | 2 | 2 | 2 | 2 |
| PDSCH Narrowband |  | 2nd | 2nd | 2nd | 2nd | 2nd | 2nd |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 | 7 | 7 |
| PDSCH start symbol | symbols | 2 | 2 | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 4 | 4 | 4 | 4 | 4 | 4 |
| Cell ID |  | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| Note 1: Allocation is located in the middle of narrowband.  Note 2: Cell ID shall depend upon the test configuration. | | | | | | | |

#### A.3.1.4.2 HD-FDD in CEModeA

Table A.3.1.4.2-1: PDSCH Reference Channel for Cat-M1 HD-FDD in CEModeA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | |
| PDSCH Reference channel |  | R.10 HD-FDD | R.11 HD-FDD | R.18 HD-FDD | R.19 HD-FDD | R.24 HD-FDD | R.25 HD-FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 | 10 | 10 |
| Number of transmitter antennas |  | 1 | 2 | 1 | 2 | 1 | 2 |
| Allocated resource blocksNote1 | PRBs | 2 | 2 | 2 | 2 | 2 | 2 |
| Allocated subframes per Radio Frame | subframes | 10 | 10 | 10 | 10 | 10 | 10 |
| Modulation |  | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Target coding rate |  | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload |  |  |  |  |  |  |  |
| Sub-Frames 0 ~ 9 | Bits | 32 | 32 | 32 | 32 | 32 | 32 |
| Number of Code Blocks per Sub-Frame |  |  |  |  |  |  |  |
| Sub-Frames 0 ~ 9 |  | 1 | 1 | 1 | 1 | 1 | 1 |
| Maximum number of repetitions |  | 16 | 16 | 16 | 16 | 1 | 1 |
| Frequency hopping |  | ON | ON | ON | ON | ON | ON |
| Number of narrowbands for frequency hopping | narrowbands | 2 | 2 | 2 | 2 | 2 | 2 |
| PDSCH Narrowband |  | 1st | 1st | 1st | 1st | 1st | 1st |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 | 7 | 7 |
| PDSCH start symbol | symbols | 2 | 2 | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 4 | 4 | 4 | 4 | 4 | 4 |
| Cell ID |  | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| Note 1: Allocation is located in the middle of narrowband.  Note 2: Cell ID shall depend upon the test configuration. | | | | | | | |

#### A.3.1.4.3 TDD in CEModeA

Table A.3.1.4.3-1: PDSCH Reference Channel for Cat-M1 TDD in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | |
| PDSCH Reference channel |  | R.16 TDD | R.17 TDD | |
| Carrier bandwidth | MHz | 10 | 10 | |
| Number of transmitter antennas |  | 1 | 2 | |
| Allocated resource blocksNote1 | PRBs | 2 | 2 | |
| Allocated subframes per Radio Frame |  | 4 | 4 | |
| TDD Uplink-Downlink Configuration |  | 0 | 0 | |
| TDD Special Subframe Configuration |  | 6 | 6 | |
| Modulation |  | QPSK | QPSK | |
| Target coding rate |  | 1/3 | 1/3 | |
| Information Bit Payload |  |  |  | |
| All Sub-Frames except 1, 6 (TDD) | Bits | 32 | 32 | |
| All Sub-Frames except 1, 6 (TDD DwPTS) | - | 0 | 0 | |
| Number of Code Blocks per Sub-Frame |  | 1 | 1 | |
| All Sub-Frames except 1, 6 (TDD) |  | 1 | 1 | |
| All Sub-Frames except 1, 6 (TDD DwPTS) |  | 0 | 0 | |
| Maximum number of repetitions |  | 16 | 16 | |
| Frequency hopping |  | ON | ON | |
| Number of narrowbands for frequency hopping |  | 2 | 2 | |
| PDSCH Narrowband |  | 2nd | 2nd | |
| Frequency HoppingOffset | narrowbands | 7 | 7 | |
| PDSCH start symbol | symbols | 2 | 2 | |
| Frequency hopping interval | subframes | 10 | 10 | |
| Cell ID |  | Note 2 | Note 2 | |
| Note 1: Allocation is located in the middle of narrowband.  Note 2: Cell ID shall depend upon the test configuration. | | | |

#### A.3.1.4.4 FDD in CEModeB

Table A.3.1.4.4-1: PDSCH Reference Channel for Cat-M1 FDD in CEModeB

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| PDSCH Reference channel |  | R.22 FDD | R.23 FDD | R.30 FDD | R.31 FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |
| Number of transmitter antennas |  | 1 | 2 | 1 | 2 |
| Allocated resource blocksNote1 |  | 2 | 2 | 2 | 2 |
| Allocated subframes per Radio Frame | - | 10 | 10 | 10 | 10 |
| Modulation | - | QPSK | QPSK | QPSK | QPSK |
| Target coding rate | - | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload |  |  |  |  |  |
| Sub-Frames 0 ~ 9 | Bits | 32 | 32 | 32 | 32 |
| Number of Code Blocks per Sub-Frame |  |  |  |  |  |
| Sub-Frames 0 ~ 9 | - | 1 | 1 | 1 | 1 |
| Maximum number of repetitions | - | 192 | 192 | 192 | 192 |
| Frequency hopping | - | ON | ON | ON | ON |
| Number of narrowbands for frequency hopping | narrowbands | 2 | 2 | 2 | 2 |
| PDSCH Narrowband | - | 2nd | 2nd | 2nd | 2nd |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 |
| PDSCH start symbol | symbols | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 8 | 8 | 8 | 8 |
| Cell ID |  | Note 2 | Note 2 | Note 2 | Note 2 |
| Note 1: Allocation is located in the middle of narrowband.  Note 2: Cell ID shall depend upon the test configuration. | | | | | |

#### A.3.1.4.5 HD-FDD in CEModeB

Table A.3.1.4.5-1: PDSCH Reference Channel for Cat-M1 HD-FDD in CEModeB

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| PDSCH Reference channel |  | R.12 HD-FDD | R.13 HD-FDD | R.20 HD-FDD | R.21 HD-FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |
| Number of transmitter antennas |  | 1 | 2 | 1 | 2 |
| Allocated resource blocksNote1 | PRBs | 2 | 2 | 2 | 2 |
| Allocated subframes per Radio Frame | subframes | 10 | 10 | 10 | 10 |
| Modulation |  | QPSK | QPSK | QPSK | QPSK |
| Target coding rate |  | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload |  |  |  |  |  |
| Sub-Frames 0 ~ 9 | Bits | 32 | 32 | 32 | 32 |
| Number of Code Blocks per Sub-Frame |  |  |  |  |  |
| Sub-Frames 0 ~ 9 |  | 1 | 1 | 1 | 1 |
| Maximum number of repetitions |  | 192 | 192 | 192 | 192 |
| Frequency hopping |  | ON | ON | ON | ON |
| Number of narrowbands for frequency hopping | narrowbands | 2 | 2 | 2 | 2 |
| PDSCH Narrowband |  | 1st | 1st | 1st | 1st |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 |
| PDSCH start symbol | symbols | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 8 | 8 | 8 | 8 |
| Cell ID |  | Note 2 | Note 2 | Note 2 | Note 2 |
| Note 1: Allocation is located in the middle of narrowband.  Note 2: Cell ID shall depend upon the test configuration. | | | | | |

#### A.3.1.4.6 TDD in CEModeB

Table A.3.1.4.6-1: PDSCH Reference Channel for Cat-M1 TDD in CEModeB

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | |
| PDSCH Reference channel |  | R.18 TDD | R.19 TDD | |
| Carrier bandwidth | MHz | 10 | 10 | |
| Number of transmitter antennas |  | 1 | 2 | |
| Allocated resource blocksNote1 | PRBs | 2 | 2 | |
| Allocated subframes per Radio Frame |  | 4 | 4 | |
| TDD Uplink-Downlink Configuration |  | 0 | 0 | |
| TDD Special Subframe Configuration |  | 6 | 6 | |
| Modulation |  | QPSK | QPSK | |
| Target coding rate |  | 1/3 | 1/3 | |
| Information Bit Payload |  |  |  | |
| All Sub-Frames except 1, 6 (TDD) | Bits | 32 | 32 | |
| All Sub-Frames except 1, 6 (TDD DwPTS) | - | 0 | 0 | |
| Number of Code Blocks per Sub-Frame |  | 1 | 1 | |
| All Sub-Frames except 1, 6 (TDD) |  | 1 | 1 | |
| All Sub-Frames except 1, 6 (TDD DwPTS) |  | 0 | 0 | |
| Maximum number of repetitions |  | 192 | 192 | |
| Frequency hopping |  | ON | ON | |
| Number of narrowbands for frequency hopping |  | 2 | 2 | |
| PDSCH Narrowband |  | 2nd | 2nd | |
| Frequency HoppingOffset | narrowbands | 7 | 7 | |
| PDSCH start symbol | symbols | 2 | 2 | |
| Frequency hopping interval | subframes | 20 | 20 | |
| Cell ID |  | Note 2 | Note 2 | |
| Note 1: Allocation is located in the middle of narrowband.  Note 2: Cell ID shall depend upon the test configuration. | | | |

### A.3.1.5 NPDSCH Reference Channel for UE category NB1

#### A.3.1.5.1 HD-FDD in-band operation

Table A.3.1.5.1-1: NPDSCH Reference Channel for UE category NB1 for in-band operation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| NPDSCH Reference channel | - | R.14 HD-FDD | R.15 HD-FDD | R.16 HD-FDD | R.17 HD-FDD |
| LTE Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |
| Allocated resource blocks | PRB | 1 | 1 | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| Allocated subframes per Radio Frame | subframes | Note 1 | Note 1 | Note 1 | Note 1 |
| Modulation |  | QPSK | QPSK | QPSK | QPSK |
| Target coding rate |  | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload |  |  |  |  |  |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 40 Note 2 | 40 Note 2 | 40 Note 2 | 40 Note 2 |
| For Sub-Frame 4, 9 | Bits | Note 3 | Note 3 | Note 3 | Note 3 |
| For Sub-Frame 0, 5 | Bits | 0 | 0 | 0 | 0 |
| Number of Code Blocks per Sub-Frame |  |  |  |  |  |
| For Sub-Frame 1, 2, 3, 6, 7, 8 |  | 1 Note 4 | 1 Note 4 | 1 Note 4 | 1 Note 4 |
| For Sub-Frame 4, 9 |  | Note 5 | Note 5 | Note 5 | Note 5 |
| For Sub-Frame 0, 5 |  | 0 | 0 | 0 | 0 |
| Maximum number of repetitions | - | Note 6 | Note 6 | Note 6 | Note 6 |
| NPDCCH start symbol | symbols | 3 | 3 | 3 | 3 |
| Cell ID | - | Note 7 | Note 7 | Note 7 | Note 7 |
| Note 1: Shall depend upon the NPDSCH scheduling.  Note 2: Only apply for subframes scheduled with NPDSCH.  Note 3: 40 for subframes scheduled with NPDSCH when mod 2 ≠ 0. Otherwise 0.  Note 4: Only apply for subframes scheduled with NPDSCH.  Note 5: 1 for subframes scheduled with NPDSCH when mod 2 ≠ 0. Otherwise 0.  Note 6: Maximum number of repetitions shall depend upon the test configuration.  Note 7: Cell ID shall depend upon the test configuration. | | | | | |

#### A.3.1.5.2 Void

#### A.3.1.5.3 HD-FDD standalone operation

Table A.3.1.5.3-1: NPDSCH Reference Channel for UE category NB1 for standalone operation

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | |
| NPDSCH Reference channel | - | R.18 HD-FDD | R.19 HD-FDD |
| Channel bandwidth | KHz | 200 | 200 |
| Number of transmitter antennas | - | 1 | 2 |
| Allocated subframes per Radio Frame | subframes | Note 1 | Note 1 |
| Modulation |  | QPSK | QPSK |
| Target coding rate |  | 1/3 | 1/3 |
| Information Bit Payload |  |  |  |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 72 Note 2 | 72 Note 2 |
| For Sub-Frame 4, 9 | Bits | Note 3 | Note 3 |
| For Sub-Frame 0, 5 | Bits | 0 | 0 |
| Number of Code Blocks per Sub-Frame |  |  |  |
| For Sub-Frame 1, 2, 3, 6, 7, 8 |  | 1 Note 4 | 1 Note 4 |
| For Sub-Frame 4, 9 |  | Note 5 | Note 5 |
| For Sub-Frame 0, 5 |  | 0 | 0 |
| Maximum number of repetitions | - | Note 6 | Note 6 |
| Cell ID | - | Note 7 | Note 7 |
| Note 1: Shall depend upon the NPDSCH scheduling  Note 2: Only apply for subframes scheduled with NPDSCH.  Note 3: 72 for subframes scheduled with NPDSCH when mod 2 ≠ 0. Otherwise 0.  Note 4: only apply for subframes scheduled with NPDSCH..  Note 5: 1 for subframes scheduled with NPDSCH when mod 2 ≠ 0. Otherwise 0.  Note 6: Maximum number of repetitions shall depend upon the test configuration.  Note 7: Cell ID shall depend upon the test configuration. | | | |

#### A.3.1.5.4 Void

#### A.3.1.5.5 HD-FDD guard band operation

Table A.3.1.5.5-1: NPDSCH Reference Channel for UE category NB1 for guard band operation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| NPDSCH Reference channel | - | R.22 HD-FDD | R.23 HD-FDD | R.32 HD-FDD | R.33 HD-FDD |
| LTE Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |
| Allocated resource blocks for NB-IoT | PRB | 1 | 1 | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| Allocated subframes per Radio Frame | subframes | Note 1 | Note 1 | Note 1 | Note 1 |
| Modulation |  | QPSK | QPSK | QPSK | QPSK |
| Target coding rate |  | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload |  |  |  |  |  |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 72 Note 2 | 72 Note 2 | 72 Note 2 | 72 Note 2 |
| For Sub-Frame 4, 9 | Bits | Note 3 | Note 3 | Note 3 | Note 3 |
| For Sub-Frame 0, 5 | Bits | 0 | 0 | 0 | 0 |
| Number of Code Blocks per Sub-Frame |  |  |  |  |  |
| For Sub-Frame 1, 2, 3, 6, 7, 8 |  | 1 Note 4 | 1 Note 4 | 1 Note 4 | 1 Note 4 |
| For Sub-Frame 4, 9 |  | Note 5 | Note 5 | Note 5 | Note 5 |
| For Sub-Frame 0, 5 |  | 0 | 0 | 0 | 0 |
| Maximum number of repetitions | - | Note 6 | Note 6 | Note 6 | Note 6 |
| Cell ID | - | Note 7 | Note 7 | Note 7 | Note 7 |
| Note 1: Shall depend upon the NPDSCH scheduling.  Note 2: Only apply for subframes scheduled with NPDSCH.  Note 3: 72 for subframes scheduled with NPDSCH when mod 2 ≠ 0. Otherwise 0.  Note 4: Only apply for subframes scheduled with NPDSCH.  Note 5: 1 for subframes scheduled with NPDSCH when mod 2 ≠ 0. Otherwise 0.  Note 6: Maximum number of repetitions shall depend upon the test configuration.  Note 7: Cell ID shall depend upon the test configuration. | | | | | |

#### A.3.1.5.6 Void

#### A.3.1.5.7 TDD in-band operation

Table A.3.1.5.7-1: NPDSCH Reference Channel for UE category NB1 for in-band operation

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | |
| NPDSCH Reference channel | - | R.14 NB-TDD | R.15 NB-TDD |
| LTE Carrier bandwidth | MHz | 10 | 10 |
| Allocated resource blocks | PRB | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 |
| Allocated subframes per Radio Frame | subframes | Note 1 | Note 1 |
| Modulation |  | QPSK | QPSK |
| Target coding rate |  | 1/3 | 1/3 |
| Information Bit Payload |  |  |  |
| For Sub-Frame 4 | Bits | 40 Note 2 | 40 Note 2 |
| For Sub-Frame 0, 5, 9 | Bits | 0 | 0 |
| For Sub-Frame 1, 6 (DwPTS) | Bits | 16 or 40 Note 6 | 16 or 40 Note 6 |
| Number of Code Blocks per Sub-Frame |  |  |  |
| For Sub-Frame 4 |  | 1 Note 2 | 1 Note 2 |
| For Sub-Frame 0, 5, 9 |  | 0 | 0 |
| For Sub-Frame 1, 6 (DwPTS) |  | 1 | 1 |
| Maximum number of repetitions | - | Note 3 | Note 3 |
| NPDCCH start symbol | symbols | 3 | 3 |
| Cell ID | - | Note 4 | Note 4 |
| Note 1: Shall depend upon the NPDSCH scheduling.  Note 2: Only apply for subframes scheduled with NPDSCH.  Note 3: Maximum number of repetitions shall depend upon the test configuration.  Note 4: Cell ID shall depend upon the test configuration.  Note 5: SIB1-NB is transmitted in subframe 0 in odd radio frames.  Note 6: Set 40 when NPDSCH is transmitted with repetition. Set 16 when NPDSCH is transmitted without repetition. | | | |

#### A.3.1.5.8 TDD standalone operation

Table A.3.1.5.8-1: NPDSCH Reference Channel for UE category NB1 for standalone operation

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | |
| NPDSCH Reference channel | - | R.18 NB-TDD | R.19 NB-TDD |
| Channel bandwidth | KHz | 200 | 200 |
| Number of transmitter antennas | - | 1 | 2 |
| Allocated subframes per Radio Frame | subframes | Note 1 | Note 1 |
| Modulation |  | QPSK | QPSK |
| Target coding rate |  | 1/3 | 1/3 |
| Information Bit Payload |  |  |  |
| For Sub-Frame 4 | Bits | 72 Note 2 | 72 Note 2 |
| For Sub-Frame 0, 5, 9 | Bits | 0 | 0 |
| For Sub-Frame 1, 6 (DwPTS) | Bits | 40 or 72 Note 6 | 40 or 72 Note 6 |
| Number of Code Blocks per Sub-Frame |  |  |  |
| For Sub-Frame 4 |  | 1 Note 2 | 1 Note 2 |
| For Sub-Frame 0, 5, 9 |  | 0 | 0 |
| For Sub-Frame 1, 6 (DwPTS) |  | 1 | 1 |
| Maximum number of repetitions | - | Note 3 | Note 3 |
| Cell ID | - | Note 4 | Note 4 |
| Note 1: Shall depend upon the NPDSCH scheduling.  Note 2: Only apply for subframes scheduled with NPDSCH.  Note 3: Maximum number of repetitions shall depend upon the test configuration.  Note 4: Cell ID shall depend upon the test configuration.  Note 5: SIB1-NB is transmitted in subframe 0 in odd radio frames.  Note 6: Set 72 when NPDSCH is transmitted with repetition. Set 40 when NPDSCH is transmitted without repetition. | | | |

#### A.3.1.5.9 TDD guard band operation

Table A.3.1.5.9-1: NPDSCH Reference Channel for UE category NB1 for guard band operation

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | |
| NPDSCH Reference channel | - | R.22 NB-TDD | R.23 NB-TDD |
| LTE Carrier bandwidth | MHz | 10 | 10 |
| Allocated resource blocks for NB-IoT | PRB | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 |
| Allocated subframes per Radio Frame | subframes | Note 1 | Note 1 |
| Modulation |  | QPSK | QPSK |
| Target coding rate |  | 1/3 | 1/3 |
| Information Bit Payload |  |  |  |
| For Sub-Frame 4 | Bits | 72 Note 2 | 72 Note 2 |
| For Sub-Frame 0, 5, 9 | Bits | 0 | 0 |
| For Sub-Frame 1, 6 (DwPTS) | Bits | 40 or 72 Note 6 | 40 or 72 Note 6 |
| Number of Code Blocks per Sub-Frame |  |  |  |
| For Sub-Frame 4 |  | 1 Note 2 | 1 Note 2 |
| For Sub-Frame 0, 5, 9 |  | 0 | 0 |
| For Sub-Frame 1, 6 (DwPTS) |  | 1 | 1 |
| Maximum number of repetitions | - | Note 3 | Note 3 |
| Cell ID | - | Note 4 | Note 4 |
| Note 1: Shall depend upon the NPDSCH scheduling.  Note 2: Only apply for subframes scheduled with NPDSCH.  Note 3: Maximum number of repetitions shall depend upon the test configuration.  Note 4: Cell ID shall depend upon the test configuration.  Note 5: SIB1-NB is transmitted in subframe 0 in odd radio frames.  Note 6: Set 72 when NPDSCH is transmitted with repetition. Set 40 when NPDSCH is transmitted without repetition. | | | |

### A.3.1.6 NPDCCH Reference Channel for UE category NB1

#### A.3.1.6.1 In-band operation

Table A.3.1.6.1-1: NPDCCH Reference Channel for UE category NB1 for in-band operation in 10MHz LTE system

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| NPDCCH Reference channel | - | R.26 HD-FDD  R.26 NB-TDD | R.27 HD-FDD  R.27 NB-TDD | R.28 HD-FDD  R.28 NB-TDD | R.29 HD-FDD  R.29 NB-TDD |
| LTE Carrier bandwidth | MHz | 10 | 10 | 10 | 10 |
| Allocated resource blocks Note1 | PRB | 1 | 1 | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | N1 | N1 | N0 | N0 |
| Aggregation level | NCCE | 2 | 2 | 2 | 2 |
| Maximum number of repetitions | - | Note 2 | Note 2 | Note 2 | Note 2 |
| NPDCCH start symbol | symbols | 3 | 3 | 3 | 3 |
| Payload (without CRC) | Bits | Note 3 | Note 3 | Note 3 | Note 3 |
| Cell ID | - | Note 4 | Note 4 | Note 4 | Note 4 |
| Note 1: Allocation is located in the middle of narrowband.  Note 2: Maximum number of repetitions shall depend upon the test configuration.  Note 3: Payload size shall depend upon the test configuration.  Note 4: Cell ID shall depend upon the test configuration. | | | | | |

Table A.3.1.6.1-2: NPDCCH Reference Channel for UE category NB1 for in-band operation in 5MHz LTE system

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| NPDCCH Reference channel | - | R.38 HD-FDD | R.39 HD-FDD | R.40 HD-FDD | R.41 HD-FDD |
| LTE Carrier bandwidth | MHz | 5 | 5 | 5 | 5 |
| Allocated resource blocks Note1 | PRB | 1 | 1 | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | N1 | N1 | N0 | N0 |
| Aggregation level | NCCE | 2 | 2 | 2 | 2 |
| Maximum number of repetitions | - | Note 2 | Note 2 | Note 2 | Note 2 |
| NPDCCH start symbol | symbols | 3 | 3 | 3 | 3 |
| Payload (without CRC) | Bits | Note 3 | Note 3 | Note 3 | Note 3 |
| Cell ID | - | Note 4 | Note 4 | Note 4 | Note 4 |
| Note 1: Allocation is located in the middle of narrowband.  Note 2: Maximum number of repetitions shall depend upon the test configuration.  Note 3: Payload size shall depend upon the test configuration.  Note 4: Cell ID shall depend upon the test configuration. | | | | | |

#### A.3.1.6.2 Void

#### A.3.1.6.3 Standalone operation

Table A.3.1.6.3-1: NPDCCH Reference Channel for UE category NB1 for standalone operation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| NPDCCH Reference channel | - | R.30 HD-FDD  R.30 NB-TDD | R.31 HD-FDD  R.31 NB-TDD | R.32 HD-FDD  R.32 NB-TDD | R.33 HD-FDD  R.33 NB-TDD |
| Channel bandwidth | KHz | 200 | 200 | 200 | 200 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | N1 | N1 | N0 | N0 |
| Aggregation level | NCCE | 2 | 2 | 2 | 2 |
| Maximum number of repetitions | - | Note 2 | Note 2 | Note 2 | Note 2 |
| Payload (without CRC) | Bits | Note 3 | Note 3 | Note 3 | Note 3 |
| Cell ID | - | Note 4 | Note 4 | Note 4 | Note 4 |
| Note 1: Allocation is located in the middle of narrowband.  Note 2: Maximum number of repetitions shall depend upon the test configuration.  Note 3: Payload size shall depend upon the test configuration.  Note 4: Cell ID shall depend upon the test configuration. | | | | | |

#### A.3.1.6.4 Void

#### A.3.1.6.5 Guard band operation

Table A.3.1.6.5-1: NPDCCH Reference Channel for UE category NB1 for guard band operation in 10MHz LTE system

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| NPDCCH Reference channel | - | R.34 HD-FDD  R.34 NB-TDD | R.35 HD-FDD  R.35 NB-TDD | R.36 HD-FDD  R.36 NB-TDD | R.37 HD-FDD  R.37 NB-TDD |
| LTE Carrier bandwidth | MHz | 10 | 10 | 10 | 10 |
| Allocated resource blocks for NB-ioTNote1 | PRB | 1 | 1 | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | N1 | N1 | N0 | N0 |
| Aggregation level | NCCE | 2 | 2 | 2 | 2 |
| Maximum number of repetitions | - | Note 2 | Note 2 | Note 2 | Note 2 |
| Payload (without CRC) | Bits | Note 3 | Note 3 | Note 3 | Note 3 |
| Cell ID | - | Note 4 | Note 4 | Note 4 | Note 4 |
| Note 1: Allocation is located in the middle of narrowband.  Note 2: Maximum number of repetitions shall depend upon the test configuration.  Note 3: Payload size shall depend upon the test configuration.  Note 4: Cell ID shall depend upon the test configuration. | | | | | |

Table A.3.1.6.5-2: NPDCCH Reference Channel for UE category NB1 for guard band operation in 5MHz LTE system

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| NPDCCH Reference channel | - | R.42 HD-FDD | R.43 HD-FDD | R.44 HD-FDD | R.45 HD-FDD |
| LTE Carrier bandwidth | MHz | 5 | 5 | 5 | 5 |
| Allocated resource blocks for NB-ioTNote1 | PRB | 1 | 1 | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | N1 | N1 | N0 | N0 |
| Aggregation level | NCCE | 2 | 2 | 2 | 2 |
| Maximum number of repetitions | - | Note 2 | Note 2 | Note 2 | Note 2 |
| Payload (without CRC) | Bits | Note 3 | Note 3 | Note 3 | Note 3 |
| Cell ID | - | Note 4 | Note 4 | Note 4 | Note 4 |
| Note 1: Allocation is located in the middle of narrowband.  Note 2: Maximum number of repetitions shall depend upon the test configuration.  Note 3: Payload size shall depend upon the test configuration.  Note 4: Cell ID shall depend upon the test configuration. | | | | | |

#### A.3.1.6.6 Void

## A.3.2 OFDMA Channel Noise Generator (OCNG)

### A.3.2.1 OCNG Patterns for FDD

The following OCNG patterns are used for modelling allocations to virtual UEs (which are not under test) and/or allocations used for MBSFN. The OCNG pattern for each sub frame specifies the allocations that shall be filled with OCNG, and furthermore, the relative power level of each such allocation.

In each test case the OCNG is expressed by parameters OCNG\_RA and OCNG\_RB which together with a relative power level () specifies the PDSCH EPRE-to-RS EPRE ratios in OFDM symbols without and with reference symbols, respectively. The relative power, which is used for modelling boosting per virtual UE allocation, is expressed by:



where  denotes the relative power level of the *i:th* virtual UE. The parameter settings of OCNG\_RA, OCNG\_RB, and the set of relative power levels are chosen such that when also taking allocations to the UE under test into account, as given by a PDSCH reference channel, a constant transmitted power spectral density that is constant on an OFDM symbol basis is targeted.

Moreover the OCNG pattern is accompanied by a PCFICH/PDCCH/PHICH reference channel which specifies the control region. The number of PDCCH OFDM symbols in the non-MBSFN subframes is the same as specified in the RMC used in the test. The number of PDCCH OFDM symbols in the MBSFN subframe is the maximal allowed according to TS 36.213 [16]. For any aggregation and PHICH allocation, the PDCCH and any unused PHICH groups are padded with resource element groups with a power level given by PDCCH\_RA/RB and PHICH\_RA/RB as specified in the test case such that a total power spectral density in the control region that is constant on an OFDM symbol basis is targeted.

For subframes configured as PRS subframes the PDSCH allocation defined in the OCNG pattern does not apply.

For subframes configured as ABS subframes the PDSCH and PMCH allocation defined in the OCNG pattern does not apply.

The system information is scheduled in the allocations reserved for the OCNG patterns, in the subframes not configured for MBSFN. For this purpose the number of the RB-s allocated with PDSCH defined in the OCNG pattern can be reduced as necessary.

#### A.3.2.1.1 OCNG FDD pattern 1: outer resource blocks allocation in 10 MHz

Table A.3.2.1.1-1: OP.1 FDD: OCNG FDD Pattern 1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data | PMCH Data |
| Subframe | | | |
| 0 | 5 | 4,9 | 1-3, 6-8 |
| 0 – 12 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 37 – 49 | 0 | 0 | 0 | N/A |
| 0-49 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH symbols shall not contain cell-specific Reference Signals. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameteris used to scale the power of PMCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS  Note 5: If SPDCCH is to be transmitted on a physical resource block(PRB), this takes priority over OCNG transmission  N/A: Not Applicable | | | | | | |

#### A.3.2.1.2 OCNG FDD pattern 2: full bandwidth allocation in 10 MHz

Table A.3.2.1.2-1: OP.2 FDD: OCNG FDD Pattern 2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data | PMCH Data |
| Subframe | | | |
| 0 | 5 | 4, 9 | 1 – 3, 6 – 8 |
| 0 – 49 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 0 – 49 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameteris used to scale the power of PMCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS  N/A: Not Applicable | | | | | | |

#### A.3.2.1.3 OCNG FDD pattern 3: outer resource blocks allocation in 1.4 MHz

Table A.3.2.1.3-1: OP.3 FDD: OCNG FDD Pattern 3

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data | PMCH Data |
| Subframe | | | |
| 0 | 5 | 4,9 | 1-3, 6-8 |
| 0 – 1 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 4 – 5 | 0 | 0 | 0 | N/A |
| 0 – 5 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH symbols shall not contain cell-specific Reference Signals. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameteris used to scale the power of PMCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS  N/A: Not Applicable | | | | | | |

#### A.3.2.1.4 OCNG FDD pattern 4: full bandwidth allocation in 1.4 MHz

Table A.3.2.1.4-1: OP.4 FDD: OCNG FDD Pattern 4

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data | PMCH Data |
| Subframe | | | |
| 0 | 5 | 4, 9 | 1 – 3, 6 – 8 |
| 0 – 5 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 0 – 5 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.The parameter is used to scale the power of PDSCH.  Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameteris used to scale the power of PMCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS  N/A: Not Applicable | | | | | | |

#### A.3.2.1.5 OCNG FDD pattern 5: outer resource blocks allocation in 10 MHz (without MBSFN)

Table A.3.2.1.5-1: OP.5 FDD: OCNG FDD Pattern 5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 4,9 | 1-3, 6-8 |
| 0 – 12 | 0 | 0 | 0 | N/A | Note 2 |
| 37 – 49 | 0 | 0 | 0 | N/A |
| 0 – 49 | N/A | N/A | N/A | 0 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  N/A: Not Applicable | | | | | |

#### A.3.2.1.6 OCNG FDD pattern 6: full bandwidth allocation in 10 MHz (without MBSFN)

Table A.3.2.1.6-1: OP.6 FDD: OCNG FDD Pattern 6

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 4, 9 | 1 – 3, 6 – 8 |
| 0 – 49 | 0 | 0 | 0 | 0 | Note 2 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  N/A: Not Applicable | | | | | |

#### A.3.2.1.7 OCNG FDD pattern 7: full bandwidth allocation in 1.4 MHz (without MBSFN)

Table A.3.2.1.7-1: OP.7 FDD: OCNG FDD Pattern 7

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 4, 9 | 1 – 3, 6 – 8 |
| 0 – 5 | 0 | 0 | 0 | 0 | Note 2 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  N/A: Not Applicable | | | | | |

#### A.3.2.1.8 OCNG FDD pattern 8: outer resource blocks allocation in 10 MHz for MBSFN ABS

Table A.3.2.1.8-1: OP.8 FDD: OCNG FDD Pattern 8

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 4,9 | (1-3, 6-8)Note4 |
| 0 – 12 | 0 | 0 | 0 | N/A | Note 2 |
| 37 – 49 | 0 | 0 | 0 | N/A |
| 0 – 49 | N/A | N/A | N/A | 0 |
| Note 1: PDSCH allocation does not apply to subframes configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 4: The subframe(s) configured as MBSFN ABS in a test shall not contain any PMCH data and shall contain CRS only in the first symbol of the first time slot. The subframe(s) configured as MBSFN ABS depend upon the MBSFN ABS pattern used in the test.  N/A: Not Applicable | | | | | |

#### A.3.2.1.9 OCNG FDD pattern 9: full bandwidth allocation in 10 MHz for MBSFN ABS

Table A.3.2.1.9-1: OP.9 FDD: OCNG FDD Pattern 9

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 4, 9 | (1-3, 6-8)Note4 |
| 0 – 49 | 0 | 0 | 0 | 0 | Note 2 |
| Note 1: PDSCH allocation applies only to subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 4: The subframe(s) configured as MBSFN ABS in a test shall not contain any PMCH data and shall contain CRS only in the first symbol of the first time slot. The subframe(s) configured as MBSFN ABS depend upon the MBSFN ABS pattern used in the test.  N/A: Not Applicable | | | | | |

#### A.3.2.1.10 OCNG FDD pattern 10: outer resource blocks allocation in 10 MHz with user data in every subframe (without MBSFN)

Table A.3.2.1.10-1: OP.10 FDD: OCNG FDD Pattern 10

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 4, 9 | 1 - 3, 6 - 8 |
| 0 - 12 | 0 | 0 | 0 | 0 | Note 2 |
| 37 - 49 | 0 | 0 | 0 | 0 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter  applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.  N/A: Not Applicable | | | | | |

#### A.3.2.1.11 OCNG FDD pattern 11: outer resource blocks allocation in 20 MHz

Table A.3.2.1.11-1: OP.11 FDD: OCNG FDD Pattern 11

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data | PMCH Data |
| Subframe | | | |
| 0 | 5 | 4,9 | 1-3, 6-8 |
| 0 – 37 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 62 – 99 | 0 | 0 | 0 | N/A |
| 0-99 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH symbols shall not contain cell-specific Reference Signals. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameteris used to scale the power of PMCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.  Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS  N/A: Not Applicable | | | | | | |

#### A.3.2.1.12 OCNG FDD pattern 12: full bandwidth allocation in 20 MHz

Table A.3.2.1.12-1: OP.12 FDD: OCNG FDD Pattern 12

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data | PMCH Data |
| Subframe | | | |
| 0 | 5 | 4, 9 | 1 – 3, 6 – 8 |
| 0 – 99 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 0 – 99 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameteris used to scale the power of PMCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.  Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS  N/A: Not Applicable | | | | | | |

#### A.3.2.1.13 OCNG FDD pattern 13: outer resource blocks allocation in 20 MHz (without MBSFN)

Table A.3.2.1.13-1: OP.13 FDD: OCNG FDD Pattern 13

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 4,9 | 1-3, 6-8 |
| 0 – 37 | 0 | 0 | 0 | N/A | Note 2 |
| 62 – 99 | 0 | 0 | 0 | N/A |
| 0 – 99 | N/A | N/A | N/A | 0 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.  N/A: Not Applicable | | | | | |

#### A.3.2.1.14 OCNG FDD pattern 14: full bandwidth allocation in 20 MHz (without MBSFN)

Table A.3.2.1.14-1: OP.14 FDD: OCNG FDD Pattern 14

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 4, 9 | 1 – 3, 6 – 8 |
| 0 – 99 | 0 | 0 | 0 | 0 | Note 2 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.  N/A: Not Applicable | | | | | |

#### A.3.2.1.15 OCNG FDD pattern 15: outer resource blocks allocation in 5 MHz

Table A.3.2.1.15-1: OP.15 FDD: OCNG FDD Pattern 15

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data | PMCH Data |
| Subframe | | | |
| 0 | 5 | 4,9 | 1-3, 6-8 |
| 0 – 6 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 18 – 24 | 0 | 0 | 0 | N/A |
| 0-24 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH symbols shall not contain cell-specific Reference Signals. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameteris used to scale the power of PMCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.  Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS  N/A: Not Applicable | | | | | | |

#### A.3.2.1.16 OCNG FDD pattern 16: full bandwidth allocation in 5 MHz

Table A.3.2.1.16-1: OP.16 FDD: OCNG FDD Pattern 16

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data | PMCH Data |
| Subframe | | | |
| 0 | 5 | 4, 9 | 1 – 3, 6 – 8 |
| 0 – 24 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 0 – 24 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameteris used to scale the power of PMCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.  Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS  N/A: Not Applicable | | | | | | |

#### A.3.2.1.17 OCNG FDD pattern 17: outer resource blocks allocation in 20 MHz with user data in every subframe (without MBSFN)

Table A.3.2.1.17-1: OP.17 FDD: OCNG FDD Pattern 17

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 4, 9 | 1 - 3, 6 - 8 |
| 0 - 37 | 0 | 0 | 0 | 0 | Note 2 |
| 62 - 99 | 0 | 0 | 0 | 0 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter  applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.  N/A: Not Applicable. | | | | | |

#### A.3.2.1.18 OCNG FDD pattern 18: outer resource blocks allocation in 5 MHz (without MBSFN)

Table A.3.2.1.18-1: OP.18 FDD: OCNG FDD Pattern 18

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 4,9 | 1-3, 6-8 |
| 0 – 6 | 0 | 0 | 0 | N/A | Note 2 |
| 18 – 24 | 0 | 0 | 0 | N/A |
| 0 – 24 | N/A | N/A | N/A | 0 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.  N/A: Not Applicable | | | | | |

#### A.3.2.1.19 OCNG FDD pattern 19: full bandwidth allocation in 5 MHz (without MBSFN)

Table A.3.2.1.19-1: OP.19 FDD: OCNG FDD Pattern 19

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 4, 9 | 1 – 3, 6 – 8 |
| 0 – 24 | 0 | 0 | 0 | 0 | Note 2 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.  N/A: Not Applicable | | | | | |

#### A.3.2.1.20 OCNG FDD pattern 20: outer resource blocks allocation in 5 MHz with user data in every subframe (without MBSFN)

Table A.3.2.1.20-1: OP.20 FDD: OCNG FDD Pattern 20

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 4, 9 | 1 - 3, 6 - 8 |
| 0 - 6 | 0 | 0 | 0 | 0 | Note 2 |
| 18 - 24 | 0 | 0 | 0 | 0 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter  applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.  N/A: Not Applicable. | | | | | |

#### A.3.2.1.21 OCNG FDD pattern 21: Generic resource blocks allocation (without MBSFN)

Table A.3.2.1.21-1: OP.21 FDD: OCNG FDD Pattern 21

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| OCNG  Pattern  Name | | | Bandwidth  (MHz) | Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe Note 5 | | | |
| 0 | 5 | 4, 9 | 1 – 3, 6 – 8 |
| OP.21 FDD | | 10 | 0 – 49Note 1,2 | 0 | 0 | 0 | 0 | Note 3 |
| Note 1: The OCNG pattern is used only for a serving cell of the UE under test.  Note 2: The OCNG allocation applied to all downlink physical resource bloacks (PRBs) except the REs that are allocated for the PDSCH for the UE under test.  Note 3: OCNG PRBs are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 4: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 5: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes. | | | | | | | |

#### A.3.2.1.22 OCNG FDD pattern 22: Generic resource blocks allocation in 5MHz (without MBSFN)

Table A.3.2.1.22-1: OP.22 FDD: OCNG FDD Pattern 22

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| OCNG  Pattern  Name | | | Bandwidth  (MHz) | Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe | | | |
| 0 | 5 | 4, 9 | 1 – 3, 6 – 8 |
| OP.22 FDD | | 5 | 0 – 24Note 1,2 | 0 | 0 | 0 | 0 | Note 3 |
| Note 1: The OCNG pattern is used only for a serving cell of the UE under test.  Note 2: The OCNG allocation applied to all downlink physical resource bloacks (PRBs) except the REs that are allocated for the PDSCH for the UE under test.  Note 3: OCNG PRBs are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 4: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213. | | | | | | | |

### A.3.2.2 OCNG Patterns for TDD

The following OCNG patterns are used for modelling allocations to virtual UEs (which are not under test). The OCNG pattern for each sub frame specifies the allocations that shall be filled with OCNG, and furthermore, the relative power level of each such allocation.

In each test case the OCNG is expressed by parameters OCNG\_RA and OCNG\_RB which together with a relative power level () specifies the PDSCH EPRE-to-RS EPRE ratios in OFDM symbols without and with reference symbols, respectively. The relative power, which is used for modelling boosting per virtual UE allocation, is expressed by:



where  denotes the relative power level of the *i:th* virtual UE. The parameter settings of OCNG\_RA, OCNG\_RB, and the set of relative power levels are chosen such that when also taking allocations to the UE under test into account, as given by a PDSCH reference channel, a transmitted power spectral density that is constant on an OFDM symbol basis is targeted.

Moreover the OCNG pattern is accompanied by a PCFICH/PDCCH/PHICH reference channel which specifies the control region. The number of PDCCH OFDM symbols in the non-MBSFN subframes is the same as specified in the RMC used in the test. The number of PDCCH OFDM symbols in the MBSFN subframe is the maximal allowed according to TS 36.213 [16]. For any aggregation and PHICH allocation, the PDCCH and any unused PHICH groups are padded with resource element groups with a power level given by PDCCH\_RA/RB and PHICH\_RA/RB as specified in the test case such that a total power spectral density in the control region that is constant on an OFDM symbol basis is targeted.

For subframes configured as PRS subframes the PDSCH allocation defined in the OCNG pattern does not apply.

For subframes configured as ABS subframes the PDSCH and PMCH allocation defined in the OCNG pattern does not apply.

The system information is scheduled in the allocations reserved for the OCNG patterns, in the subframes not configured for MBSFN. For this purpose the number of the RB-s allocated with PDSCH defined in the OCNG pattern can be reduced as necessary.

#### A.3.2.2.1 OCNG TDD pattern 1: outer resource blocks allocation in 10 MHz

Table A.3.2.2.1-1: OP.1 TDD: OCNG TDD Pattern 1 for 5ms downlink-to-uplink switch-point periodicity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 3 , 4, 8, 9 and 6 (as normal subframe) Note 3 | 1 and 6 (as special subframe) Note 3 |
| 0 – 12 | 0 | 0 | 0 | Table A.3.2.2.1-2 | Note 2 |
| 37 – 49 | 0 | 0 | 0 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated The parameteris used to scale the power of PDSCH.  Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration defined in Table 4.2-2 in TS 36.211 [16].  Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 5: If SPDCCH is to be transmitted on a physical resource block(PRB), this takes priority over OCNG transmission | | | | | |

Table A.3.2.2.1-2: OP.1 TDD: OCNG TDD Pattern 1 for special subframe configuration with 5ms downlink-to-uplink switch-point periodicity

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | | | | | | | | | | | | | | |
| Special subframe configuration | | | | | | | | | | | | | | | | | |
| 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | |
| Control region OFDM symbols | | | | | | | | | | | | | | | | | |
| 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 0 – 12 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
|  | |  | |
| 37 – 49 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
|  | |  | |
| Note 1: Special subframe configurations are defined in Table 4.2-1 in TS 36.211 [16]. | | | | | | | | | | | | | | | | | | |

#### A.3.2.2.2 OCNG TDD pattern 2: full bandwidth allocation in 10 MHz

Table A.3.2.2.2-1: OP.2 TDD: OCNG TDD Pattern 2 for 5ms downlink-to-uplink switch-point periodicity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 3 , 4, 8, 9 and 6 (as normal subframe)Note 3 | 1 and 6 (as special subframe) Note 3 |
| 0 – 49 | 0 | 0 | 0 | 0 | Note 2 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameteris used to scale the power of PDSCH.  Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in TS 36.211 [16].  Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213. | | | | | |

#### A.3.2.2.3 OCNG TDD pattern 3: outer resource blocks allocation in 1.4 MHz

Table A.3.2.2.3-1: OP.3 TDD: OCNG TDD Pattern 3 for 5 ms downlink-to-uplink switch-point periodicity

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | | PDSCH Data |
| Subframe (Note 1) | | | | |
| 0 | 5 | | 3 , 4, 8, 9 and 6 (as normal subframe) Note 3 | 1 and 6 (as special subframe) Note 3 |
|  | | | | |
| 0 – 1 | 0 | 0 | 0 | | 0 | Note 2 |
| 4 – 5 | 0 | 0 | 0 | | 0 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.The parameteris used to scale the power of PDSCH.  Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration defined in Table 4.2-2 in TS 36.211 [16].  Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213. | | | | | | |

#### A.3.2.2.4 OCNG TDD pattern 4: full bandwidth allocation in 1.4 MHz

Table A.3.2.2.4-1: OP.4 TDD: OCNG TDD Pattern 4 for 5 ms downlink-to-uplink switch-point periodicity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 3 , 4, 8, 9 and 6 (as normal subframe) Note 3 | 1 and 6 (as special subframe) Note 3 |
| 0 – 5 | 0 | 0 | 0 | 0 | Note 2 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.The parameteris used to scale the power of PDSCH.  Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in TS 36.211 [16].  Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213. | | | | | |

#### A.3.2.2.5 OCNG TDD pattern 5: outer resource blocks allocation in 10 MHz for MBSFN ABS

Table A.3.2.2.5-1: OP.5 TDD: OCNG TDD Pattern 5 for 5ms downlink-to-uplink switch-point periodicity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 3, 4, 8, 9 and 6 (as normal subframe) Note 3 | 1 and 6 (as special subframe) Note 3 |
| 0 – 12 | 0 | 0 | 0 | Table A.3.2.2.5-2 | Note 2 |
| 37 – 49 | 0 | 0 | 0 |
| Note 1: PDSCH allocation does not apply to subframes configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated The parameteris used to scale the power of PDSCH.  Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration defined in Table 4.2-2 in TS 36.211 [16]. Any of the subframes 3, 4, 8 and 9 configured as MBSFN ABS in a test shall not contain any PMCH data and shall contain CRS only in the first symbol of the first time slot. The subframe(s) configured as MBSFN ABS depend upon the MBSFN ABS pattern used in the test.  Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213. | | | | | |

Table A.3.2.2.5-2: OP.5 TDD: OCNG TDD Pattern 5 for special subframe configuration with 5ms downlink-to-uplink switch-point periodicity

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | | | | | | | | | | | | | | |
| Special subframe configuration | | | | | | | | | | | | | | | | | |
| 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | |
| Control region OFDM symbols | | | | | | | | | | | | | | | | | |
| 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 0 – 12 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
|  | |  | |
| 37 – 49 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
|  | |  | |
| Note 1: Special subframe configurations are defined in Table 4.2-1 in TS 36.211 [16]. | | | | | | | | | | | | | | | | | | |

#### A.3.2.2.6 OCNG TDD pattern 6: full bandwidth allocation in 10 MHz for MBSFN ABS

Table A.3.2.2.6-1: OP.6 TDD: OCNG TDD Pattern 6 for 5ms downlink-to-uplink switch-point periodicity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 3 , 4, 8, 9 and 6 (as normal subframe)Note 3 | 1 and 6 (as special subframe) Note 3 |
| 0 – 49 | 0 | 0 | 0 | 0 | Note 2 |
| Note 1: PDSCH allocation does not apply to subframes configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameteris used to scale the power of PDSCH.  Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in TS 36.211 [16]. Any of the subframes 3, 4, 8 and 9 configured as MBSFN ABS in a test shall not contain any PMCH data and shall contain CRS only in the first symbol of the first time slot. The subframe(s) configured as MBSFN ABS depend upon the MBSFN ABS pattern used in the test.  Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213. | | | | | |

#### A.3.2.2.7 OCNG TDD pattern 7: outer resource blocks allocation in 20 MHz

Table A.3.2.2.7-1: OP.7 TDD: OCNG TDD Pattern 7 for 5ms downlink-to-uplink switch-point periodicity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 3, 4, 8, 9 and 6 (as normal subframe) Note 3 | 1 and 6 (as special subframe) Note 3 |
| 0 – 37 | 0 | 0 | 0 | Table A.3.2.2.7-2 | Note 2 |
| 62 – 99 | 0 | 0 | 0 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated The parameteris used to scale the power of PDSCH.  Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration defined in Table 4.2-2 in 3GPP TS 36.211 [16].  Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213. | | | | | |

Table A.3.2.2.7-2: OP.7 TDD: OCNG TDD Pattern 7 for special subframe configuration with 5ms downlink-to-uplink switch-point periodicity

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Allocation | CP length | Relative power level  [dB] | | | | | | | | | | | | | | | | | |
| Special subframe configuration | | | | | | | | | | | | | | | | | |
| 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | |
| Control region OFDM symbols | | | | | | | | | | | | | | | | | |
| 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 0 – 37 | N | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
|  | |  | |
| 62 – 99 | N | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
|  | |  | |
| Note 1: Special subframe configurations are defined in Table 4.2-1 in TS 36.211 [16]. | | | | | | | | | | | | | | | | | | | |

#### A.3.2.2.8 OCNG TDD pattern 8: full bandwidth allocation in 20 MHz

Table A.3.2.2.8-1: OP.8 TDD: OCNG TDD Pattern 8 for 5ms downlink-to-uplink switch-point periodicity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 3 , 4, 8, 9 and 6 (as normal subframe)Note 3 | 1 and 6 (as special subframe) Note 3 |
| 0 – 99 | 0 | 0 | 0 | 0 | Note 2 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameteris used to scale the power of PDSCH.  Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in 3GPP TS 36.211 [16].  Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213. | | | | | |

#### A.3.2.2.9 OCNG TDD pattern 9: outer resource blocks allocation in 5 MHz

Table A.3.2.2.9-1: OP.9 TDD: OCNG TDD Pattern 9 for 5ms downlink-to-uplink switch-point periodicity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 3, 4, 8, 9 and 6 (as normal subframe) Note 3 | 1 and 6 (as special subframe) Note 3 |
| 0 – 6 | 0 | 0 | 0 | Table A.3.2.2.9-2 | Note 2 |
| 18 – 24 | 0 | 0 | 0 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated The parameteris used to scale the power of PDSCH.  Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration defined in Table 4.2-2 in 3GPP TS 36.211 [16].  Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213. | | | | | |

Table A.3.2.2.9-2: OP.9 TDD: OCNG TDD Pattern 9 for special subframe configuration with 5ms downlink-to-uplink switch-point periodicity

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Allocation | CP length | Relative power level  [dB] | | | | | | | | | | | | | | | | | |
| Special subframe configuration | | | | | | | | | | | | | | | | | |
| 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | |
| Control region OFDM symbols | | | | | | | | | | | | | | | | | |
| 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 0 – 6 | N | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
|  | |  | |
| 18 – 24 | N | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
|  | |  | |
| Note 1: Special subframe configurations are defined in Table 4.2-1 in TS 36.211 [16]. | | | | | | | | | | | | | | | | | | | |

#### A.3.2.2.10 OCNG TDD pattern 10: full bandwidth allocation in 5 MHz

Table A.3.2.2.10-1: OP.10 TDD: OCNG TDD Pattern 10 for 5ms downlink-to-uplink switch-point periodicity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | | PDSCH Data |
| Subframe (Note 1) | | | |
| 0 | 5 | 3 , 4, 8, 9 and 6 (as normal subframe)Note 3 | 1 and 6 (as special subframe) Note 3 |
| 0 – 24 | 0 | 0 | 0 | 0 | Note 2 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.  Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameteris used to scale the power of PDSCH.  Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in 3GPP TS 36.211 [16].  Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213. | | | | | |

#### A.3.2.2.11 OCNG TDD pattern 11: Generic resource blocks allocation (without MBSFN)

Table A.3.2.2.11-1: OP.11 TDD: OCNG TDD Pattern 11

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| OCNG  Pattern  Name | | | Bandwidth  (MHz) | | Allocation | | Relative power level  [dB] | | | | | | | PDSCH Data | |
| Subframe Note 6 | | | | | | |
| 0 | 5 | | 3 , 4, 8, 9 and 6 (as normal subframe) Note 5 | | 1 and 6 (as special subframe) Note 5 | |
| OP.11 TDD | | | 10 | | 0 – 49Note 1,2 | 0 | | 0 | | 0 | | 0 | | Note 3 | |
| Note 1: The OCNG pattern is used only for a serving cell of the UE under test.  Note 2: The OCNG allocation applied to all downlink physical resource bloacks (PRBs) except the REs that are allocated for the PDSCH for the UE under test.  Note 3: OCNG PRBs are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PDSCH.  Note 4: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 5: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in TS 36.211 [16].  Note 6: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes. | | | | | | | | | | | | | | | |

### A.3.2.3 OCNG Patterns for Narrowband IoT

The following Narrowband OCNG patterns (NOCNG) are used for modelling allocations to UEs not under test in a Narrowband IoT cell. Depending on scenario, allocations may be for UEs of category NB1only, or for UEs of category NB1 as well as of other categories. The former is applicable to guard-band and stand-alone deployments of Narrowband IoT, whereas the latter is applicable to in-band deployment. In order to allow different power levels for the LTE cell and the Narrowband IoT cell, a distinction is made between OCNG and NOCNG where the latter is used for category NB1 UEs and the former is used for other UE categories.

OCNG in the LTE cell is expressed by parameters OCNG\_RA and OCNG\_RB which together with a relative power level () specifies the PDSCH-to-RS EPRE ratio in OFDM symbols with and without LTE cell-specific reference symbols, respectively. The relative power, which is used for modelling boosting per virtual LTE UE allocation, is expressed by:



where  denotes the relative power level of the *i:th* virtual LTE UE.

Moreover in each test case NOCNG is expressed by parameters NOCNG\_RA and NOCNG\_RB which together with a relative power level () specifies the <channel>-to-RS EPRE ratio in OFDM symbols with and without Narrowband reference symbols (NB-RS), respectively. The relative power, which is used for modelling boosting per virtual UE category NB1 allocation, is expressed by:



where  denotes the relative power level of the *k:th* virtual NB-IoT UE, and channel may be either of NPDCCH and NPDSCH.

The parameter settings of OCNG\_RA, OCNG\_RB, NOCNG\_RA, NOCNG\_RB and the set of relative power levels are chosen such that when also taking allocations to the UE category NB1 under test into account, as given by a NPDCCH and NPDSCH reference channels, a transmitted power spectral density that is constant on an OFDM symbol basis is targeted.

#### A.3.2.3.1 Narrowband IoT OCNG FDD pattern 1: In-band NB-IoT in 10 MHz EUTRAN cell

Table A.3.2.3.1-1: NOP.1 FDD: OCNG FDD Pattern 1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | PDSCH  Data | NPDCCH and NPDSCH  Data |
| Subframe | | |
| 0, 4 | 5, 9 | 1-3, 6-8 |
| *0* – ( *nCell[1]RB -1*)  (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[1]RB*  (Note 5) | 0 (Note 3) | 0 (Note 3) | N/A | N/A | Note 2 |
| N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[1]RB +1* ) – ( *nCell[…]RB -1*)  (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[…]RB*  (Note 5) | 0 (Note 3) | 0 (Note 3) | N/A | N/A | Note 2 |
| N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[...]RB +1* ) –  ( *nCell[N]RB -1*)  (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[N]RB*  (Note 5) | 0 (Note 3) | 0 (Note 3) | N/A | N/A | Note 2 |
| N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[N]RB+1* ) – 49  (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated QPSK modulated pseudo random data. The parameter is used to scale the power of PDSCH.  If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 2: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter is used to scale the power of NPDCCH and NPDSCH. If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 3: Value of is applicable to PRBs not used for transmission of NPSS, NSSS, and NPBCH in anchor cells.  Note 4: SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over OCNG and NOCNG.  Note 5: *nCell[k]RB* is the index of the RB used for allocation of the NB-IoT cell *k* with *k = {1, .., N}* with *N* the total number of the NB-IoT cells belonging to the same LTE donor cell as specified in the individual tests.  N/A: Not Applicable | | | | | |

#### A.3.2.3.2 Narrowband IoT OCNG FDD pattern 2: guard band NB-IoT in 10 MHz EUTRAN cell

Table A.3.2.3.2-1: NOP.2 FDD: OCNG FDD Pattern 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | PDSCH  Data | NPDCCH and NPDSCH  Data |
| Subframe | | |
| 0, 4 | 5, 9 | 1-3, 6-8 |
| 0-49 | 0 | 0 | 0 | Note 1 | N/A |
| 50 | 0 (Note 3) | 0 (Note 3) | 0 | N/A | Note 2 |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated QPSK modulated pseudo random data. The parameter is used to scale the power of PDSCH.  If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 2: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter is used to scale the power of NPDCCH and NPDSCH. If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 3: Value of is applicable to PRBs not used for transmission of NPSS, NSSS and NPBCH in anchor cell (= 50).  Note 4: SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over OCNG and NOCNG.  N/A: Not Applicable | | | | | |

#### A.3.2.3.3 Narrowband IoT OCNG FDD pattern 3: standalone NB-IoT

Table A.3.2.3.3-1: NOP.3 FDD: OCNG FDD Pattern 3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | NPDCCH and NPDSCH  Data |
| Subframe | | |
| 0, 4 | 5, 9 | 1-3, 6-8 |
| 0 | 0 (Note 2) | 0 (Note 2) | 0 | Note 1 |
| Note 1: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter is used to scale the power of NPDCCH and NPDSCH. If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 2: Value of is applicable to PRBs not used for transmission of NPSS, NSSS and NPBCH in anchor cell (= 0).  Note 3: SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over NOCNG. | | | | |

#### A.3.2.3.4 Narrowband IoT OCNG FDD pattern 4: In-band NB-IoT in 5 MHz EUTRAN cell

Table A.3.2.3.4-1: NOP.4 FDD: OCNG FDD Pattern 4

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | PDSCH  Data | NPDCCH and NPDSCH  Data |
| Subframe | | |
| 0, 4 | 5, 9 | 1-3, 6-8 |
| *0* – ( *nCell[1]RB -1*)  (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[1]RB*  (Note 5) | 0 (Note 3) | 0 (Note 3) | N/A | N/A | Note 2 |
| N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[1]RB +1* ) – ( *nCell[…]RB -1*)  (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[…]RB*  (Note 5) | 0 (Note 3) | 0 (Note 3) | N/A | N/A | Note 2 |
| N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[...]RB +1* ) –  ( *nCell[N]RB -1*)  (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[N]RB*  (Note 5) | 0 (Note 3) | 0 (Note 3) | N/A | N/A | Note 2 |
| N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[N]RB+1* ) – 24  (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated QPSK modulated pseudo random data. The parameter is used to scale the power of PDSCH.  If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 2: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter is used to scale the power of NPDCCH and NPDSCH. If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 3: Value of is applicable to PRBs not used for transmission of NPSS, NSSS, and NPBCH in anchor cells.  Note 4: SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over OCNG and NOCNG.  Note 5: *nCell[k]RB* is the index of the RB used for allocation of the NB-IoT cell *k* with *k = {1, .., N}* with *N* the total number of the NB-IoT cells belonging to the same LTE donor cell as specified in the individual tests.  N/A: Not Applicable | | | | | |

#### A.3.2.3.5 Narrowband IoT OCNG FDD pattern 5: guard band NB-IoT in 5 MHz EUTRAN cell

Table A.3.2.3.5-1: NOP.5 FDD: OCNG FDD Pattern 5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | PDSCH  Data | NPDCCH and NPDSCH  Data |
| Subframe | | |
| 0, 4 | 5, 9 | 1-3, 6-8 |
| 0 – 24 | 0 | 0 | 0 | Note 1 | N/A |
| 25 | 0 (Note 3) | 0 (Note 3) | 0 | N/A | Note 2 |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated QPSK modulated pseudo random data. The parameter is used to scale the power of PDSCH. If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 2: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter is used to scale the power of NPDCCH and NPDSCH. If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 3: Value of is applicable to PRBs not used for transmission of NPSS, NSSS and NPBCH in anchor cell (= 25).  Note 4: SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over OCNG and NOCNG.  N/A: Not Applicable | | | | | |

#### A.3.2.3.6 Narrowband IoT OCNG TDD pattern 1: In-band NB-IoT in 10 MHz EUTRAN cell

Table A.3.2.3.6-1: NOP.1 TDD: OCNG TDD Pattern 1 for uplink-downlink configurations 1 and 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | PDSCH  Data | NPDCCH and NPDSCH  Data |
| Subframe | | |
| 0, 5, 9 | 1, 6Note 7 | 3, 4, 8Note 4 |
| *0* – ( *nCell[1]RB -1*)  (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[1]RB*  (Note 5) | 0 (Note 3) | 0 | N/A | N/A | Note 2 |
| N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[1]RB +1* ) – ( *nCell[…]RB -1*)  (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[…]RB*  (Note 5) | 0 (Note 3) | 0 | N/A | N/A | Note 2 |
| N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[...]RB +1* ) –  ( *nCell[N]RB -1*)  (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[N]RB*  (Note 5) | 0 (Note 3) | 0 | N/A | N/A | Note 2 |
| N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[N]RB+1* ) – 49  (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated QPSK modulated pseudo random data. The parameter is used to scale the power of PDSCH.  If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 2: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter is used to scale the power of NPDCCH and NPDSCH. If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 3: Value of is applicable to PRBs not used for transmission of NPSS, NSSS, and NPBCH in anchor cells.  Note 4: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in TS 36.211 [16].  Note 5: *nCell[k]RB* is the index of the RB used for allocation of the NB-IoT cell *k* with *k = {1, .., N}* with *N* the total number of the NB-IoT cells belonging to the same E-UTRA donor cell as specified in the individual tests.  Note 6: SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over OCNG and NOCNG.  Note 7: Whether NPDSCH transmissions are carried out in DwPTS depends on the special subframe configuration in use.  N/A: Not Applicable | | | | | |

#### A.3.2.3.7 Narrowband IoT OCNG TDD pattern 2: guard band NB-IoT in 10 MHz EUTRAN cell

Table A.3.2.3.7-1: NOP.2 TDD: OCNG TDD Pattern 2 for uplink-downlink configurations 1 and 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | PDSCH  Data | NPDCCH and NPDSCH  Data |
| Subframe | | |
| 0, 5, 9 | 1, 6Note 6 | 3, 4, 8Note 4 |
| 0-49 | 0 | 0 | 0 | Note 1 | N/A |
| 50 | 0 (Note 3) | 0 | 0 | N/A | Note 2 |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated QPSK modulated pseudo random data. The parameter is used to scale the power of PDSCH.  If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 2: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter is used to scale the power of NPDCCH and NPDSCH. If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 3: Value of is applicable to PRBs not used for transmission of NPSS, NSSS and NPBCH in anchor cell (= 50).  Note 4: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in TS 36.211 [16].  Note 5: SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over OCNG and NOCNG.  Note 6: Whether NPDSCH transmissions are carried out in DwPTS depends on the special subframe configuration in use.  N/A: Not Applicable | | | | | |

#### A.3.2.3.8 Narrowband IoT OCNG TDD pattern 3: standalone NB-IoT

Table A.3.2.3.8-1: NOP.3 TDD: OCNG TDD Pattern 3 for uplink-downlink configurations 1 and 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Allocation | Relative power level  [dB] | | | NPDCCH and NPDSCH  Data |
| Subframe | | |
| 0, 5, 9 | 1, 6Note 5 | 3, 4, 8Note 3 |
| 0 | 0 (Note 2) | 0 | 0 | Note 1 |
| Note 1: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter is used to scale the power of NPDCCH and NPDSCH. If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.  Note 2: Value of is applicable to PRBs not used for transmission of NPSS, NSSS and NPBCH in anchor cell (= 0).  Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in TS 36.211 [16].  Note 4: SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over NOCNG.  Note 5: Whether NPDSCH transmissions are carried out in DwPTS depends on the special subframe configuration in use. | | | | |

### A.3.2.4 OCNG Patterns for V2X sidelink

The following V2X sidelink OCNG patterns (VOCNG) are used for modelling allocations to virtual V2X UEs (which are not under test). The OCNG pattern for each subframe specifies the allocations that shall be filled with OCNG, and furthermore, the relative power level of each such allocation.

In each test case VOCNG is expressed by parameters VOCNG\_RA and VOCNG\_RB which together with a relative power level () specifies the PSSCH EPRE-to-RS EPRE ratios in OFDM symbols without and with reference symbols, respectively. The relative power, which is used for modelling boosting per virtual V2X UE allocation, is expressed by:



where  denotes the relative power level of the *i:th* virtual V2X UE. The parameter settings of VOCNG\_RA, VOCNG\_RB, and the set of relative power levels are chosen such that when also taking allocations to the UE under test into account, as given by a PSSCH reference channel.

Moreover the VOCNG pattern is accompanied by a PSCCH reference channel which specifies the control region. The number of PSCCH OFDM symbols in all subframes is the same as specified in the RMC used in the test.

#### A.3.2.4.1 V2X sidelink OCNG TDD pattern 1: outer resource blocks allocation in 10 MHz

Table A.3.2.4.1-1: VOP.1 HD: OCNG TDD Pattern 1

|  |  |  |
| --- | --- | --- |
| Allocation | Relative power level  [dB] | PSCCH and PSSCH Data |
| Subframe Note 2 |
| 0 - 19 |
| 0 – 4 | 18 | Note 1 |
| 10–25 | 18 |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PSSCH per virtual UE; the data transmitted over the OCNG PSSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PSSCH.  Note 2: Value of is applicable to subframes not used for V2X sidelink transmissions. | | |

#### A.3.2.4.2 V2X sidelink OCNG TDD pattern 2: outer resource blocks allocation in 10 MHz

Table A.3.2.4.2-1: VOP.2 HD: OCNG TDD Pattern 2

|  |  |  |
| --- | --- | --- |
| Allocation | Relative power level  [dB] | PSCCH and PSSCH Data |
| Subframe Note 2 |
| 0 - 19 |
| 0 – 4 | 18 | Note 1 |
| 10-14 | 18 |
| 15 –19 | 8.1 |
| 20–25 | 18 |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PSSCH per virtual UE; the data transmitted over the OCNG PSSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter is used to scale the power of PSSCH.  Note 2: Value of is applicable to subframes not used for V2X sidelink transmissions. | | |

## A.3.3 Reference DRX Configurations

Table A.3.3-1: Reference DRX Configurations

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comments |
| Reference configuration | DRX\_S | DRX\_L | As defined in 4.8.2.1.5 in TS 36.508 |
| onDurationTimer | psf2 | psf6 |  |
| drx-InactivityTimer | psf100 | psf1920 |  |
| drx-RetransmissionTimer | psf16 | psf16 |  |
| longDRX-CycleStartOffset | sf40, 0 | sf1280, 0 |  |
| shortDRX | disabled | disabled |  |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

## A.3.4 ABS Transmission Configurations

### A.3.4.1 Non-MBSFN ABS Transmission Configurations

#### A.3.4.1.1 Non-MBSFN ABS Transmission, 1x2 antenna with PBCH

Table A.3.4.1.1-1: Transmission configuration with non-MBSFN ABS, 1x2 with PBCH

|  |  |  |  |
| --- | --- | --- | --- |
| Physical Channels and Signals | Parameters | EPRE, [dB] | |
| Non-ABS | ABS |
| PBCH | PBCH\_RA | 0 | 0 |
| PBCH\_RB | 0 | 0 |
| PSS | PSS\_RA | 0 | 0 |
| SSS | SSS\_RA | 0 | 0 |
| PCFICH | PCFICH\_RB | 0 | 0 Note 1 |
| PHICH | PHICH\_RA | 0 | -Inf |
| PHICH\_RB | 0 | -Inf |
| PDCCH | PDCCH\_RA | 0 | 0 Note 1 |
| PDCCH\_RB | 0 | 0 Note 1 |
| PDSCH | PDSCH\_RA | 0 | 0 Note 1 |
| PDSCH\_RB | 0 | 0 Note 1 |
| OCNG | OCNG\_RA | 0 | -Inf |
| OCNG\_RB | 0 | -Inf |
| NOTE 1: Only used for SIB1, otherwise EPRE is –Inf  NOTE 2: 1x2 antenna configuration is assumed | | | |

#### A.3.4.1.2 Non-MBSFN ABS Transmission, 2x2 antenna without PBCH

Table A.3.4.1.2-1: Transmission configuration #1 with non-MBSFN ABS, 2x2 without PBCH

|  |  |  |  |
| --- | --- | --- | --- |
| Physical Channels and Signals | Parameters | EPRE, [dB] | |
| Non-ABS | ABS |
| PBCH | PBCH\_RA | -3 | -Inf |
| PBCH\_RB | -3 | -Inf |
| PSS | PSS\_RA | -3 | -3 |
| SSS | SSS\_RA | -3 | -3 |
| PCFICH | PCFICH\_RB | 1 | -Inf |
| PHICH | PHICH\_RA | -3 | -Inf |
| PHICH\_RB | -3 | -Inf |
| PDCCH | PDCCH\_RA | 1 | -Inf |
| PDCCH\_RB | 1 | -Inf |
| PDSCH | PDSCH\_RA | -3 | -Inf |
| PDSCH\_RB | -3 | -Inf |
| OCNG | OCNG\_RA | -3 | -Inf |
| OCNG\_RB | -3 | -Inf |
| NOTE: 2x2 antenna configuration is assumed | | | |

Table A.3.4.1.2-2: Transmission configuration #2 with non-MBSFN ABS, 2x2 without PBCH

|  |  |  |  |
| --- | --- | --- | --- |
| Physical Channels and Signals | Parameters | EPRE, [dB] | |
| Non-ABS | ABS |
| PBCH | PBCH\_RA | -3 | -Inf |
| PBCH\_RB | -3 | -Inf |
| PSS | PSS\_RA | -3 | -3 |
| SSS | SSS\_RA | -3 | -3 |
| PCFICH | PCFICH\_RB | 1 | -Inf |
| PHICH | PHICH\_RA | -3 | -Inf |
| PHICH\_RB | -3 | -Inf |
| PDCCH | PDCCH\_RA | -3 | -Inf |
| PDCCH\_RB | -3 | -Inf |
| PDSCH | PDSCH\_RA | -3 | -Inf |
| PDSCH\_RB | -3 | -Inf |
| OCNG | OCNG\_RA | -3 | -Inf |
| OCNG\_RB | -3 | -Inf |
| NOTE: 2x2 antenna configuration is assumed | | | |

### A.3.4.2 MBSFN ABS Transmission Configurations

#### A.3.4.2.1 MBSFN ABS Transmission, 1x2 antenna

Table A.3.4.2.1-1: Transmission configuration with MBSFN ABS, 1x2

|  |  |  |  |
| --- | --- | --- | --- |
| Physical Channels and Signals | Parameters | EPRE, [dB] | |
| Non-ABS | ABS |
| PBCH | PBCH\_RA | 0 | N/A |
| PBCH\_RB | 0 | N/A |
| PSS | PSS\_RA | 0 | N/A |
| SSS | SSS\_RA | 0 | N/A |
| PCFICH | PCFICH\_RB | 0 | -Inf |
| PHICH | PHICH\_RA | 0 | -Inf |
| PHICH\_RB | 0 | -Inf |
| PDCCH | PDCCH\_RA | 0 | -Inf |
| PDCCH\_RB | 0 | -Inf |
| PDSCH | PDSCH\_RA | 0 | -Inf |
| PDSCH\_RB | 0 | -Inf |
| PMCH | PMCH\_RA | 0 | -Inf |
| PMCH\_RB | 0 | -Inf |
| OCNG | OCNG\_RA | 0 | -Inf |
| OCNG\_RB | 0 | -Inf |
| NOTE: 1x2 antenna configuration is assumed | | | |

#### A.3.4.2.2 MBSFN ABS Transmission, 2x2 antenna

Table A.3.4.2.2-1: Transmission configuration #1 with MBSFN ABS, 2x2

|  |  |  |  |
| --- | --- | --- | --- |
| Physical Channels and Signals | Parameters | EPRE, [dB] | |
| Non-ABS | ABS |
| PBCH | PBCH\_RA | -3 | N/A |
| PBCH\_RB | -3 | N/A |
| PSS | PSS\_RA | -3 | N/A |
| SSS | SSS\_RA | -3 | N/A |
| PCFICH | PCFICH\_RB | 1 | -Inf |
| PHICH | PHICH\_RA | -3 | -Inf |
| PHICH\_RB | -3 | -Inf |
| PDCCH | PDCCH\_RA | 1 | -Inf |
| PDCCH\_RB | 1 | -Inf |
| PDSCH | PDSCH\_RA | -3 | -Inf |
| PDSCH\_RB | -3 | -Inf |
| PMCH | PMCH\_RA | -3 | -Inf |
| PMCH\_RB | -3 | -Inf |
| OCNG | OCNG\_RA | -3 | -Inf |
| OCNG\_RB | -3 | -Inf |
| NOTE: 2x2 antenna configuration is assumed | | | |

Table A.3.4.2.2-2: Transmission configuration # 2 with MBSFN ABS, 2x2

|  |  |  |  |
| --- | --- | --- | --- |
| Physical Channels and Signals | Parameters | EPRE, [dB] | |
| Non-ABS | ABS |
| PBCH | PBCH\_RA | -3 | N/A |
| PBCH\_RB | -3 | N/A |
| PSS | PSS\_RA | -3 | N/A |
| SSS | SSS\_RA | -3 | N/A |
| PCFICH | PCFICH\_RB | 1 | -Inf |
| PHICH | PHICH\_RA | -3 | -Inf |
| PHICH\_RB | -3 | -Inf |
| PDCCH | PDCCH\_RA | -3 | -Inf |
| PDCCH\_RB | -3 | -Inf |
| PDSCH | PDSCH\_RA | -3 | -Inf |
| PDSCH\_RB | -3 | -Inf |
| PMCH | PMCH\_RA | -3 | -Inf |
| PMCH\_RB | -3 | -Inf |
| OCNG | OCNG\_RA | -3 | -Inf |
| OCNG\_RB | -3 | -Inf |
| NOTE: 2x2 antenna configuration is assumed | | | |

## A.3.5 Impact of Reference Sensitivity Degradation with Carrier Aggregation on Test Cases

### A.3.5.1 Impact of Reference Sensitivity Degradation due to Insertion Loss

For a UE supporting inter-band carrier aggregation configuration with uplink in one E-UTRA band, if there is a relaxation of receiver sensitivity ΔRIB,c>0 dB as defined in TS 36.101 [5], 7.3.1-1A, there is no adjustment of test parameters in the tests specified in TS 36.133 when ΔRIB,c ≤ 1 dB.

## A.3.6 Carrier Aggregation Test Cases with Different Channel Bandwidth Combinations

### A.3.6.1 Introduction

In Annex A carrier aggregation test cases may be defined with different channel bandwidth combinations to verify the same RRM requirement.

If multiple carrier aggregation test cases with different channel bandwidth combinations are defined to verify the same RRM requirement that is channel bandwidth independent, then the UE needs to be tested only with one bandwidth combination out of the bandwidth combination sets supported by that UE.

## A.3.7 Test Cases with Different Channel Bandwidths

### A.3.7.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for single carrier operation.

### A.3.7.2 Principle of testing

Test cases defined for 5MHz channel bandwidth that reference this clause are applicable to UEs that support only bands within band group FDD\_N.

## A.3.8 Antenna Configuration

Unless otherwise specified, E-UTRA FDD or E-UTRA TDD cells in all RRM Test cases in AWGN propagation condition are configured with Antenna Configuration 1x2.

### A.3.8.1 Antenna connection for 4 Rx capable UEs

#### A.3.8.1.1 Introduction

All tests in sections A.4 to A.9 are specified for UEs supporting either category 0 (1RX) or 2RX. In this section, the antenna connection method for applying 2RX tests to UEs supporting 4RX antenna ports is specified. No tests are currently specified in section A.4-A.9 which are applicable only to 4RX antenna ports, so 4RX capable UEs are always tested by reusing tests which were originally specified for 2RX UEs.

#### A.3.8.1.2 Principle of testing

##### A.3.8.1.2.1 Single carrier tests

For 4RX capable UEs supporting at least one 2RX band, all single carrier tests specified in section A.4 to A.8 shall be tested on any band where 2RX is supported with the antenna connection specified in A.8.3.1.2.3. For single carrier tests specified in section A.9, all tests shall be tested with the antenna connection specified in A.3.8.1.2.3 for bands where 2RX is supported, and the antenna connection specified in A.3.8.1.2.4 for bands where 4RX is supported.

For 4RX capable UEs which do not support any 2RX band, all tests specified in sections A.4 to A.9 shall be tested using the antenna connection specified in section A.3.8.1.2.4. For radio link monitoring tests, the SNR levels are modified according to table A.3.8.1.2.1-1 and table A.3.8.1.2.1-2.

Table A.3.8.1.2.1-1 Modified parameters for RLM out of sync testing with 4 RX antenna connection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test case | SNR during T3 (dB) | | | |
| Test 1 | Test 2 | Test 3 | Test 4 |
| A.7.3.1 | -17 | -17 | -15 | -15.7 |
| A.7.3.3 | -16.6 | -16.7 | -14.8 | -15.4 |
| A.7.3.5 | -15.7 | -17 | N/A | N/A |
| A.7.3.7 | -15.4 | -16.6 | N/A | N/A |
| A.7.3.9 (cell 1) | Note 1 | N/A | N/A | N/A |
| A.7.3.10 (cell 1) | Note 1 | N/A | N/A | N/A |
| A.7.3.13 (cell 1) | Note 1 | N/A | N/A | N/A |
| A.7.3.14 (cell 1) | Note 1 | N/A | N/A | N/A |
| A.7.3.17 (cell 1) | Note 1 | N/A | N/A | N/A |
| A.7.3.18 (cell 1) | Note 1 | N/A | N/A | N/A |
| A.7.3.23 | -15.7 | N/A | N/A | N/A |
| Note 1: For 4Rx capable UEs without any 2Rx supported RF bands,this test can be skipped. | | | | |

Table A.3.8.1.2.1-2 Modified parameters for RLM in sync single carrier testing with 4 RX antenna connection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test case | SNR during T3 (dB) | | SNR during T4 (dB) | |
| Test 1 | Test 2 | Test 1 | Test 2 |
| A.7.3.2 | -14 | -15.7 | -9.9 | -10.8 |
| A.7.3.4 | -14.8 | -15.4 | -9.9 | -10.8 |
| A.7.3.6 | -17 | N/A | -12.2 | N/A |
| A.7.3.8 | -16.6 | N/A | -12.6 | N/A |
| A.7.3.11 (cell 1) | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.12 (cell 1)** | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.15 (cell 1)** | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.16 (cell 1)** | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.19 (cell 1)** | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.20 (cell 1)** | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.21(cell 1)** | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.22 (cell 1)** | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.24** | -15.7 | N/A | -10.8 | N/A |
| **A.7.3.25** | -15.7 | N/A | -10.8 | N/A |
| Note 1: For 4Rx capable UEs without any 2Rx supported RF bands,this test can be skipped. | | | | |

##### A.3.8.1.2.2 Carrier aggregation and Dual connectivity tests

All carrier aggregation and dual connectivity tests are performed using the antenna connection in section A.3.8.1.2.3 for the PCell antenna connection if the PCell is on a band where 2RX is supported or the antenna connection in A.3.8.1.2.4 for the PCell antenna connection if the PCell is on a band where 4RX is supported.

All carrier aggregation and dual connectivity tests are performed using the antenna connection in section A.3.8.1.2.3 for the SCell or PSCell antenna connection if an SCell or PSCell is on band where 2RX is supported or the testing procedure in A.3.8.1.2.4 for the SCell or PSCell antenna connection if an SCell or PSCell is on a band where 4RX is supported.

For dual connectivity radio link monitoring tests with the PSCell on a band where 4RX is supported, the PSCell SNR levels are modified according to table A.3.8.1.2.2 -1 and table A.3.8.1.2.2 -2.

Tabke A.3.8.1.2.1-1 Modified parameters for dual connectivity RLM out of sync testing with 4 RX antenna connection

|  |  |
| --- | --- |
| Test case | SNR during T3 (dB) |
| A.7.3.38 (cell 2) | -15.7 (5MHz)  -15.7 (10MHz)  -16.3 (20 MHz) |
| A.7.3.39 (cell 2) | -15.7 (5MHz)  -15.7 (10MHz)  -16.3 (20 MHz) |
| A.7.3.40 (cell 2) | -15.4 (5MHz)  -15.4 (10MHz)  -16.1 (20MHz) |

Table A.3.8.1.2.1-1 Modified parameters for RLM out of sync testing with 4 RX antenna connection

|  |  |  |
| --- | --- | --- |
| Test case | SNR during T3 (dB) | SNR during T4 (dB) |
| A.7.3.41 (cell 2) | -15.7 (5 Mhz)  -17.0 (10 Mhz)  -17.0 (20 Mhz) | -10.8 (5MHz)  -12.2 (10MHz)  -12.2 (20 MHz) |
| A.7.3.42 (cell 2) | -15.7 (5 Mhz)  -17.0 (10 Mhz)  -17.0 (20 Mhz) | -10.8 (5MHz)  -12.2 (10MHz)  -12.2 (20 MHz) |
| A.7.3.43 (cell 2) | -16.6 (5MHz)  -16.6 (10 MHz)  -16.6 (20 MHz) | -12.6 (5MHz)  -12.6 (10 MHz)  -12.6 (20 MHz) |

##### A.3.8.1.2.3 Antenna connection for bands where 2RX is supported

For bands where 2RX is supported, it is left to the UE declaration and AP configuration to decide which 2 of the 4 Rx ports are connected with data source from system simulator. The remaning 2 Rx ports shall be connected with zero input**.** No test parameters or requirements are modified.

##### A.3.8.1.2.4 Antenna connection for bands where 4RX is supported

For bands where 4RX is supporetd, all 4 Rx are connected with data source from system simulator**.** The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring theresholds described in sections A.3.8.1.2.1 and A.3.8.1.2.2, no test parameters or requirements are modified.

### A.3.8.2 Antenna connection for 8 Rx capable UEs

#### A.3.8.2.1 Introduction

In this clause, the antenna connection method for applying 2RX tests or 4RX tests to UEs supporting 8RX antenna ports is specified. No tests are currently specified in clause A.4-A.9 which are applicable only to 8RX antenna ports, so 8RX capable UEs are always tested by reusing tests which were originally specified for 2RX UEs or 4Rx UEs.

#### A.3.8.2.2 Principle of testing

##### A.3.8.2.2.1 Single carrier tests

For 8RX capable UEs supporting at least one 2RX band, all single carrier tests specified in clause A.4 to A.8 shall be tested on any band where 2RX is supported with the antenna connection specified in A.8.3.2.2.3. For single carrier tests specified in clause A.9, all tests shall be tested with the antenna connection specified in A.3.8.2.2.3 for bands where 2RX is supported, and the antenna connection specified in A.3.8.2.2.5 for bands where 8RX is supported.

For 8RX capable UEs supporting at least one 4RX band but without supporting any 2RX band, all single carrier tests specified in clause A.4 to A.8 shall be tested on any band where 4RX is supported with the antenna connection specified in A.3.8.2.2.4. For single carrier tests specified in clause A.9, all tests shall be tested with the antenna connection specified in A.3.8.2.2.4 for bands where 4RX is supported, and the antenna connection specified in A.3.8.2.2.8 for bands where 8RX is supported. For radio link monitoring tests, the SNR levels are modified according to table A.3.8.1.2.1-1 and table A.3.8.1.2.1-2.

For 8RX capable UEs which do not support any 2RX or 4RX band, all tests specified in clauses A.4 to A.9 shall be tested using the antenna connection specified in clause A.3.8.1.2.5. For radio link monitoring tests, the SNR levels are modified according to table A.3.8.1.2.1-1 and table A.3.8.1.2.1-2.

##### A.3.8.2.2.2 Carrier aggregation and Dual connectivity tests

All carrier aggregation and dual connectivity tests are performed using the antenna connection in clause A.3.8.2.2.3 for the PCell antenna connection if the PCell is on a band where 2RX is supported or the antenna connection in A.3.8.2.2.4 for the PCell antenna connection if the PCell is on a band where 4RX is supported but without supporting any 2RX band or the antenna connection in A.3.8.2.2.5 for the PCell antenna connection if the PCell is on a band where 8RX is supported.

All carrier aggregation and dual connectivity tests are performed using the antenna connection in clause A.3.8.2.2.3 for the SCell or PSCell antenna connection if an SCell or PSCell is on band where 2RX is supported or the testing procedure in A.3.8.2.2.4 for the SCell or PSCell antenna connection if an SCell or PSCell is on a band where 4RX is supported but without supporting any 2RX band or the testing procedure in A.3.8.2.2.5 for the SCell or PSCell antenna connection if an SCell or PSCell is on a band where 8RX is supported.

For dual connectivity radio link monitoring tests with the PSCell on a band where 8RX is supported, the PSCell SNR levels are modified according to table A.3.8.1.2.2 -1 and table A.3.8.1.2.2 -2.

##### A.3.8.2.2.3 Antenna connection for bands where 2RX is supported

For bands where 2RX is supported, it is left to the UE declaration and AP configuration to decide which 2 of the 8 Rx ports are connected with data source from system simulator. The remaning 6 Rx ports shall be connected with zero input**.** No test parameters or requirements are modified.

##### A.3.8.2.2.4 Antenna connection for bands where 4RX is supported

For bands where 4RX is supporetd,it is left to the UE declaration and AP configuration to decide which 4 of the 8 Rx ports are connected with data source from system simulator. The remaning 4 Rx ports shall be connected with zero input**.** Except for the modifications to radio link monitoring theresholds described in clauses A.3.8.1.2.1 and A.3.8.1.2.2, no test parameters or requirements are modified.

##### A.3.8.2.2.5 Antenna connection for bands where 8RX is supported

For bands where 8RX is supporetd, all 8 Rx are connected with data source from system simulator**.** The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring theresholds described in clauses A.3.8.1.2.1 and A.3.8.1.2.2, no test parameters or requirements are modified.

## A.3.9 Carrier Aggregation Test Cases with Different Duplex Modes

### A.3.9.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for carrier aggregation.

### A.3.9.2 Principle of testing

In Annex A carrier aggregation test cases may be defined for different duplex modes or combination of duplex modes (E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD) to verify the same RRM requirement.

If multiple carrier aggregation test cases are defined for different duplex modes (E-UTRA FDD or E-UTRA TDD) or for combination of duplex modes (E-UTRA TDD-FDD) to verify the same RRM requirement which is independent of the duplex mode and is identical for different duplex modes or combination of duplex modes, then from UE the performance point of view the test coverage can be considered fulfilled by executing only the corresponding test case(s) with one of the duplex modes supported by the UE.

## A.3.10 Carrier Aggregation Test Cases with Different CA Configurations

### A.3.10.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for carrier aggregation.

### A.3.10.2 Principle of testing

In Annex A carrier aggregation test cases may be defined for two CCs as well as for more than two CCs to verify the same RRM requirement.

If multiple carrier aggregation test cases are defined for two CCs as well as for more than two CCs to verify the same RRM requirement, then from the UE performance point of view the test coverage can be considered fulfilled by executing only the test cases with the maximum number of CCs supported by the UE.

*Editor’s note:* whether it is sufficient to test for any one of the band combinations supported by the UE is FFS*.*

## A.3.11 Test Cases for Synchronous and Asynchronous Dual Connectivity

### A.3.11.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for dual connectivity (DC) operation in synchronous and asynchronous scenarios.

### A.3.11.2 Principle of Testing

In Annex A test cases may be defined in both synchronous DC and asynchronous DC scenarios to verify the same RRM requirement.

If test cases are defined in both synchronous and asynchronous DC scenarios to verify the same RRM requirement then the UE capable of both synchronous and asynchronous DC operations needs to be tested with one of the tests in either synchronous or asynchronous DC scenarios.

## A.3.12 Proximity-based Services

### A.3.12.1 Introduction

This clause also defines the principle and the reference configurations that are applicable to test cases verifying RRM core requirements for ProSe Direct Discovery and ProSe Direct Communication.

### A.3.12.2 Reference DRX configurations for ProSe tests

Table A.3.12.2-1: Reference DRX Configurations

|  |  |
| --- | --- |
| Parameter | Value |
| Reference configuration | DRX\_P1 |
| onDurationTimer | psf1 |
| drx-InactivityTimer | psf1 |
| drx-RetransmissionTimer | psf1 |
| longDRX-CycleStartOffset | sf320, 0 |
| shortDRX | Disabled |
| Note: For further information see clause 6.3.2 in TS 36.331. | |

### A.3.12.3 Test Cases with Different Channel Bandwidths

#### A.3.12.3.1 Introduction

This clause defines a principle which is applicable to test cases verifying ProSe RRM requirements with different channel bandwidths.

#### A.3.12.3.2 Principle of testing

Some ProSe test cases are defined for different channel bandwidths to verify the same RRM requirement.

If test cases with different channel bandwidth are defined to verify the same RRM requirement then the UE is required to pass the test cases only with one of the channel bandiwdths.

### A.3.12.4 Reference resource pool configurations for ProSe Direct Discovery

Table A.3.12.4-1: ProSe Direct Discovery configuration for E-UTRA FDD (Configuration #1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Information Element | | | | Value |
| *discRxPool* | *cp-Len* |  |  | Normal |
|  | *discPeriod* |  |  | rf32 |
|  | *numRetx* |  |  | 0 |
|  | *numRepetition* |  |  | 1 |
|  | *tf-ResourceConfig* | *prb-Num* |  | 12 |
|  |  | *prb-Start* |  | 0 |
|  |  | *prb-End* |  | 23 |
|  |  | *offsetIndicator* |  | 160 |
|  |  | *subframeBitmap* |  | 11000000  00000000  00000000  00000000  00000000 |
|  | *txParameters* |  |  | not present |
|  | *rxParameters* |  |  | not present |
| *discTxPoolCommon/ discTxPoolDedicated* | *cp-Len* |  |  | Normal |
|  | *discPeriod* |  |  | rf32 |
|  | *numRetx* |  |  | 0 |
|  | *numRepetition* |  |  | 1 |
|  | *tf-ResourceConfig* | *prb-Num* |  | 2 |
|  |  | *prb-Start* |  | 3 |
|  |  | *prb-End* |  | 5 |
|  |  | *offsetIndicator* |  | 160 |
|  |  | *subframeBitmap* |  | 10000000  00000000  00000000  00000000  00000000 |
|  | *txParameters* | *txParametersGeneral* | *alpha* | al0 |
|  |  |  | *p0* | 31 |
|  |  | *ue-SelectedResourceConfig* | *poolSelection* | random |
|  |  |  | *txProbability* | p100 |
|  | *rxParameters* |  |  | not present |
| *discTxPowerInfo* | *discMaxTxPower* |  |  | 23 |
| *SL-SyncConfig* | *syncCP-Len* |  |  | Normal |
|  | *syncOffsetIndicator* |  |  | 35 (155 mod 40) |
|  | *slssid* |  |  | 30 |
|  | *txParameters* | *txParametersGeneral* | *alpha* | al0 |
|  |  |  | *p0* | 31 |
|  |  | *syncTxThreshIC* |  | 0 (-infinity) |
|  | *rxParamsNCell* |  |  | not present |
| *discInterFreqList* |  |  |  | not present |

Table A.3.12.4-2: ProSe Direct Discovery configuration for E-UTRA FDD (Configuration #2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Information Element | | | | Value |
| *discRxPool* | *cp-Len* |  |  | Normal |
|  | *discPeriod* |  |  | rf32 |
|  | *numRetx* |  |  | 0 |
|  | *numRepetition* |  |  | 1 |
|  | *tf-ResourceConfig* | *prb-Num* |  | 12 |
|  |  | *prb-Start* |  | 0 |
|  |  | *prb-End* |  | 23 |
|  |  | *offsetIndicator* |  | 160 |
|  |  | *subframeBitmap* |  | 11000000  00000000  00000000  00000000  00000000 |
|  | *txParameters* |  |  | not present |
|  | *rxParameters* | *tdd-Config* |  | not present |
|  |  | *syncConfigIndex* |  | 0 |
| *discTxPoolCommon/ discTxPoolDedicated* |  |  |  | not present |
| *discTxPowerInfo* | *discMaxTxPower* |  |  | 23 |
| *SL-SyncConfig* | *syncCP-Len* |  |  | Normal |
|  | *syncOffsetIndicator* |  |  | 20 (140 mod 40) |
|  | *slssid* |  |  | 30 |
|  | *txParameters* |  |  | not present |
|  | *rxParamsNCell* | *physCellId* |  | 1 |
|  |  | *discSyncWindow* |  | w1 |
| *discInterFreqLis* |  |  |  | not present |

Table A.3.12.4-3: ProSe Direct Discovery configuration for E-UTRA TDD Config 0 (Configuration #3)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Information Element | | | | Value |
| *discRxPool* | *cp-Len* |  |  | Normal |
|  | *discPeriod* |  |  | rf32 |
|  | *numRetx* |  |  | 0 |
|  | *numRepetition* |  |  | 1 |
|  | *tf-ResourceConfig* | *prb-Num* |  | 12 |
|  |  | *prb-Start* |  | 0 |
|  |  | *prb-End* |  | 23 |
|  |  | *offsetIndicator* |  | 163 |
|  |  | *subframeBitmap* |  | 11000000  00000000  00000000  00000000  00000000  00 |
|  | *txParameters* |  |  | not present |
|  | *rxParameters* |  |  | not present |
| *discTxPoolCommon/*  *discTxPoolDedicated* | *cp-Len* |  |  | Normal |
|  | *discPeriod* |  |  | rf32 |
|  | *numRetx* |  |  | 0 |
|  | *numRepetition* |  |  | 1 |
|  | *tf-ResourceConfig* | *prb-Num* |  | 2 |
|  |  | *prb-Start* |  | 3 |
|  |  | *prb-End* |  | 5 |
|  |  | *offsetIndicator* |  | 163 |
|  |  | *subframeBitmap* |  | 10000000  00000000  00000000  00000000  00000000  00 |
|  | *txParameters* | *txParametersGeneral* | *alpha* | al0 |
|  |  |  | *p0* | 31 |
|  |  | *ue-SelectedResourceConfig* | *poolSelection* | random |
|  |  |  | *txProbability* | p100 |
|  | *rxParameters* |  |  | not present |
| *discTxPowerInfo* | *discMaxTxPower* |  |  | 23 |
| *SL-SyncConfig* | *syncCP-Len* |  |  | Normal |
|  | *syncOffsetIndicator* |  |  | 38 (158 mod 40) |
|  | *slssid* |  |  | 30 |
|  | *txParameters* | *txParametersGeneral* | *alpha* | al0 |
|  |  |  | *p0* | 31 |
|  |  | *syncTxThreshIC* |  | 0 (-infinity) |
|  | *rxParamsNCell* |  |  | not present |
| *discInterFreqList* |  |  |  | not present |

Table A.3.12.4-4: ProSe Direct Discovery configuration for E-UTRA FDD for PS discovery (Configuration #4)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Information Element | | | | Value |
| *discConfig* |  |  |  | not present |
| *discInterFreqList* |  |  |  | not present |
| *discConfig-v1310* |  |  |  | not present |
| *discConfigPS* | *discRxPoolPS* | *cp-Len* |  | Normal |
|  |  | *discPeriod-v1310* |  | rf4 |
|  |  | *numRetx* |  | 0 |
|  |  | *numRepetition* |  | 1 |
|  |  | *tf-ResourceConfig* | *prb-Num* | 12 |
|  |  |  | *prb-Start* | 0 |
|  |  |  | *prb-End* | 23 |
|  |  |  | *offsetIndicator* | 20 |
|  |  |  | *subframeBitmap* | 11000000  00000000  00000000  00000000  00000000 |
|  |  | *txParameters* |  | not present |
|  |  | *rxParameters* | *tdd-Config* | not present |
|  |  |  | *syncConfigIndex* | 0 |
|  | *discTxPoolPS-Common/* *discTxPoolPS-Dedicated* |  |  | not present |
| *discConfigRelay* | *relayUE-Config* | *threshHigh* |  | not present |
|  |  | *threshLow* |  | not present |
|  |  | *hystMax* |  | not present |
|  |  | *hystMin* |  | not present |
|  | *remoteUE-Config* | *threshHigh* |  | 0  (-130dBm) |
|  |  | *hystMax* |  | dB0 |
|  |  | *reselectionInfoIC* | *q-RxLevMin* | (-94dBm) |
|  |  |  | *filterCoefficient* | fc0 |
|  |  |  | *minHyst* | dB3 |

Table A.3.12.4-5: ProSe Direct Discovery configuration for E-UTRA FDD for inter-frequency discovery (Configuration #5)

|  |  |  |  |
| --- | --- | --- | --- |
| Information Element | | | Value |
| *discConfig* |  |  | not present |
| *discInterFreqList* | *carrierFreq* |  | Note 1 |
|  | *plmn-IdentityList* |  | not present |
| *discConfig-v1310* |  |  |  |
| *discInterFreqList-v1310* |  |  |  |
| *discResourcesNonPS* | *discRxResourcesInterFreq* | *cp-Len* | Normal |
|  |  | *discPeriod* | rf32 |
|  |  | *numRetx* | 0 |
|  |  | *numRepetition* | 1 |
|  |  | *tf-ResourceConfig* |  |
|  |  | *prb-Num* | 12 |
|  |  | *prb-Start* | 0 |
|  |  | *prb-End* | 23 |
|  |  | *offsetIndicator* | 160 |
|  |  | *subframeBitmap* | 11000000  00000000  00000000  00000000  00000000 |
|  |  | *txParameters* | not present |
|  |  | *rxParameters* | not present |
|  |  | *rxParamsAddNeighFreq* |  |
|  |  | *physCellId* | Note 1 |
|  | *discTxResourcesInterFreq* | *discTxPoolCommon* |  |
|  |  | *cp-Len* | Normal |
|  |  | *discPeriod* | rf32 |
|  |  | *numRetx* | 0 |
|  |  | *numRepetition* | 1 |
|  |  | *tf-ResourceConfig* |  |
|  |  | *prb-Num* | 2 |
|  |  | *prb-Start* | 3 |
|  |  | *prb-End* | 5 |
|  |  | *offsetIndicator* | 160 |
|  |  | *subframeBitmap* | 10000000  00000000  00000000  00000000  00000000 |
|  |  | *txParameters* |  |
|  |  | *txParametersGeneral* |  |
|  |  | *alpha* | al0 |
|  |  | *p0* | 31 |
|  |  | *ue-SelectedResourceConfig* |  |
|  |  | *poolSelection* |  |
|  |  | *txProbability* | p100 |
|  |  | *rxParameters* | not present |
|  |  | *rxParamsAddNeighFreq* | not present |
|  |  | *txParamsAddNeighFreq* |  |
|  |  | *physCellId* | Note 1 |
|  |  | *p-Max* | 23 |
|  |  | *tdd-Config* | not present |
|  |  | *tdd-Config-v1130* | not present |
|  |  | *freqInfo* |  |
|  |  | *ul-CarrierFreq* | Note 1 |
|  |  | *ul-Bandwidth* | n25 |
|  |  | *additionalSpectrumEmission* | NS\_01 |
|  |  | *referenceSignalPower* | Note 2 |
|  |  | *syncConfigIndex* | not present |
| *discResourcesPS* |  |  | not present |
| *discConfigOther* | *txPowerInfo* | *discMaxTxPower* | 23 |
|  | *refCarrierCommon* |  | not present |
|  | *discSyncConfig* |  | not present |
|  | *discCellSelectionInfo* | *q-RxLevMin* | -70  (-140dBm) |
|  |  | *q-RxLevMinOffset* | not present |
|  |  | *q-Hyst* | dB0 |
|  |  | *q-RxLevMinReselection* | -70  (-140dBm) |
|  |  | *t-ReselectionEUTRA* | 0 |
| *gapRequestsAllowedCommon* |  |  | True |
| *discConfigRelay* |  |  | not present |
| *discConfigPS* |  |  | not present |
| NOTE 1: As specified in the test.  NOTE 2: As configured by the test system. | | | |

### A.3.12.5 Reference resource pool configurations for ProSe Direct Communication

Table A.3.12.5-1: ProSe Direct Communication configuration for E-UTRA FDD (Configuration #1)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Information Element | | | | Value  (5MHz) | Value  (10MHz) | |
| *commRxPool* | *sc-CP-Len* |  |  | Normal | | |
|  | *sc-Period* |  |  | sf40 | | |
|  | *sc-TF-ResourceConfig* | *prb-Num* |  | 12 | 25 | |
|  |  | *prb-Start* |  | 0 | 0 | |
|  |  | *prb-End* |  | 23 | 49 | |
|  |  | *offsetIndicator* |  | 0 | | |
|  |  | *subframeBitmap* |  | 00011000  00000000  00000000  00000000  00000000 | | |
|  | *data-CP-Len* |  |  | Normal | | |
|  | *dataHoppingConfig* | *hoppingParameter* |  | 0 | | |
|  |  | *numSubbands* |  | ns1 | | |
|  |  | *rb-Offset* |  | 0 | | |
|  | *ue-SelectedResourceConfig* | *data-TF-ResourceConfig* | *prb-Num* | 12 | | 25 |
|  |  |  | *prb-Start* | 0 | | 0 |
|  |  |  | *prb-End* | 23 | | 49 |
|  |  |  | *offsetIndicator* | 0 | | |
|  |  |  | *subframeBitmap* | 00000000  11111111  11111111  11111111  11111111 | | |
|  |  | *trpt-Subset-r12* |  | 001 | | |
|  | *rxParametersNCell* |  |  | not present | | |
|  | *txParameters* |  |  | not present | | |
| *commTxPoolNormalCommon/ commTxPoolNormalDedicated* | *sc-CP-Len* |  |  | Normal | | |
|  | *sc-Period* |  |  | sf40 | | |
|  | *sc-TF-ResourceConfig* | *prb-Num* |  | 12 | | 25 |
|  |  | *prb-Start* |  | 0 | | 0 |
|  |  | *prb-End* |  | 24 | | 49 |
|  |  | *offsetIndicator* |  | 0 | | |
|  |  | *subframeBitmap* |  | 00011000  00000000  00000000  00000000  00000000 | | |
|  | *data-CP-Len* |  |  | Normal | | |
|  | *dataHoppingConfig* | *hoppingParameter* |  | 0 | | |
|  |  | *numSubbands* |  | ns1 | | |
|  |  | *rb-Offset* |  | 0 | | |
|  | *ue-SelectedResourceConfig* | *data-TF-ResourceConfig* | *prb-Num* | 12 | | 25 |
|  |  |  | *prb-Start* | 0 | | 0 |
|  |  |  | *prb-End* | 23 | | 49 |
|  |  |  | *offsetIndicator* | 0 | | |
|  |  |  | *subframeBitmap* | 00000000  11111111  11111111  11111111  11111111 | | |
|  |  | *trpt-Subset-r12* |  | 001 | | |
|  | *rxParametersNCell* |  |  | not present | | |
|  | *txParameters* | *sc-TxParameters* | *alpha* | al0 | | |
|  |  |  | *p0* | 31 | | |
|  |  | *dataTxParameters* | *alpha* | al0 | | |
|  |  |  | *p0* | 31 | | |
| *SL-SyncConfig* | *syncCP-Len* |  |  | Normal | | |
|  | *syncOffsetIndicator* |  |  | 2 | | |
|  | *slssid* |  |  | 30 | | |
|  | *txParameters* | *txParametersGeneral* | *alpha* | al0 | | |
|  |  |  | *p0* | 31 | | |
|  |  | *syncTxThreshIC* |  | 0 (-infinity) | | |
|  | *rxParamsNCell* |  |  | not present | | |

Table A.3.12.5-2: ProSe Direct Communication pre-configuration for E-UTRAN FDD for out-of-network coverage operation (Configuration #2)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Information Element | | |  | Value  (5MHz) | Value  (10MHz) | |
| *preconfigSync* | *syncCP-Len-r12* |  |  | Normal | | |
|  | *syncOffsetIndicator1* |  |  | 2 | | |
|  | *syncOffsetIndicator2* |  |  | 1 | | |
|  | *syncTxParameters* |  |  | 31 | | |
|  | *syncTxThreshOoC* |  |  | 0  (-110dBm / 15kHz) | | |
|  | *filterCoefficient* |  |  | fc0 | | |
|  | *syncRefMinHyst* |  |  | dB0 | | |
|  | *syncRefDiffHyst* |  |  | dB0 | | |
| *preconfigComm* | *sc-CP-Len* |  |  | Normal | | |
|  | *sc-Period* |  |  | sf40 | | |
|  | *sc-TF-ResourceConfig* | *prb-Num* |  | 12 | 25 | |
|  |  | *prb-Start* |  | 0 | 0 | |
|  |  | *prb-End* |  | 23 | 49 | |
|  |  | *offsetIndicator* |  | 0 | | |
|  |  | *subframeBitmap* |  | 00011000  00000000  00000000  00000000  00000000 | | |
|  | *data-CP-Len* |  |  | Normal | | |
|  | *dataHoppingConfig* | *hoppingParameter* |  | 0 | | |
|  |  | *numSubbands* |  | ns1 | | |
|  |  | *rb-Offset* |  | 0 | | |
|  | *ue-SelectedResourceConfig* | *data-TF-ResourceConfig* | *prb-Num* | 12 | | 25 |
|  |  |  | *prb-Start* | 0 | | 0 |
|  |  |  | *prb-End* | 23 | | 49 |
|  |  |  | *offsetIndicator* | 0 | | |
|  |  |  | *subframeBitmap* | 00000000  11111111  11111111  11111111  11111111 | | |
|  |  | *trpt-Subset-r12* |  | 001 | | |

### A.3.12.6 Reference Measurement Channels for ProSe Direct Discovery

#### A.3.12.6.1 FDD

Table A.3.12.6-1: PSDCH Reference Measurement Channels for FDD

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Reference channel |  | D.1 FDD |
| Channel bandwidth | MHz | 5 |
| Allocated resource blocks |  | 2 |
| Subcarriers per resource block |  | 12 |
| Allocated subframes per Discovery period |  | 1 |
| DFT-OFDM Symbols per subframe (see note) |  | 11 |
| Modulation |  | QPSK |
| Information Bit Payload |  | 232 |
| Transport block CRC | Bits | 24 |
| Maximum number of HARQ transmissions |  | 1 |
| Binary Channel Bits (see note) | Bits | 528 |
| Note1: PSDCH transmissions are rate-matched for 12 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211. | | |

### A.3.12.7 Reference measurement channels for ProSe Direct Communication

#### A.3.12.7.1 FDD

Table A.3.12.7-1: PSCCH Reference Measurement Channels for FDD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | |
| Reference channel | |  | CC.1 FDD | CC.2 FDD |
| Channel bandwidth | | MHz | 5 | 10 |
| Allocated resource blocks | |  | 1 | 1 |
| Subcarriers per resource block | |  | 12 | 12 |
| DFT-OFDM Symbols per subframe (see Note 1) | |  | 11 | 11 |
| Modulation | |  | QPSK | QPSK |
| Information Bit Payload | | Bits | 41 | 43 |
| Information bits | Frequency hopping flag |  | 0 | |
| RB assignment |  | Set as per PSSCH RB allocation specific in the test | |
| Time resource pattern (ITRP) |  | 0 (Note 2) | |
| Modulation and coding scheme |  | Set as the PSSCH MCS specified in the test | |
| Timing advance indication |  | 0 | |
| Group destination ID |  | As set by higher layers | |
| Transport block CRC | | Bits | 16 | 16 |
| Maximum number of HARQ transmissions | |  | 2 | 2 |
| Binary Channel Bits (see Note 1) | | Bits | 264 | 264 |
| Note1: PSCCH transmissions are rate-matched for 12 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211.  NOTE 2: For NTRP = 8 (FDD) and *trpt-Subset* = 001, ITRP = 0 corresponds to a time repetition pattern of (1,0,0,0,0,0,0,0) as per TS 36.213. | | | | |

Table A.3.12.7-1: PSSCH Reference Measurement Channels for FDD

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | |
| Reference channel |  | CD.1 FDD | CD.2 FDD |
| Channel bandwidth | MHz | 5 | 10 |
| Allocated resource blocks |  | 2 | 3 |
| Subcarriers per resource block |  | 12 | 12 |
| DFT-OFDM Symbols per subframe (see Note 1) |  | 11 | 11 |
| Modulation |  | QPSK | QPSK |
| Target Code Rate |  | 1/3 | 1/3 |
| Information Bit Payload |  | 176 | 256 |
| Transport block CRC | Bits | 24 | 24 |
| Maximum number of HARQ transmissions |  | 3 | 3 |
| Binary Channel Bits (see note) | Bits | 528 | 1056 |
| Note1: PSDCH transmissions are rate-matched for 12 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211. | | | |

### A.3.12.8 ProSe Receive Traffic Generator

This clause defines the configuration for active Sidelink UEs used to generate receive traffic in ProSe RRM tests.

#### A.3.12.8.1 ProSe Direct Communication Receive Traffic Generator for FDD

Table A.3.12.8.1-1: Active Sidelink UE configuration for ProSe Direct Communication

|  |  |  |  |
| --- | --- | --- | --- |
| Configuration | |  | PCP.1.FDD |
| Channel BW | | MHz | 5 or 10 |
| Number of Active Sidelink UEs per sc-period | |  | 5 MHz: 12  10 MHz: 16 |
| Active Sidelink UEs | PSCCH RMC  (defined in A.3.12.7) |  | 5 MHz: CC.1 FDD  10 MHz: CC.2 FDD |
| PSCCH resource allocation |  | 5MHz: [2i:2i], for Sidelink UE i=0,..,11  10MHz:[3i:3i], for Sidelink UE i = 0, .., 15 |
| PSSCH RMC  (defined in A.3.12.7) |  | 5 MHz: CD.1 FDD  10 MHz: CD.2 FDD |
| PSSCH resource allocation |  | Non-overlapping RBs  5MHz: [2i:2i+1], for Sidelink UE i = 0, .., 11  10MHz:[3i:3i+2], for Sidelink UE i = 0, .., 15 |
| RSRP | dBm/15kHz | -98 |

#### A.3.12.8.2 ProSe Direct Discovery Receive Traffic Generator for FDD

Table A.3.12.8.2-1: Active Sidelink UE configuration for ProSe Direct Discovery

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Configuration | |  | PDP.1.FDD | PDP.2.FDD |
| Channel BW | | MHz | 5 | |
| Number of Active Sidelink UEs per Discovery subframe | |  | 12 | |
| Active Sidelink UEs | Sidelink UE Transmissions |  | PSDCH  (RMC D.1 FDD) | PSDCH  (RMC D.1 FDD)  +  SLSS on synchronization subframe |
| Resource allocation |  | Non overlapping RBs in a subframe | |
| RSRP | dBm/15kHz | -95 | |

## A.3.13 Time Offset between Cells

### A.3.13.1 Introduction

In Annex A in some test cases a parameter called, ‘time offset between cells’ is used. The meaning of this parameter is defined in this clause.

### A.3.13.2 Definition

Unless explicitly stated otherwise, the time offset between cells for a pair of cells is defined as the difference between radio frame start timings of the pair of cells.

## A.3.14 Carrier Aggregation under operation with Frame Structure 3 Test Cases with Different Duplex Modes

### A.3.14.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for carrier aggregation with at least one Scell under operation with Frame Structure 3.

### A.3.14.2 Principle of testing

In Annex A, tests for carrier aggregation with at least one Scell under operation with frame structure 3are specified with both an FDD and a TDD Pell to verify the same RRM requirement. If both types of tests are relevant to a UE considering supported CA bands, the test coverage can be considered fulfilled by executing either the tests with FDD PCell or the tests with TDD PCell and the UE is not required to pass both tests.

## A.3.15 Dual connectivity test cases with different combination of duplex mode

### A.3.15.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for dual connectivity (DC) operation with different combination of duplex modes.

### A.3.15.2 Principle of testing

If multiple dual connectivity test cases are defined for different combination of duplex modes (E-UTRA FDD-FDD, E-UTRA TDD-TDD and E-UTRA TDD-FDD) to verify the same RRM requirement which is independent of the combination of duplex modes and is identical for different combination of duplex modes, then from UE the performance point of view the test coverage can be considered fulfilled by executing only the corresponding test case(s) with one of the combination of duplex modes supported by the UE.

## A.3.16 Reference PRACH Configurations

Table A.3.16-1: PRACH configuration parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Value | | | Comments |
| Reference configuration | PRACH\_2CE | PRACH\_3CE | PRACH\_4CE |  |
| Rsrp-ThresholdsPRACH | {-99} dBm | {-107, -99} dBm | {-107, -99, -92} dBm | As defined in TS36.331 |
| CE level 0: | Configured | Configured | Configured | Up to 4 CE levels, each corrsesonding to a PRACH configuration |
| Prach Configuration Index: | 4 | 4 | 4 | See TS 36.211 section 5.7.1 |
| numRepetitionPerPreambleAttempt: | 1 | 1 | 1 | Number of PRACH repetitions per attempt for each CE level, See TS 36.211 |
| prach-HoppingConfig: | off | off | off | Coverage level specific frequency hopping configuration for PRACH |
| CE level 1: | Configured | Configured | Configured | Up to 4 CE levels, each corrsesonding to a PRACH configuration |
| Prach Configuration Index: | 4 | 4 | 4 | see TS 36.211 section 5.7.1 |
| numRepetitionPerPreambleAttempt: | 128 | 64 | 32 | Number of PRACH repetitions per attempt for each CE level, See TS 36.211 |
| prach-HoppingConfig: | off | off | off | Coverage level specific frequency hopping configuration for PRACH |
| CE level 2: | Not Configured | Configured | Configured | Up to 4 CE levels, each corrsesonding to a PRACH configuration |
| Prach Configuration Index: | - | 4 | 4 | see TS 36.211 section 5.7.1 |
| numRepetitionPerPreambleAttempt: | - | 128 | 64 | Number of PRACH repetitions per attempt for each CE level, See TS 36.211 |
| prach-HoppingConfig: | - | off | off | Coverage level specific frequency hopping configuration for PRACH |
| CE level 3: | Not Configured | Not Configured | Configured | Up to 4 CE levels, each corrsesonding to a PRACH configuration |
| Prach Configuration Index: | - | - | 4 | see TS 36.211 section 5.7.1 |
| numRepetitionPerPreambleAttempt: | - | - | 128 | Number of PRACH repetitions per attempt for each CE level, See TS 36.211 |
| prach-HoppingConfig: | - | - | off | Coverage level specific frequency hopping configuration for PRACH |

## A.3.17 Listen before talk model

### A.3.17.1 Introduction

In some RRM test cases for FS3, a listen before talk (LBT) model is specified. The intention of the LBT model is to emulate using test equipment the behaviour of an FS3 eNB which performs channel measurement to check that the channel is clear prior to performing downlink transmission.

### A.3.17.2 Definition

Prior to each DMTC window, the test equipment shall determine whether to transmit a discovery reference signal (DRS) during the DMTC window with probability P=0.75. In many cases the test requirement depends on the number of configured discovery signal occasions which are not available during the test, so the test equipment shall track how many DRS are not transmitted during the test period. If the test equipment determines that it shall transmit a DRS, then the timing of the DRS transmission within the DMTC window is randomly selected from the set of possible DRS transmission signal timings, such that there is an equal probability of any valid DRS timing.

For non DRS downlink transmission bursts, if transmission occurred in the previous subframe, transmission is muted for a duration of one subframe. Additionaly, if the start time of the candidate transmission burst is within 8 subframes of the start of the DMTC window, transmission is not performed. Otherwise

The length of the transmission burst in subframes is defined as N. The burst transmission format is determined according to the steps below:

1. Select N randomly from a given set of the number of subframes S1={1,3,5,8} with equal probability as the total length of burst transmission format.

2. A uniform random variable from 0 to 1 is generated. If the random variable is less than P=0.75, a burst of N fully occupied subframes is transmitted. Otherwise, the burst transmission is muted and the muting duration is the same as the number N of subframes for determined burst format.

## A.3.18 Reference NPRACH Configurations

Table A.3.18-1 and A.3.18-2 define the reference NB-IoT PRACH configurations for a NB-IoT RRM test case where the UE is required to transmit NPRACH during the testing procedure, but the testing purpose of the RRM test case does not include testing NPRACH performance.

Table A.3.18-1: NPRACH.R-1: HD-FDD Reference NPRACH Configuration

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Field | Value | | | Comment | |
| Parameters not per NPRACH coverage level | | | | | |
| rsrp-ThresholdsPrach | {rsrp1, rsrp2} | | | The values of NPRACH RSRP thresholds for will be set according the requirement of individual test cases | |
| nprach-CP-Length | us66dot7 | | | NPRACH format 0 | |
| Parameters per NPRACH coverage Level | | | | | |
| *CE Level* | *Level 0* | *Level 1* | *Level 2* | | Valid values as defined in TS 36.331 [2] | |
| nprach-Periodicity | ms40 | ms40 | ms40 | | {ms40, ms80, ms160, ms240, ms320, ms640, ms1280, ms2560} | |
| nprach-StartTime | ms8 | ms8 | ms8 | | {ms8, ms16, ms32, ms64, ms128, ms256, ms512, ms1024} | |
| nprach-SubcarrierOffset | n0 | n0 | n0 | | {n0, n12, n24, n36, n2, n18, n34} | |
| nprach-NumSubcarriers | n12 | n12 | n12 | | {n12, n24, n36, n48} | |
| nprach-SubcarrierMSG3-RangeStart | {one} | {one} | {one} | | {zero, oneThird, twoThird, one} | |
| maxNumPreambleAttemptCE | n3 | n5 | n7 | | {n3, n4, n5, n6, n7, n8, n10} | |
| numRepetitionsPerPreambleAttempt | n1 | n8 | n32 | | {n1, n2, n4, n8, n16, n32, n64, n128} | |
| npdcch-NumRepetitions-RA | r1 | r8 | r32 | | {r1, r2, r4, r8, r16, r32, r64, r128, r256, r512, r1024, r2048} | |
| npdcch-StartSF-CSS-RA | v8 | v2 | v2 | | {v1dot5, v2, v4, v8, v16, v32, v48, v64} | |
| npdcch-Offset-RA | zero | zero | zero | | {zero, oneEighth, oneFourth, threeEighth} | |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 | | {n8, n10, n11, n12, n20, n22, n23, n24, n32, n34, n35, n36, n40, n44, n48} | |
| Note 1: See Clause 6.7.3.2 in TS 36.331 [2] for further information on the parameters in this table. | | | | | |

Table A.3.18-2: NPRACH.R-2: TDD Reference NPRACH Configuration

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Field | Value | | | Comment | |
| Parameters not per NPRACH coverage level | | | | | |
| rsrp-ThresholdsPrach | {rsrp1, rsrp2} | | | The values of NPRACH RSRP thresholds for will be set according the requirement of individual test cases | |
| nprach-PreambleFormat | fmt-0 | | | See TS 36.211 [16] section 10.1.6 | |
| Parameters per NPRACH coverage Level | | | | | |
| *CE Level* | *Level 0* | *Level 1* | *Level 2* | | Valid values as defined in TS 36.331 [2] | |
| nprach-Periodicity | ms80 | ms80 | ms80 | | {ms80, ms160, ms320, ms640, ms1280, ms2560, ms5120, ms10240} | |
| nprach-StartTime | ms10 | ms10 | ms10 | | {ms10, ms20, ms40, ms80, ms160, ms320, ms640, ms1280, ms 2560, ms5120} | |
| nprach-SubcarrierOffset | n0 | n0 | n0 | | {n0, n12, n24, n36, n2, n18, n34} | |
| nprach-NumSubcarriers | n12 | n12 | n12 | | {n12, n24, n36, n48} | |
| nprach-SubcarrierMSG3-RangeStart | {one} | {one} | {one} | | {zero, oneThird, twoThird, one} | |
| maxNumPreambleAttemptCE | n3 | n5 | n7 | | {n3, n4, n5, n6, n7, n8, n10} | |
| numRepetitionsPerPreambleAttempt | n1 | n8 | n32 | | {n1, n2, n4, n8, n16, n32, n64, n128, n256, n512, n1024} | |
| npdcch-NumRepetitions-RA | r1 | r8 | r32 | | {r1, r2, r4, r8, r16, r32, r64, r128, r256, r512, r1024, r2048} | |
| npdcch-StartSF-CSS-RA | v8 | v4 | v4 | | {v4, v8, v16, v32, v48, v64, v96, v128} | |
| npdcch-Offset-RA | zero | zero | zero | | {zero, oneEighth, oneFourth, threeEighth} | |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 | | {n8, n10, n11, n12, n20, n22, n23, n24, n32, n34, n35, n36, n40, n44, n48} | |
| Note 1: See Clause 6.7.3.2 in TS 36.331 [2] for further information on the parameters in this table. | | | | | |

## A.3.19 Dual connectivity test cases with different bandwidth combinations

### A.3.19.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for dual connectivity (DC) operation with different bandwidth combinations.

### A.3.19.2 Principle of testing

If multiple dual connectivity test cases with different channel bandwidth combinations are defined to verify the same RRM requirement that is channel bandwidth independent, then the UE needs to be tested only with one bandwidth combination out of the bandwidth combination sets supported by that UE.

## A.3.20 Category M1 UE Test Cases

### A.3.20.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for Category M1 UE in both CEModeA and CEModeB.

### A.3.20.2 Principle of Cat-M1 UE Testing

In Annex A Cat-M1 UE test cases may be defined for both CEModeA and CEModeB to verify the same type of RRM requirement.

If test cases are defined in both CEModeA and CEmodeB in order to verify the same type of RRM requirement then the UE capable of CEModeB needs to be tested for the corresponding test(s) defined in CEModeA and/or in CEModeB according to the applicability rules defined in Table A.3.20.2-1.

The UE which is not capable of CEModeB shall be tested for all CEModeA test cases defined in Annex A.

In test cases defined for CEModeB, test equipment shall transmit PBCH with 5 repetitions as specified in section 6.6.4 of TS 36.211 [16].

Table A.3.20.2-1: Test case applicability rules for category M1 UE in CEModeA and CEModeB

|  |  |  |
| --- | --- | --- |
| Type of Test Cases | Coverage mode(s) Applicable for Testing | |
|  | **CEModeA** | **CEModeB** |
| A.4 E-UTRAN RRC IDLE State: Intra-frequency Cell Re-Selection Tests for Category M1 UE | X | X |
| A.4 E-UTRAN RRC IDLE State: Intrer-frequency Cell Re-Selection Tests for Category M1 UE | X | X |
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Intra-frequency with SFN acquisition Handover Tests for Category M1 UE | X |  |
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Inter-frequency with SFN acquisition Handover Tests for Category M1 UE | X |  |
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Intra-frequency without SFN acquisition Handover Tests for Category M1 UE |  | X |
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Inter-frequency without SFN acquisition Handover Tests for Category M1 UE |  | X |
| A.5 RRC Connection Control: E-UTRAN Intra-frequency RRC Re-Restablishment Tests for Category M1 UE |  | X |
| A.5 RRC Connection Control: E-UTRAN Inter-frequency RRC Re-Restablishment Tests for Category M1 UE |  | X |
| A.6 E-UTRAN Contention Based Random Access Tests for Cat-M1 UE |  | X |
| A.7 Timing and Signalling Characteristics: E-UTRAN UE Transmit Timing Timing Accuracy Tests for Category M1 UE |  | X |
| A.7 Timing and Signalling Characteristics: E-UTRAN Timing Advance Adjustment Accuracy Tests for Cat-M1 UE |  | X |
| A.7.3 Radio Link Monitoring: E-UTRAN Radio Link Monitoring Tests for Category M1 UE | X |  |
| A.7.3 Radio Link Monitoring: E-UTRAN Radio Link Monitoring Tests for for Early In-sync and Early Out-of-sync for Category M1 UE |  | X |
| A.8 Measurements Procedures: E-UTRAN Intra-frequency Event Triggered Reporting under Fading Propagation Conditions Tests for Category M1 UE | X | X |
| A.8 Measurements Procedures: E-UTRAN Intra-frequency Serving Cell Event Triggered Reporting under Fading Propagation Conditions Tests for Category M1 UE without Gaps | X | N/A |
| A.8 Measurements Procedures: E-UTRAN Intra-frequency Identification of a New CGI of E-UTRA cell using Autonomous Gaps Tests for Category M1 UE | N/A | X |
| A.8 Measurements Procedures: E-UTRAN Inter-frequency Event Triggered Reporting under Fading Propagation Conditions Tests for Category M1 UE | X | X |
| A.8.12 Measurements Procedures: E-UTRAN Intra-frequency RSTD measurement reporting delay tests for Category M1 UE | X | X |
| A.8.13 Measurements Procedures: E-UTRAN Inter-frequency RSTD measurement reporting delay tests for Category M1 UE | X | X |
| A.9 Measurement Performance Requirements: RSRP Intra-Frequency Measurement Accuracy Tests for Category M1 UE | X | X |
| A.9.7 Measurement Performance Requirements: E-UTRAN UE Rx–Tx Time Difference Measurement Accuracy Tests for Category M1 UE | X | N/A |
| A.9.8 Measurement Performance Requirements: E-UTRAN Intra-frequency RSTD Measurement Accuracy Tests for Category M1 UE | X | X |
| A.9.8 Measurement Performance Requirements: E-UTRAN Inter-frequency RSTD Measurement Accuracy Tests for Category M1 UE | X | X |

### A.3.20.3 Principle of Cat-M1 UE testing for inter-frequency RSTD measurement period requirements with measurement gaps

For the Cat-M1 UE, capable of supporting measurement gaps specified in Table 8.1.2.1-3 and requiring gaps for inter-frequency RSTD measurements, and which can be configured with applicable measurement gaps specified in Table 8.1.2.1-1 or Table 8.1.2.1-3, in order to verify inter-frequency RSTD measurement period with measurement gaps, it is sufficient to verify the RSTD measurement period requirements only under the applicable measurement gaps specified in Table 8.1.2.1-3, for each of the CEModeA and CEModeB.

## A.3.21 V2V Sidelink Communication on Dedicated V2V Carrier

### A.3.21.1 Introduction

This clause also defines the principle and the reference configurations that are applicable to test cases verifying RRM core requirements for V2V sidelink communication on dedicated V2V carrier.

### A.3.21.2 Reference resource pool configurations for V2V Sidelink Communication

Table A.3.21.2-1: Pre-configuration for V2V Sidelink Communication

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.331 [3] clause 9.3.2, SL-V2X-Preconfiguration | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-V2X-PreconfigCommPool-r14 ::= SEQUENCE { |  |  |  |
| sl-OffsetIndicator-r14 | 0 | Indicates the offset of the first subframe of a resource pool within a SFN cycle. If absent, the resource pool starts from first subframe of SFN=0. |  |
| sl-Subframe-r14 included in SL-PreconfigV2X-TxPoolList | 10000000000000000000  10000000000000000000  10000000000000000000  10000000000000000000  10000000000000000000 | Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) |  |
| sl-Subframe-r14 included in SL-PreconfigV2X-RxPoolList | 11111111111111111111  11111111111111111111  11111111111111111111  11111111111111111111  11111111111111111111 | Indicates the bitmap of the RX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) |  |
| adjacencyPSCCH-PSSCH-r14 | True | Adjacent: TURE  Non-adjacent: FALSE |  |
| sizeSubchannel-r14 | 5 | Minimum bandwidth of subchannel for adjacent transmission |  |
| startRB-Subchannel-r14 | 0 | Indicates the lowest RB index of the subchannel with the lowest index. |  |
| startRB-PSCCH-Pool-r14 | 0 | Indicates the lowest RB index of the PSCCH pool |  |
| } |  |  |  |

### A.3.21.3 Reference measurement channels for V2V Sidelink Communication

Table A.3.21.3-1: PSCCH Reference Measurement Channels

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
| Reference channel | |  | CC.1 |
| Channel bandwidth | | MHz | 10 |
| Allocated PSCCH resource blocks | |  | 2 |
| DFT-OFDM symbols per subframe (see Note 1) | |  | 9 |
| Modulation | |  | QPSK |
| Information Bit Payload (without CRC) | | Bits | 32 |
| Information Bit | SCI Format |  | 1 |
| Priority |  | As set by higher layers |
| Resource reservation |  | 0 |
| Modulation and coding scheme |  | Set as the PSSCH MCS specified in the test |
| Retransmission index |  | Note 4 |
| Time gap between initial transmission and retransmission |  | 0 (Note 2) |
| Frequency resource location of the initial transmission and retransmission |  | Initial transmission: Set as per PSSCH RB allocation specific in the test  Retransmission: Note 4 |
| Reserved bits |  | Set all these bits to 0 |
| Transport block CRC | | Bits | 16 |
| Binary Channel Bits (see Note 3) | | Bits | 432 |
| Note 1: PSCCH transmissions are rate-matched for 10 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211.  Note 2: *SFgap* is the value indicated by "Time gap between initial transmission and retransmission" field in the configured sidelink grant, and *SFgap* =0 means no retransmission of the associated TB as per TS 36.213.  Note 3: Binary channel bits calculated under assumption of 9 DFT-OFDM symbols per subframe.  Note 4: UE is allowed to autonomously select the un-used or redundant bits/code-points in SCI format 1 | | | |

Table A.3.21.3-2: PSSCH Reference Measurement Channels

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Reference channel |  | CD.1 |
| Sidelink transmission mode |  | 4 |
| Channel bandwidth | MHz | 10 |
| Allocated PSSCH resource blocks |  | 3 |
| DFT-OFDM symbols per subframe (see Note 1) |  | 9 |
| Modulation |  | QPSK |
| Target Code Rate |  | 1/3 |
| Information Bit Payload (Transport block size) | Bits | 208 |
| Transport block CRC | Bits | 24 |
| Number of PSSCH HARQ retransmissions |  | 0 |
| Binary Channel Bits (see Note 2) | Bits | 648 |
| Note1: PSSCH transmissions are rate-matched for 10 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211.  Note 2: Binary channel bits calculated under assumption of 9 DFT-OFDM symbols per subframe. | | |

## A.3.22 Category 1bis UE Test Cases

### A.3.22.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for Category 1bis UE.

### A.3.22.2 Principle of Category 1bis UE Testing

In Annex A, tests in table A.3.22.2-1 defined for Category ≥1 UE with 2 Rx antenna are applicable to Category 1bis UE with 1 Rx antenna. Unless otherwise specified, same test configurations are used except for propagation channel change to 1x1 or 2x1 according to number of Tx antennas. For RSRP and RSRQ measurement accuracy test, corresponding measurement accuracy requirement for Category 1bis UE is specified in the table. For band dependent RRM tests defined in section A.9, only subset of bands that are defined for Cat.1bis UE are applicable.

Table A.3.22.2-1: Test cases applicable to category 1bis UE

|  |  |  |
| --- | --- | --- |
| Test category | Test case | Test case name |
| Cell re-selection tests | A.4.2.20 | E-UTRAN FDD – FDD Intra frequency case for UE Category 1bis |
| A.4.2.21 | E-UTRAN TDD – TDD Intra frequency case for UE Category 1bis |
| A.4.2.31 | E-UTRAN FDD – FDD Inter frequency case for UE Category 1bis |
| A.4.2.32 | E-UTRAN FDD – TDD Inter frequency case for UE Category 1bis |
| A.4.2.33 | E-UTRAN TDD – FDD Inter frequency case for UE Category 1bis |
| A.4.2.34 | E-UTRAN TDD – TDD: Inter frequency case for UE Category 1bis |
| Handover tests | A.5.1.19 | E-UTRAN FDD - FDD Intra frequency handover for UE Category 1bis |
| A.5.1.20 | E-UTRAN TDD - TDD Intra frequency handover for UE Category 1bis |
| A.5.1.3 | E-UTRAN FDD – FDD Inter frequency handover |
| A.5.1.4 | E-UTRAN TDD – TDD Inter frequency handover |
| A.5.1.5 | E-UTRAN FDD – FDD Inter frequency handover: unknown target cell |
| A.5.1.6 | E-UTRAN TDD – TDD Inter frequency handover; unknown Target Cell |
| A.5.1.7 | E-UTRAN FDD – TDD Inter frequency handover |
| A.5.1.8 | E-UTRAN TDD – FDD Inter frequency handover |
| RRC re-establishment tests | A.6.1.1 | E-UTRAN FDD Intra-frequency RRC Re-establishment |
| A.6.1.2 | E-UTRAN FDD Inter-frequency RRC Re-establishment |
| A.6.1.3 | E-UTRAN TDD Intra-frequency RRC Re-establishment |
| A.6.1.4 | E-UTRAN TDD Inter-frequency RRC Re-establishment |
| Random access tests | A.6.2.1 | E-UTRAN FDD – Contention Based Random Access Test |
| A.6.2.2 | E-UTRAN FDD – Non-Contention Based Random Access Test |
| A.6.2.3 | E-UTRAN TDD – Contention Based Random Access Test |
| A.6.2.4 | E-UTRAN TDD – Non-Contention Based Random Access Test |
| RRC connection release with redirection tests | A.6.3.1 | Redirection from E-UTRAN FDD to UTRAN FDD |
| A.6.3.2 | Redirection from E-UTRAN TDD to UTRAN FDD |
| A.6.3.3 | Redirection from E-UTRAN FDD to GERAN when System Information is provided |
| A.6.3.4 | Redirection from E-UTRAN TDD to GERAN when System Information is provided |
| A.6.3.5 | E-UTRA TDD RRC connection release redirection to UTRA TDD |
| A.6.3.6 | E-UTRA FDD RRC connection release redirection to UTRA TDD |
| A.6.3.7 | E-UTRA TDD RRC connection release redirection to UTRA TDD without SI provided |
| A.6.3.8 | E-UTRA FDD RRC connection release redirection to UTRA TDD without SI provided |
| A.6.3.9 | Redirection from E-UTRAN FDD to UTRAN FDD without System Information |
| A.6.3.10 | Redirection from E-UTRAN FDD to GERAN when System Information is not provided |
| A.6.3.11 | Redirection from E-UTRAN TDD to GERAN when System Information is not provided |
| A.6.3.12 | E-UTRAN TDD RRC connection release redirection to UTRAN FDD without SI provided |
| UE transmit timing tests | A.7.1.1 | E-UTRAN FDD – UE Transmit Timing Accuracy Tests |
| A.7.1.2 | E-UTRAN TDD - UE Transmit Timing Accuracy Tests |
| UE timing advance tests | A.7.2.1 | E-UTRAN FDD – UE Timing Advance Adjustment Accuracy Test |
| A.7.2.2 | E-UTRAN TDD – UE Timing Advance Adjustment Accuracy Test |
| Radio link monitoring tests | A.7.3.26 | E-UTRAN FD-FDD Radio Link Monitoring Test for Out-of-sync for UE Category 0 |
| A.7.3.27 | E-UTRAN FD-FDD Radio Link Monitoring Test for In-sync for UE Category 0 |
| A.7.3.28 | E-UTRAN FD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category 0 |
| A.7.3.29 | E-UTRAN FD-FDD Radio Link Monitoring Test for In-sync in DRX for UE Category 0 |
| A.7.3.34 | E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync for UE Category 0 |
| A.7.3.35 | E-UTRAN TDD Radio Link Monitoring Test for In-sync for UE category 0 |
| A.7.3.36 | E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category 0 |
| A.7.3.37 | E-UTRAN TDD Radio Link Monitoring Test for In-sync in DRX for UE category 0 |
| Event-triggered reporting | A.8.1.11 | E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category 0 |
| A.8.1.12 | E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for UE category 0 |
| A.8.1.13 | E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells with DRX for UE category 0 |
| A.8.2.12 | E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells |
| A.8.2.13 | E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells with DRX |
| A.8.3.1 | E-UTRAN FDD-FDD Inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells |
| A.8.3.2 | E-UTRAN FDD-FDD Inter-frequency event triggered reporting when DRX is used under fading propagation conditions in asynchronous cells |
| A.8.3.3 | E-UTRAN FDD-FDD inter-frequency event triggered reporting under AWGN propagation conditions in asynchronous cells with DRX when L3 filtering is used |
| A.8.4.1 | E-UTRAN TDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in synchronous cells |
| A.8.4.2 | E-UTRAN TDD-TDD Inter-frequency event triggered reporting when DRX is used under fading propagation conditions in synchronous cells |
| A.8.4.3 | E-UTRAN TDD-TDD inter-frequency event triggered reporting under AWGN propagation conditions in synchronous cells with DRX when L3 filtering is used |
| A.8.4.6 | E-UTRAN TDD-TDD Inter-frequency event triggered reporting for TDD UL/DL configuration 0 |
| CGI reading tests | A.8.1.19 | E-UTRAN FDD-FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for UE category 0 |
| A.8.1.20 | E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for UE category 0 |
| A.8.2.7 | E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps |
| A.8.2.8 | E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX |
| RSTD measurement reporting delay test | A.8.12.1 | E-UTRAN FDD intra-frequency RSTD measurement reporting delay test case |
| A.8.12.2 | E-UTRAN TDD intra-frequency RSTD measurement reporting delay test case |
| A.8.13.1 | E-UTRAN FDD-FDD inter-frequency RSTD measurement reporting delay test case with the reference cell on the serving carrier frequency |
| A.8.13.2 | E-UTRAN TDD-TDD inter-frequency RSTD measurement reporting delay test case with the reference cell on the serving carrier frequency |
| RSRP measurement accuracy tests | A.9.1.1 | FDD Intra frequency case  Measurement accuracy requirement in 9.1.2.7 and 9.1.2.8 |
| A.9.1.2 | TDD Intra frequency case  Measurement accuracy requirement in 9.1.2.7 and 9.1.2.8 |
| A.9.1.3 | FDD—FDD Inter frequency case  Measurement accuracy requirement in 9.1.3.3 and 9.1.3.4 |
| A.9.1.4 | TDD—TDD Inter frequency case  Measurement accuracy requirement in 9.1.3.3 and 9.1.3.4 |
| A.9.1.5 | FDD—TDD Inter frequency case  Measurement accuracy requirement in 9.1.3.3 and 9.1.3.4 |
| RSRQ measurement accuracy tests | A.9.2.1 | FDD Intra frequency case  Measurement accuracy requirement in 9.1.5.5 |
| A.9.2.2 | TDD Intra frequency case  Measurement accuracy requirement in 9.1.5.5 |
| A.9.2.3 | FDD—FDD Inter frequency case  Measurement accuracy requirement in 9.1.6.5 and 9.1.6.6 |
| A.9.2.4 | TDD—TDD Inter frequency case  Measurement accuracy requirement in 9.1.6.5 and 9.1.6.6 |
| A.9.2.4A | FDD—TDD Inter frequency case  Measurement accuracy requirement in 9.1.6.5 and 9.1.6.6 |
| UE Rx-Tx time difference measurement accuracy tests | A.9.7.1 | E-UTRAN FDD UE Rx **–** Tx time difference case |
| A.9.7.2 | E-UTRA TDD |
| RSTD measurement accuracy tests | A.9.8.1 | E-UTRAN FDD RSTD intra frequency case  Measurement accuracy requirement in 9.1.10.5 |
| A.9.8.2 | E-UTRAN TDD RSTD intra frequency case  Measurement accuracy requirement in 9.1.10.5 |
| A.9.8.3 | E-UTRAN FDD-FDD RSTD inter frequency case  Measurement accuracy requirement in 9.1.10.6 |
| A.9.8.4 | E-UTRAN TDD-TDD RSTD inter frequency case  Measurement accuracy requirement in 9.1.10.5 |

## A.3.23 Category NB2 UE Test Cases

### A.3.23.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for Category NB2 UE in both normal and enhanced coverage.

### A.3.23.2 Principle of Category NB2 UE Testing

In Annex A, test cases in table A.3.23.2-1 defined for Category NB1 UE are applicable to Category NB2 UE.

Table A.3.23.2-1: Test cases applicable to Category NB2 UE

|  |  |  |
| --- | --- | --- |
| Test category | Section | Test case |
| Cell re-selection | A.4.2.18 | HD – FDD Intra frequency case for UE Category NB1 In-Band mode in normal coverage |
| A.4.2.19 | HD – FDD Intra frequency case for UE Category NB1 In-Band mode in enhanced coverage |
| A.4.2.24 | HD – FDD Inter frequency case for UE Category NB1 In-Band mode in enhanced coverage |
| A.4.2.35 | TDD - TDD Intra frequency case for UE Category NB1 In-Band mode in normal coverage |
| A.4.2.36 | TDD – TDD Intra frequency case for UE Category NB1 In-Band mode in enhanced coverage |
| A.4.2.37 | TDD – TDD Inter frequency case for UE Category NB1 In-Band mode in enhanced coverage |
| Idle RSTD measurement | A.4.7.1 | HD – FDD Intra frequency case for UE Category NB1 standalone mode in enhanced coverage |
| A.4.7.2 | HD – FDD Inter frequency case for UE Category NB1 standalone mode in enhanced coverage |
| A.4.7.3 | TDD Intra frequency case for UE Category NB1 standalone mode in enhanced coverage |
| A.4.7.4 | TDD Inter frequency case for UE Category NB1 standalone mode in enhanced coverage |
| RRC re-establishment | A.6.1.15 | HD-FDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhancednormal coverage |
| A.6.1.16 | HD-FDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normalenhanced coverage |
| A.6.1.23 | TDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage |
| A.6.1.24 | TDD - TDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage |
| Random access | A.6.2.16 | HD-FDD Random Access Test for UE category NB1 in In-band Mode under Normal Coverage |
| A.6.2.17 | HD-FDD Contention Based Random Access Test for UE category NB1s in In-band Mode in Enhanced Coverage |
| A.6.2.18 | HD-FDD Contention Based Random Access on Non-anchor Carrier Test for UE category NB1 UEs In-band mode in Enhanced Coverage |
| A.6.2.19 | TDD Contention Based Random Access Test for UE category NB1 UEs In-band mode in normal coverage |
| A.6.2.20 | TDD Contention Based Random Access Test for UE category NB1 UEs In-band mode in enhanced coverage |
| A.6.2.21 | TDD Contention Based Random Access on Non-anchor Carrier Test for UE category NB1 UEs In-band mode in Enhanced Coverage |
| UE transmit timing | A.7.1.17 | E-UTRAN HD-FDD – UE Transmit Timing Accuracy Tests for Category NB1 UE In-Band mode under normal coverage |
| A.7.1.18 | E-UTRAN HD-FDD – UE Transmit Timing Accuracy Tests for Category NB1 UE In-band mode under enhanced coverage |
| A.7.1.27 | TDD – UE Transmit Timing Accuracy Tests for Category NB1 UE In-Band mode under normal coverage |
| A.7.1.28 | TDD – UE Transmit Timing Accuracy Tests for Category NB1 UE In-band mode under enhanced coverage |
| UE timing advance | A.7.2.9 | HD-FDD UE Timing Advance Adjustment Accuracy Test for UE Category NB1 in Standalone Mode under Enhance Coverage |
| A.7.2.15 | TDD – TDD UE Timing Advance Adjustment Accuracy Test for UE Category NB1 in Standalone Mode under Enhanced Coverage |
| Radio link monitoring | A.7.3.60 | HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in normal coverage |
| A.7.3.61 | HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage |
| A.7.3.62 | HD-FDD Radio Link Monitoring Test for In-sync with DRX for UE Category NB1 In-Band mode in Enhanced Coverage |
| A.7.3.63 | HD-FDD Radio Link Monitoring Test for In-sync with DRX for UE Category NB1 In-Band mode in Normal Coverage |
| A.7.3.64 | HD-FDD Radio Link Monitoring Test for In-sync without DRX for UE Category NB1 In-Band mode in Normal Coverage |
| A.7.3.65 | HD-FDD Radio Link Monitoring Test for In-sync without DRX for UE Category NB1 In-Band mode in Enhanced Coverage |
| A.7.3.66 | HD-FDD Radio Link Monitoring Test for Out-of-sync without DRX for UE category NB1 in Standalone Mode in Normal Coverage |
| A.7.3.67 | HD-FDD Radio Link Monitoring Test for Out-of-sync without DRX for UE category NB1 in Guardband Mode under Enhanced Coverage |
| A.7.3.88 | TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in normal coverage |
| A.7.3.89 | TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage |
| A.7.3.90 | TDD Radio Link Monitoring Test for In-sync with DRX for UE Category NB1 In-Band mode in Normal Coverage |
| A.7.3.91 | TDD Radio Link Monitoring Test for In-sync with DRX for UE Category NB1 In-Band mode in Enhanced Coverage |
| A.7.3.92 | TDD Radio Link Monitoring Test for In-sync without DRX for UE Category NB1 In-Band mode in Normal Coverage |
| A.7.3.93 | TDD Radio Link Monitoring Test for In-sync without DRX for UE Category NB1 In-Band mode in Enhanced Coverage |
| A.7.3.94 | TDD Radio Link Monitoring Test for Out-of-sync without DRX for UE Category NB1 Standalone mode in Normal Coverage |
| A.7.3.95 | TDD Radio Link Monitoring Test for Out-of-sync without DRX for UE Category NB1 guard band mode in Enhanced Coverage |
| RSTD measurement accuracy | A.9.8.16 | HD – FDD Intra frequency case for UE Category NB1 inband mode in normal coverage |
| A.9.8.17 | HD – FDD Inter frequency case for UE Category NB1 inband mode in normal coverage |
| A.9.8.18 | HD – FDD Intra frequency case for UE Category NB1 inband mode in enhanced coverage |
| A.9.8.19 | HD – FDD Inter frequency case for UE Category NB1 inband mode in enhanced coverage |
| A.9.8.32 | TDD Intra frequency case for UE Category NB1 inband mode in normal coverage |
| A.9.8.33 | TDD Inter frequency case for UE Category NB1 inband mode in normal coverage |
| A.9.8.34 | TDD Intra frequency case for UE Category NB1 inband mode in enhanced coverage |
| A.9.8.35 | TDD Inter frequency case for UE Category NB1 inband mode in enhanced coverage |
| Channel quality reporting accuracy | A.9.14.1 | E-UTRAN HD-FDD Downlink channel quality reporting accuracy for UE Category NB1 Standalone mode under normal coverage |
| A.9.14.2 | E-UTRAN HD-FDD Downlink channel quality reporting accuracy for UE Category NB1 Standalone mode under enhanced coverage |

## A.3.24 V2X sidelink communication

### A.3.24.1 Introduction

This clause also defines the principle and the reference configurations that are applicable to test cases verifying RRM core requirements for V2X sidelink communication.

### A.3.24.2 Reference resource pool configurations for V2X Sidelink Communication

Table A.3.24.2-1: Pre-configuration for V2X Sidelink Communication (Configuration #1)

|  |  |  |  |
| --- | --- | --- | --- |
| **Derivation Path: TS 36.331 [3] clause 9.3.2, SL-V2X-Preconfiguration** | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-V2X-PreconfigCommPool-r14 ::= SEQUENCE { |  |  |  |
| sl-OffsetIndicator-r14 | 0 | Indicates the offset of the first subframe of a resource pool within a SFN cycle. If absent, the resource pool starts from first subframe of SFN=0. |  |
| sl-Subframe-r14 included in SL-PreconfigV2X-TxPoolList | 11111111111111111111  11111111111111111111  11111111111111111111  11111111111111111111  11111111111111111111 | Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) |  |
| sl-Subframe-r14 included in SL-PreconfigV2X-RxPoolList | 11111111111111111111  11111111111111111111  11111111111111111111  11111111111111111111  11111111111111111111 | Indicates the bitmap of the RX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) |  |
| adjacencyPSCCH-PSSCH-r14 | True | Adjacent: TURE  Non-adjacent: FALSE |  |
| sizeSubchannel-r14 | 5 | Minimum bandwidth of subchannel for adjacent transmission |  |
| startRB-Subchannel-r14 | 0 | Indicates the lowest RB index of the subchannel with the lowest index. |  |
| startRB-PSCCH-Pool-r14 | 0 | Indicates the lowest RB index of the PSCCH pool |  |
| } |  |  |  |

Table A.3.24.2-2: V2X sidelink Communication configuration for E-UTRAN (Configuration #2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Derivation Path: 36.331 clause 6.3.8 | | | | |
| Information Element | | | Value  (10MHz) | Comment |
| SL-V2X-InterFreqUE-Config-r14 ::= SEQUENCE { |  |  |  |  |
|  | physCellIdList-r14 |  |  | Not present |
|  | typeTxSync-r14 |  | *Set according to the specific test configuration* | ENUMERATED {gnss, enb, ue} |
|  | v2x-SyncConfig-r14 |  |  | Not present |
|  | v2x-CommRxPool-r14 | SL-CommResourcePoolV2X -r14 SEQUENCE { |  | RxPool  A monitoring UE can receive on the resources of this pool when a transmitting UE uses the Tx Pool Normal or Tx Pool Exceptional |
|  |  | sl-OffsetIndicator-r14 | 0 | small-r12  Indicates the offset of the first subframe of a resource pool within a SFN cycle. If absent, the resource pool starts from first subframe of SFN=0. |
|  |  | sl-Subframe-r14 | 11111111  11111111  1111 | bs20-r14 for FDD  Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) |
|  |  | adjacencyPSCCH-PSSCH-r14 | TRUE | BOOLEAN  Adjacent: TURE  Non-adjacent: FALSE |
|  |  | sizeSubchannel-r14 | 50 | ENUMERATED {n50}  Minimum bandwidth of subchannel for adjacent transmission |
|  |  | numSubchannel-r14 | 1 | ENUMERATED {n1}  Number of subchannel for adjacent transmission |
|  |  | startRB-Subchannel-r14 | 0 | Indicates the lowest RB index of the subchannel with the lowest index. |
|  |  | startRB-PSCCH-Pool-r14 | 0 | Indicates the lowest RB index of the PSCCH pool |
|  |  | } |  |  |
|  | v2x-CommTxPoolNormal-r14 | SL-CommResourcePoolV2X -r14 SEQUENCE { |  | Tx Pool Normal |
|  |  | sl-OffsetIndicator-r14 | 0 | small-r12 |
|  |  | sl-Subframe-r14 | 11111111  11111111  0000 | bs20-r14 |
|  |  | adjacencyPSCCH-PSSCH-r14 | TRUE | BOOLEAN |
|  |  | sizeSubchannel-r14 | 50 | ENUMERATED {n50} |
|  |  | numSubchannel-r14 | 1 | ENUMERATED {n1} |
|  |  | startRB-Subchannel-r14 | 0 |  |
|  |  | startRB-PSCCH-Pool-r14 | 0 |  |
|  |  | dataTxParameters-r14 SEQUENCE { |  |  |
|  |  | alpha-r12 | al0 | Sidelink power control: al0 corresponds to 0 |
|  |  | p0-r12 | 31 | INTEGER (-126..31), unit dBm |
|  |  | } |  |  |
|  |  | } |  |  |
|  | v2x-CommTxPoolExceptional-r14 | SL-CommResourcePoolV2X -r14 SEQUENCE { |  | Tx Pool Exceptional |
|  |  | sl-OffsetIndicator-r14 | 0 | small-r12 |
|  |  | sl-Subframe-r14 | 00000000  00000000  1111 | bs20-r14 |
|  |  | adjacencyPSCCH-PSSCH-r14 | TRUE | BOOLEAN |
|  |  | sizeSubchannel-r14 | 50 | ENUMERATED {n50} |
|  |  | numSubchannel-r14 | 1 | ENUMERATED {n1} |
|  |  | startRB-Subchannel-r14 | 0 |  |
|  |  | startRB-PSCCH-Pool-r14 | 0 |  |
|  |  | dataTxParameters-r14 SEQUENCE { |  |  |
|  |  | alpha-r12 | al0 | Sidelink power control: al0 corresponds to 0 |
|  |  | p0-r12 | 31 | INTEGER (-126..31), unit dBm |
|  |  | } |  |  |
|  |  | } |  |  |
|  | p2x-CommTxPoolNormal-r14 |  |  | Not present |
|  | v2x-ResourceSelectionConfig-r14 | SL-CommTxPoolSensingConfig-r14 ::= SEQUENCE { |  |  |
|  |  | pssch-TxConfigList-r14 ::= SEQUENCE { | SL-PSSCH-TxConfig-r14 |  |
|  |  | typeTxSync-r14 | *Set according to the specific test configuration* | ENUMERATED {gnss, enb, ue} |
|  |  | thresUE-Speed-r14 | kmph200 |  |
|  |  | parametersAboveThres-r14 SEQUENCE { |  |  |
|  |  | minMCS-PSSCH-r14 | 0 |  |
|  |  | maxMCS-PSSCH-r14 | 15 |  |
|  |  | minSubChannel-NumberPSSCH-r14 | 1 |  |
|  |  | maxSubchannel-NumberPSSCH-r14 | 1 |  |
|  |  | allowedRetxNumberPSSCH-r14 | Both |  |
|  |  | maxTxPower-r14 | Not present |  |
|  |  | } |  |  |
|  |  | parametersBelowThres-r14 SEQUENCE { |  |  |
|  |  | minMCS-PSSCH-r14 | 4 |  |
|  |  | maxMCS-PSSCH-r14 | 25 |  |
|  |  | minSubChannel-NumberPSSCH-r14 | 1 |  |
|  |  | maxSubchannel-NumberPSSCH-r14 | 1 |  |
|  |  | allowedRetxNumberPSSCH-r14 | n1 |  |
|  |  | maxTxPower-r14 | Not present |  |
|  |  | } |  |  |
|  |  | } |  |  |
|  |  | thresPSSCH-RSRP-List-r14 SEQUENCE (SIZE (64)) OF SL-ThresPSSCH-RSRP-r14 { |  |  |
|  |  | SL-ThresPSSCH-RSRP-r14[n] | 1 | For n=1,2,…,64, where n denotes the index for the threshold used for sensing based UE autonomous resource selection |
|  |  | } |  |  |
|  |  | restrictResourceReservationPeriod-r14 | {v1} | BIT STRING (SIZE (10)) |
|  |  | probResourceKeep-r14 | v0 |  |
|  |  | } |  |  |
|  | zoneConfig-r14 |  |  | Not present |
| } |  |  |  |  |

### A.3.24.3 Reference measurement channels for V2X Sidelink Communication

Table A.3.24.3-1: PSCCH Reference Measurement Channels

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
| Reference channel | |  | CC.1A HD |
| Channel bandwidth | | MHz | 10 |
| Allocated PSCCH resource blocks | |  | 2 |
| DFT-OFDM symbols per subframe (see Note 1) | |  | 9 |
| Modulation | |  | QPSK |
| Information Bit Payload (without CRC) | | Bits | 32 |
| Information Bit | SCI Format |  | 1 |
| Priority |  | As set by higher layers |
| Resource reservation |  | 0 |
| Modulation and coding scheme |  | Set as the PSSCH MCS specified in the test |
| Retransmission index |  | Note 4 |
| Time gap between initial transmission and retransmission |  | 0 (Note 3) |
| Frequency resource location of the initial transmission and retransmission |  | Initial transmission: Set as per PSSCH RB allocation specific in the test  Retransmission: Note 4 |
| Reserved bits |  | Set all these bits to 0 |
| Transport block CRC | | Bits | 16 |
| Binary Channel Bits (see Note 2) | | Bits | 432 |
| Note 1: PSCCH transmissions are rate-matched for 10 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211.  Note 2: Binary channel bits calculated under assumption of 9 DFT-OFDM symbols per subframe.  Note 3: *SFgap* is the value indicated by "Time gap between initial transmission and retransmission" field in the configured sidelink grant, and *SFgap* =0 means no retransmission of the associated TB as per TS 36.213.  Note 4: UE is allowed to autonomously select the un-used or redundant bits/code-points in SCI format 1 | | | |

Table A.3.24.3-2: PSSCH Reference Measurement Channels

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Reference channel |  | CD.1A HD |
| Sidelink transmission mode |  | 4 |
| Channel bandwidth | MHz | 10 |
| Allocated PSSCH resource blocks |  | 48 |
| DFT-OFDM symbols per subframe (see Note 1) |  | 9 |
| Modulation |  | QPSK |
| Target Code Rate |  | 1/3 |
| Information Bit Payload (Transport block size) | Bits | 3496 |
| Transport block CRC | Bits | 24 |
| Number of PSSCH HARQ retransmissions |  | 0 |
| Binary Channel Bits (see Note 2) | Bits | 10368 |
| Note 1: PSSCH transmissions are rate-matched for 10 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211.  Note 2: Binary channel bits calculated under assumption of 9 DFT-OFDM symbols per subframe. | | |

Table A.3.24.3-3: PSSCH Reference Measurement Channels

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Reference channel |  | CD.1B HD |
| Sidelink transmission mode |  | 4 |
| Channel bandwidth | MHz | 10 |
| Allocated PSSCH resource blocks |  | 3 |
| DFT-OFDM symbols per subframe (see Note 1) |  | 9 |
| Modulation |  | QPSK |
| Target Code Rate |  | 1/3 |
| Information Bit Payload (Transport block size) | Bits | 208 |
| Transport block CRC | Bits | 24 |
| Number of PSSCH HARQ retransmissions |  | 0 |
| Binary Channel Bits (see Note 2) | Bits | 648 |
| Note 1: PSSCH transmissions are rate-matched for 10 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211.  Note 2: Binary channel bits calculated under assumption of 9 DFT-OFDM symbols per subframe. | | |

## A.3.25 Category M2 UE Test Cases

### A.3.25.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for Category M2 UE in both CEModeA and CEModeB.

### A.3.25.2 Principle of Cat-M2 UE Testing

In Annex A Cat-M2 UE test cases may be defined for both CEModeA and CEModeB to verify the same type of RRM requirement.

If test cases are defined in both CEModeA and CEmodeB in order to verify the same type of RRM requirement then the UE capable of CEModeB needs to be tested for the corresponding test(s) defined in CEModeA and/or in CEModeB according to the applicability rules defined in Table A.3.25.2-1.

The UE which is not capable of CEModeB shall be tested for all CEModeA test cases defined in Annex A.

Table A.3.25.2-1: Test case applicability rules for category M2 UE in CEModeA and CEModeB

|  |  |  |
| --- | --- | --- |
| Type of Test Cases | Coverage mode(s) Applicable for Testing | |
|  | **CEModeA** | **CEModeB** |
| A.4 E-UTRAN RRC IDLE State: Intra-frequency Cell Re-Selection Tests for Category M1 UE | X | X |
| A.4 E-UTRAN RRC IDLE State: Intrer-frequency Cell Re-Selection Tests for Category M1 UE | X | X |
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Intra-frequency with SFN acquisition Handover Tests for Category M1 UE | X |  |
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Inter-frequency with SFN acquisition Handover Tests for Category M1 UE | X |  |
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Intra-frequency without SFN acquisition Handover Tests for Category M1 UE |  | X |
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Inter-frequency without SFN acquisition Handover Tests for Category M1 UE |  | X |
| A.5 RRC Connection Control: E-UTRAN Intra-frequency RRC Re-Restablishment Tests for Category M1 UE |  | X |
| A.5 RRC Connection Control: E-UTRAN Inter-frequency RRC Re-Restablishment Tests for Category M1 UE |  | X |
| A.6 E-UTRAN Contention Based Random Access Tests for Cat-M1 UE |  | X |
| A.7 Timing and Signalling Characteristics: E-UTRAN UE Transmit Timing Timing Accuracy Tests for Category M2 UE |  | X |
| A.7 Timing and Signalling Characteristics: E-UTRAN Timing Advance Adjustment Accuracy Tests for Cat-M1 UE |  | X |
| A.7.3 Radio Link Monitoring: E-UTRAN Radio Link Monitoring Tests for Category M1 UE | X |  |
| A.7.3 Radio Link Monitoring: E-UTRAN Radio Link Monitoring Tests for for Early In-sync and Early Out-of-sync for Category M1 UE |  | X |
| A.8 Measurements Procedures: E-UTRAN Intra-frequency Event Triggered Reporting under Fading Propagation Conditions Tests for Category M1 UE | X | X |
| A.8 Measurements Procedures: E-UTRAN Inter-frequency Event Triggered Reporting under Fading Propagation Conditions Tests for Category M1 UE | X | X |
| A.8 Measurements Procedures: E-UTRAN Intra-frequency Serving Cell Event Triggered Reporting under Fading Propagation Conditions Tests for Category M1 UE without Gaps | X | N/A |
| A.8 Measurements Procedures: E-UTRAN Intra-frequency Identification of a New CGI of E-UTRA cell using Autonomous Gaps Tests for Category M1 UE | N/A | X |
| A.8.12 Measurements Procedures: E-UTRAN Intra-frequency RSTD measurement reporting delay tests for Category M2 UE | X | X |
| A.8.13 Measurements Procedures: E-UTRAN Inter-frequency RSTD measurement reporting delay tests for Category M2 UE | X | X |
| A.9 Measurement Performance Requirements: RSRP Intra-Frequency Measurement Accuracy Tests for Category M2 UE | X | X |
| A.9.7 Measurement Performance Requirements: E-UTRAN UE Rx–Tx Time Difference Measurement Accuracy Tests for Category M2 UE | X | N/A |
| A.9.8 Measurement Performance Requirements: E-UTRAN Intra-frequency RSTD Measurement Accuracy Tests for Category M2 UE | X | X |
| A.9.8 Measurement Performance Requirements: E-UTRAN Inter-frequency RSTD Measurement Accuracy Tests for Category M2 UE | X | X |

### A.3.25.3 Principle of Cat-M2 UE testing for inter-frequency RSTD measurement period requirements with measurement gaps

For the Cat-M2 UE configured with 1.4 MHz UE RF bandwidth, capable of supporting measurement gaps specified in Table 8.1.2.1-3 and requiring gaps for inter-frequency RSTD measurements, and which can be configured with applicable measurement gaps specified in Table 8.1.2.1-1 or Table 8.1.2.1-3, in order to verify inter-frequency RSTD measurement period with measurement gaps it is sufficient to verify the requirement only under the applicable measurement gaps specified in Table 8.1.2.1-3, for each of the CEModeA and CEModeB.

For the Cat-M2 UE in CEModeB configured with 5 MHz UE RF bandwidth, capable of supporting measurement gaps specified in Table 8.1.2.1-3 and requiring gaps for inter-frequency RSTD measurements, and which can be configured with applicable measurement gaps specified in Table 8.1.2.1-1 or Table 8.1.2.1-3, in order to verify inter-frequency RSTD measurement period with measurement gaps it is sufficient to verify the requirement only under the applicable measurement gaps specified in Table 8.1.2.1-3.

## A.3.26 sTTI and processing time reduction test cases with different sTTI/processing time reduction scheme

### A.3.26.1 Introduction

This clause defines a principle which is applicable to RRM performance requirement test cases with different TTI duration and processing time for a UE configured with *ShortTTI-r15* or *ShortProcessingTime=TRUE*.

### A.3.26.2 Principle of testing

If multiple test cases defined for different TTI duration and processing time are applicable to a UE configured with *ShortTTI-r15* or *ShortProcessingTime=TRUE* to verify the timing advance adjustment delay, from the UE performance point of view the test coverage can be considered fulfilled by executing only the test case with the shortest TTI duration and processing time among all the TTI duration and processing time supported by the UE. For a UE capable of *ShortTTI-r15* and *dl-STTI-Length-r15=subslot* configuration and *ProcessingTimelineSet-r15=set1*, coverage is fulfilled by executing only the test with configured *ShortTTI-r15*, *dl-STTI-Length-r15= subslot*, and *proc-Timeline-r15= nplus4set1*, and for a UE capable of *ShortTTI-r15* and *dl-STTI-Length-r15=subslot* configuration and *ProcessingTimelineSet-r15=set2*, coverage is fulfilled by executing only the test with configured *ShortTTI-r15*, *dl-STTI-Length-r15= subslot*, and *proc-Timeline-r15=nplus6set2*.

## A.3.27 LTE INACTIVE Cell Re-selection Test Cases

### A.3.27.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for INACTIVE mode cell-reselection under connectivity to 5GC.

### A.3.27.2 Principle of INACTIVE cell re-selection Testing

For a UE supporting RRC\_INACTIVE state, the requirements in Section 4A are considered fulfilled if the UE passes the cell-reselection test cases defined in Section A.4 for RRC\_IDLE state.

# A.4 E-UTRAN RRC\_IDLE state

## A.4.2 Cell Re-Selection

### A.4.2.1 E-UTRAN FDD – FDD Intra frequency case

#### A.4.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency cell reselection requirements specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.4.2.1.1-1 and A.4.2.1.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

Table A.4.2.1.1-1: General test parameters for FDD intra frequency cell reselection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 |  |
| Neighbour cells |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| Final condition | Visited cell |  | Cell1 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
|  | |  |  |  |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.1.1-2: Cell specific test parameters for FDD intra frequency cell reselection test case in AWGN

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | |
| BWchannel | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) |  | OP.2 FDD | | | OP.2 FDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote 1 |
| OCNG\_RBNote 1 |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | RSRP | | | RSRP | | |
|  | dB | 16 | -3.11 | 2.79 | -infinity | 2.79 | -3.11 |
| Note2 | dBm/15 kHz | -98 | | | | | |
|  | dB | 16 | 13 | 16 | -infinity | 16 | 13 |
| RSRP Note3 | dBm/15 kHz | -82 | -85 | -82 | -infinity | -82 | -85 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition |  | AWGN | | | | | |
| 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.4.2.1.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 8 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Intra + TSI, and to an already detected cell can be expressed as: TevaluateFDD,intra + TSI,

Where:

Tdetect,EUTRAN\_Intra See Table 4.2.2.3-1 in clause 4.2.2.3

TevaluateFDD,intra See Table 4.2.2.3-1 in clause 4.2.2.3

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s, allow 8 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.2 E-UTRAN TDD – TDD Intra frequency case

#### A.4.2.2.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency cell reselection requirements specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.4.2.2.1-1 and A.4.2.2.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.2.1-1: General test parameters for TDD intra frequency cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 |  |
| Neighbour cells |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| Final condition | Visited cell |  | Cell1 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| Time offset between cells | | μs | 3 | Synchronous cells |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.2.1-2: Cell specific test parameters for TDD intra frequency cell re-selection test case in AWGN

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | |
| BWchannel | MHz | 10 | | | 10 | | |
| OCNG Pattern defined in A.3.2.2.2 (OP.2 TDD) |  | OP.2 TDD | | | OP.2 TDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote 1 |
| OCNG\_RBNote 1 |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| Qhysts | dB | 0 | | | 0 | | |
| Qoffsets, n | dB | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | RSRP | | | RSRP | | |
|  | dB | 16 | -3.11 | 2.79 | -infinity | 2.79 | -3.11 |
| Note2 | dBm/15 kHz | -98 | | | | | |
|  | dB | 16 | 13 | 16 | -infinity | 16 | 13 |
| RSRP Note3 | dBm/15 kHz | -82 | -85 | -82 | -infinity | -82 | -85 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition |  | AWGN | | | | | |
| 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.4.2.2.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay shall be less than 8 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Intra + TSI-EUTRA, and to an already detected cell can be expressed as: Tevaluate, E-UTRAN\_ intra + TSI-EUTRA,

Where:

Tdetect,EUTRAN\_Intra See Table 4.2.2.3-1 in clause 4.2.2.3

Tevaluate,E-UTRAN\_ intra See Table 4.2.2.3-1 in clause 4.2.2.3

TSI-EUTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s, allow 8 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.3 E-UTRAN FDD – FDD Inter frequency case

#### A.4.2.3.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter-frequency cell reselection requirements specified in clause 4.2.2.4.

The test scenario comprises of 2 E-UTRA FDD cells on 2 different carriers as given in tables A.4.2.3.1-1 and A.4.2.3.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.3.1-1: General test parameters for FDD-FDD inter frequency cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 during T1 |
| Neighbour cell |  | Cell2 |  |
| Final condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T3 |
| E-UTRA RF Channel Number | |  | 1, 2 | Two FDD carrier frequencies are used. |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.3.1-2: Cell specific test parameters for FDD-FDD inter-frequency cell reselection test case in AWGN

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | | |
| T1 | T2 | | T3 | T1 | | | T2 | | T3 |
| E-UTRA RF Channel number |  | 1 | | | | 2 | | | | | |
| BWchannel | MHz | 10 | | | | 10 | | | | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) |  | OP.2 FDD | | | | OP.2 FDD | | | | | |
| PBCH\_RA | dB | 0 | | | | 0 | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | | -140 | | | | | |
| Note 2 | dBm/15 kHz | -98 | | | | | | | | | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 | | -102 | | -infinity | | -86 | |
|  | dB | 14 | 14 | 14 | | -4 | | -infinity | | 12 | |
|  | dB | 14 | 14 | 14 | | -4 | -infinity | | | 12 | |
| TreselectionEUTRAN | s | 0 | | | | 0 | | | | | |
| Snonintrasearch | dB | 50 | | | | Not sent | | | | | |
| Threshx, high | dB | 48 | | | | 48 | | | | | |
| Threshserving, low | dB | 44 | | | | 44 | | | | | |
| Threshx, low | dB | 50 | | | | 50 | | | | | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.4.2.3.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

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

NOTE: The cell re-selection delay to higher priority cell can be expressed as: Thigher\_priority\_search + TevaluateFDD,inter + TSI , and to lower priority cell can be expressed as: TevaluateFDD,inter + TSI,

Where:

Thigher\_priority\_search See clause 4.2.2

TevaluateFDD,inter See Table 4.2.2.4-1 in clause 4.2.2.4

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

### A.4.2.4 E-UTRAN FDD – TDD Inter frequency case

#### A.4.2.4.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-TDD inter-frequency cell reselection requirements specified in clause 4.2.2.4.

The test scenario comprises of 1 E-UTRA FDD cell and 1 E-UTRA TDD cell as given in tables A.4.2.4.1-1 and A.4.2.4.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.4.1-1: General test parameters for FDD-TDD inter frequency cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 during T1 |
| Neighbour cell |  | Cell2 |  |
| Final condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T3 |
| Cell 1 E-UTRA RF Channel Number | |  | 1 | One FDD carrier frequency is used. And Cell 1 is on RF channel number 1. |
| Cell 2 E-UTRA RF Channel Number | |  | 2 | One TDD carrier frequencies is used. And Cell 2 is on RF channel number 2. |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| E-UTRA FDD PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E-UTRA TDD PRACH configuration | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| E-UTRA FDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| E-UTRA TDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.4.1-2: Cell specific test parameters for FDD-TDD inter-frequency cell reselection test case in AWGN

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | | |
| T1 | T2 | | T3 | T1 | | | T2 | | T3 |
| E-UTRA RF Channel number |  | 1 | | | | 2 | | | | | |
| BWchannel | MHz | 10 | | | | 10 | | | | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) and A.3.2.2.2 (OP.2 TDD) |  | OP.2 FDD | | | | OP.2 TDD | | | | | |
| PBCH\_RA | dB | 0 | | | | 0 | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | | -140 | | | | | |
| Note 2 | dBm/15 kHz | -98 | | | | | | | | | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 | | -102 | | -infinity | | -86 | |
|  | dB | 14 | 14 | 14 | | -4 | | -infinity | | 12 | |
|  | dB | 14 | 14 | 14 | | -4 | -infinity | | | 12 | |
| TreselectionEUTRAN | s | 0 | | | | 0 | | | | | |
| Snonintrasearch | dB | 50 | | | | Not sent | | | | | |
| Threshx, high | dB | 48 | | | | 48 | | | | | |
| Threshserving, low | dB | 44 | | | | 44 | | | | | |
| Threshx, low | dB | 50 | | | | 50 | | | | | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.4.2.4.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

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

NOTE: The cell re-selection delay to higher priority cell can be expressed as: Thigher\_priority\_search + Tevaluate,E-UTRAN\_inter  + TSI-EUTRA , and to lower priority cell can be expressed as: Tevaluate,E-UTRAN\_inter  + TSI-EUTRA,

Where:

Thigher\_priority\_search See clause 4.2.2

Tevaluate,E-UTRAN\_inter  See Table 4.2.2.4-1 in clause 4.2.2.4

TSI-EUTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

### A.4.2.5 E-UTRAN TDD – FDD Inter frequency case

#### A.4.2.5.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-FDD inter-frequency cell reselection requirements specified in clause 4.2.2.4.

The test scenario comprises of 1 E-UTRA TDD cell and 1 E-UTRA FDD cell as given in tables A.4.2.5.1-1 and A.4.2.5.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.5.1-1: General test parameters for TDD-FDD inter frequency cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 during T1 |
| Neighbour cell |  | Cell2 |  |
| Final condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T3 |
| Cell 1 E-UTRA RF Channel Number | |  | 1 | One TDD carrier frequency is used. And Cell 1 is on RF channel number 1. |
| Cell 2 E-UTRA RF Channel Number | |  | 2 | One FDD carrier frequencies is used. And Cell 2 is on RF channel number 2. |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| E-UTRA TDD PRACH configuration | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| E-UTRA FDD PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E-UTRA FDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| E-UTRA TDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.5.1-2: Cell specific test parameters for TDD-FDD inter-frequency cell reselection test case in AWGN

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | | |
| T1 | T2 | | T3 | T1 | | | T2 | | T3 |
| E-UTRA RF Channel number |  | 1 | | | | 2 | | | | | |
| BWchannel | MHz | 10 | | | | 10 | | | | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) and A.3.2.2.2 (OP.2 TDD) |  | OP.2 TDD | | | | OP.2 FDD | | | | | |
| PBCH\_RA | dB | 0 | | | | 0 | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | | -140 | | | | | |
| Note 2 | dBm/15 kHz | -98 | | | | | | | | | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 | | -102 | | -infinity | | -86 | |
|  | dB | 14 | 14 | 14 | | -4 | | -infinity | | 12 | |
|  | dB | 14 | 14 | 14 | | -4 | -infinity | | | 12 | |
| TreselectionEUTRAN | s | 0 | | | | 0 | | | | | |
| Snonintrasearch | dB | 50 | | | | Not sent | | | | | |
| Threshx, high | dB | 48 | | | | 48 | | | | | |
| Threshserving, low | dB | 44 | | | | 44 | | | | | |
| Threshx, low | dB | 50 | | | | 50 | | | | | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.4.2.5.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

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

NOTE: The cell re-selection delay to higher priority cell can be expressed as: Thigher\_priority\_search + Tevaluate,E-UTRAN\_inter  + TSI-EUTRA , and to lower priority cell can be expressed as: Tevaluate,E-UTRAN\_inter  + TSI-EUTRA,

Where:

Thigher\_priority\_search See clause 4.2.2

Tevaluate,E-UTRAN\_inter  See Table 4.2.2.4-1 in clause 4.2.2.4

TSI-EUTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

### A.4.2.6 E-UTRAN TDD – TDD: Inter frequency case

#### A.4.2.6.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter-frequency cell reselection requirements specified in clause 4.2.2.4.

The test scenario comprises of 2 E-UTRA TDD cells on 2 different carriers as given in tables A.4.2.6.1-1 and A.4.2.6.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.6.1-1: General test parameters for TDD-TDD inter frequency cell reselection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cells |  | Cell1 | UE shall perform reselection to cell 1 during T1 |
| Neighbour cell |  | Cell2 |  |
| Final condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T3 |
| E-UTRA RF Channel Number | |  | 1, 2 | Two TDD carrier frequencies are used. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.6.1-2: Cell specific test parameters for TDD-TDD inter-frequency cell reselection test case in AWGN

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | |
| T1 | T2 | T3 | T1 | T2 | T3 | |
| E-UTRA RF Channel number |  | 1 | | | 2 | | | |
| BWchannel | MHz | 10 | | | 10 | | | |
| OCNG Pattern defined in A.3.2.2.2 (OP.2 TDD) |  | OP.2 TDD | | | OP.2 TDD | | | |
| PBCH\_RA | dB | 0 | | | 0 | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | -140 | | | |
| Note 2 | dBm/15 kHz | -98 | | | | | | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 | -102 | -infinity | | -86 |
|  | dB | 14 | 14 | 14 | -4 | -infinity | | 12 |
|  | dB | 14 | 14 | 14 | -4 | -infinity | | 12 |
| TreselectionEUTRAN | S | 0 | | | 0 | | | |
| Snonintrasearch | dB | 50 | | | Not sent | | | |
| Threshx, high | dB | 48 | | | 48 | | | |
| Threshserving, low | dB | 44 | | | 44 | | | |
| Threshx, low | dB | 50 | | | 50 | | | |
| Propagation Condition |  | AWGN | | | | | | |
| 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.4.2.6.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

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

NOTE: The cell re-selection delay to higher priority cell can be expressed as: Thigher\_priority\_search + Tevaluate,E-UTRAN\_inter  + TSI-EUTRA , and to lower priority cell can be expressed as: Tevaluate,E-UTRAN\_inter  + TSI-EUTRA,

Where:

Thigher\_priority\_search See clause 4.2.2

Tevaluate,E-UTRAN\_inter  See Table 4.2.2.4-1 in clause 4.2.2.4

TSI-EUTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

### A.4.2.7 E-UTRAN FDD – FDD Inter frequency case in the existence of non-allowed CSG cell

#### A.4.2.7.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter-frequency cell reselection requirements specified in clause 4.2.2.4 when there is the interference from non-allowed CSG cell and the layers have equal priority.

The test scenario comprises of 2 E-UTRA FDD cells on 2 different carriers and 1 non-allowed E-UTRA FDD CSG cell as given in tables A.4.2.7.1-1 and A.4.2.7.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 3 is a non-allowed CSG cell. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.7.1-1: General test parameters for FDD-FDD inter frequency cell re-selection test case with non-allowed CSG cell

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 | UE shall be forced to cell 1 in the initialisation phase |
| Final condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T2 |
| E-UTRA RF Channel Number | |  | 1, 2 | Two FDD carrier frequencies are used. |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that the non-allowed CSG cell is identified. |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that whether cell re-selection would not occur is insured. |

Table A.4.2.7.1-2: Cell specific test parameters for FDD-FDD inter frequency cell re-selection test case with non-allowed CSG cell

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | Cell 3(Non-allowed CSG cell) | | | |
| T1 | T2 | T3 | T1 | | T2 | T3 | | T1 | | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | | 2 | | | | | 1 | | | |
| BW**channel** | MHz | 10 | | | 10 | | | | | 10 | | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) |  | OP.2 FDD | | | OP.2 FDD | | | | | OP.2 FDD | | | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | 0 | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | -140 | | | | | -140 | | | |
| Qqualmin | dB | -20 | | | | | | | | | | | |
| Note 2 | dBm/15 kHz | -98 | | | | | | | | | | | |
| RSRP Note 3 | dBm/15 kHz | -90 | -90 | -85 | -Infinity | -85 | | | -90 | -90 | -85 | | -60 |
| RSRQ Note 3 | dB | -14.1 | -17.1 | -35.8 |  |  | | |  | -14.1 | -12.1 | | -10.8 |
|  | dB | -0.64 | -5.21 | -25 | -Infinity | 13 | | | 8 | -0.64 | 4.36 | | 24.8 |
|  | dB | 8 | 8 | 13 | -Infinity | 13 | | | 8 | 8 | 13 | | 38 |
| Treselection | s | 0 | | | 0 | | | | | 0 | | | |
| Snonintrasearch | dB | -10 | | | Not sent | | | | | Not sent | | | |
| Propagation Condition |  | AWGN | | | | | | | | | | | |
| 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 and RSRQ levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | | | |

#### A.4.2.7.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

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

The probability of reselection from Cell 2 to Cell 1 during T3 observed during testing shall be less than 10%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Inter + TSI,

Where:

Tdetect,EUTRAN\_Inter See Table 4.2.2.4-1 in clause 4.2.2.4

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell in the test case.

### A.4.2.8 E-UTRAN TDD – TDD Inter frequency case in the existence of non-allowed CSG cell

#### A.4.2.8.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter-frequency cell reselection requirements specified in clause 4.2.2.4 when there is the interference from non-allowed CSG cell and the layers have equal priority.

The test scenario comprises of 2 E-UTRA TDD cells on 2 different carriers and 1 non-allowed E-UTRA TDD CSG cell as given in tables A.4.2.8.1-1 and A.4.2.8.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 3 is a non-allowed CSG cell. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.8.1-1: General test parameters for TDD-TDD inter frequency cell re-selection test case with non-allowed CSG cell

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 | UE shall be forced to cell 1 in the initialisation phase |
| Final condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T2 |
| E-UTRA RF Channel Number | |  | 1, 2 | Two TDD carrier frequencies are used. |
| Time offset between cells | | μs | 3 | Synchronous cells |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| PRACH configuration | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that the non-allowed CSG cell is identified. |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that whether cell re-selection would not occur is insured. |

Table A.4.2.8.1-2: Cell specific test parameters for TDD-TDD inter frequency cell re-selection test case with non-allowed CSG cell

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3  (Non-allowed CSG cell) | | |
| T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | | 2 | | | 1 | | |
| BW**channel** | MHz | 10 | | | 10 | | | 10 | | |
| OCNG Pattern defined in A.3.2.2.2 (OP.2 TDD) |  | OP.2 TDD | | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | -140 | | | -140 | | |
| Qqualmin | dB | -20 | | | | | | | | |
| Note 2 | dBm/  15kHz | -98 | | | | | | | | |
| RSRP Note 3 | dBm/  15kHz | -90 | -90 | -85 | -Infinity | -85 | -90 | -90 | -85 | -60 |
| RSRQ Note 3 | dB | -14.1 | -17.1 | -35.8 |  |  |  | -14.1 | -12.1 | -10.8 |
|  | dB | -0.64 | -5.21 | -25 | -Infinity | 13 | 8 | -0.64 | 4.36 | 24.8 |
|  | dB | 8 | 8 | 13 | -Infinity | 13 | 8 | 8 | 13 | 38 |
| Treselection | S | 0 | | | 0 | | | 0 | | |
| Snonintrasearch | dB | -10 | | | Not sent | | | Not sent | | |
| Propagation Condition |  | AWGN | | | | | | | | |
| 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 and RSRQ levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | |

#### A.4.2.8.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

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

The probability of reselection from Cell 2 to Cell 1 during T3 observed during testing shall be less than 10%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Inter + TSI,

Where:

Tdetect,EUTRAN\_Inter See Table 4.2.2.4-1 in clause 4.2.2.4

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell in the test case.

### A.4.2.9 E-UTRAN FDD – FDD Intra frequency case for 5MHz bandwidth

#### A.4.2.9.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.4.2.1.1.

The parameters of this test are the same as defined in Subclause A.4.2.1.1 except that the values of the parameters in the Table A.4.2.9.1-1 will replace the values of the corresponding parameters in A.4.2.1.1-1, and the values of the parameters in the Table A.4.2.9.1-2 will replace the values of the corresponding parameters in A.4.2.1.1-2.

Table A.4.2.9.1-1: General test parameters for FDD intra frequency cell reselection test case for 5MHz bandwidth

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| Channel Bandwidth (BWchannel) | MHz | 5 |  |
| Note 1: See Table A.4.2.1.1-1 for the other parameters.  Note 2: This is according to the principle defined in section A.3.7.2. | | | |

Table A.4.2.9.1-2: Cell specific test parameters for FDD intra frequency cell reselection test case in AWGN for 5MHz

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | MHz | 5 | | | 5 | | |
| OCNG Patterns defined in A.3.2.1.16 (OP.16 FDD) |  | OP.16 FDD | | | OP.16 FDD | | |
| 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: See Table A.4.2.1.1-2 for the other parameters. | | | | | | | |

#### A.4.2.9.2 Test Requirements

The test requirements defined in section A.4.2.1.2 shall apply to this test case.

### A.4.2.10 E-UTRAN FDD – FDD reselection using an increased number of carriers

#### A.4.2.10.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter-frequency cell reselection requirements for increased UE carrier monitoring specified in clause 4.2.2.4.

The test scenario comprises of indicating 8 E-UTRA FDD interfrequency cells on 8 different carriers in the neighbour list of cell 1 as given in tables A.4.2.10.1-1 and A.4.2.10.1-2. Each repetition of the test consists of five successive time periods, with time duration of T0, T1, T2, T3 and T4 respectively. In the initialisation phase and at the start of each repetition of T0, the test equipment provides signals for cell 1 (serving cell), and selects frequencies for cells 2, 3 and 4 which are chosen from the 8 intefrequency layers which are configured in the UE neighbour cell list as described in general and cell specific parameters. The neighbour lists of cells 2, 3 and 4 shall include the frequency of cell 1 in the normal performance group as well as the other frequencies configured to the UE in the test.

Cell 1, 2, 3 and 4 are identified by the UE during time phase T0. Cell 1, cell 2, cell 3 and cell 4 all belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2, 3 or 4. Cells 1, 2, 3 and 4 all have equal absolute priority.

Table A.4.2.10.1-1: General test parameters for FDD-FDD inter frequency cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| T0 | Active cell |  | Cell1 | T0 is repeated on each repetition of the test. In T0 the test equipment selects frequencies for cell 2, 3, 4 and then time is allowed for the UE to identify the neighbour cells. See cell specific parameters for detailed settings. |
| T1 start condition | Active cell |  | Cell 1 |  |
| T1 end condition | Active cell |  | Cell 2 | UE shall perform reselection to cell 2 during T1 |
| Neighbour cell |  | Cell 1, cell 3, cell 4 |  |
| T2 end condition | Active cell |  | Cell 3 | UE shall perform reselection to cell 3 during T2 |
| Neighbour cell |  | Cell 1, cell 2, cell 4 |  |
| T3 end condition | Active cell |  | Cell 4 | UE shall perform reselection to cell 4 during T3 |
| Neighbour cell |  | Cell 1, cell 2, cell 3 |  |
| T4 end condition | Active cell |  | Cell 1 | UE shall perform reselection to cell 1 during T4 |
|  | Neighbour cell |  | Cell 2, cell 3, cell 4 |  |
| UE configured E-UTRA RF Channel Number | |  | 1, 2,3,4,5,6,7,8,9 | Serving cell and eight xDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6,7,8 and 9 are indicated to have reduced performance |
| Test eqipment configuration | |  | Cell 1 uses UTRA RF channel number 1  Cells 2,3,4 are randomly selected to use different frequencies selected from frequencies 2,3,4,5,6,7,8,9 |  |
| PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 [16] |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T0 | | s | (Test equipment frequency selection and configuration time) + 960 | T0 is defined so that the Test equipment selects frequencies and configures the cells, then the UE cell detection time is taken into account. |
| T1 | | s | 25 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 200 | T2 need to be defined so that cell re-selection reaction time is taken into account |
| T3 | | s | 200 | T3 need to be defined so that cell re-selection reaction time is taken into account. |
| T4 | | s | 25 | T4 need to be defined so that cell re-selection reaction time is taken into account |

Table A.4.2.10.1-2: Cell specific test parameters for FDD-FDD inter-frequency cell reselection test case in AWGN

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | | Cell 3 | | | | | Cell 4 | | | | |
| T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel number |  | 1 | | | | | Randomly selected from 2,3,4 such that cell 2 is in the normal performance group | | | | | Randomly selected from 5,6,7,8,9 such that cell 3 is in the reduced performance group | | | | | Randomly selected from 5,6,7,8,9 such that cell 4 is in the reduced performance group | | | | |
| BWchannel | MHz | 5MHz: NRB = 25  10MHz: NRB = 50 | | | | | 5MHz: NRB,= 25  10MHz: NRB,= 50 | | | | | 5MHz: NRB = 25  10MHz: NRB = 50 | | | | | 5MHz: NRB= 25  10MHz: NRB, = 50 | | | | |
| OCNG patterns |  | OP.16 FDD (5MHz)  OP.2 FDD (10MHz) | | | | | OP.16 FDD (5MHz)  OP.2 FDD (10MHz) | | | | | OP.16 FDD (5MHz)  OP.2 FDD (10MHz) | | | | | OP.16 FDD (5MHz)  OP.2 FDD (10MHz) | | | | |
| PBCH\_RA | dB | 0 | | | | | 0 | | | | | 0 | | | | | 0 | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | | | -140 | | | | | -140 | | | | | -140 | | | | |
| Note 2 | dBm/15 kHz | -98 | | | | | -98 | | | | | -98 | | | | | -98 | | | | |
|  | dB | 14 | 8 | 8 | 8 | 14 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 |
|  | dB | 14 | 8 | 8 | 8 | 14 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 |
| RSRP Note 3 | dBm/15 kHz | -84 | -90 | -90 | -90 | -84 | -90 | -84 | -90 | -90 | -90 | -90 | -90 | -84 | -90 | -90 | -90 | -90 | -90 | -84 | -90 |
| TreselectionEUTRAN | s | 0 | | | | | 0 | | | | | 0 | | | | | 0 | | | | |
| Snonintrasearch | dB | 62 | | | | | 62 | | | | | 62 | | | | | 62 | | | | |
| Propagation Condition |  | AWGN | | | | | AWGN | | | | | AWGN | | | | | AWGN | | | | |
| Antenna Configuration |  | 1x2 | | | | | 1x2 | | | | | 1x2 | | | | | 1x2 | | | | |
| Timing offset to Cell 1 |  | - | | | | | 3ms | | | | | 3ms | | | | | 3ms | | | | |
| 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | | | | | | | | | | | |

#### A.4.2.10.2 Test Requirements

The cell reselection delay is defined as the time from the beginning of a relevant time period, to the moment when the UE camps on the target cell, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on the target cell.

The reselection delays shall meet the requirements in table A.4.2.10.2-1.

Table A.4.2.10.2-1 : Reselection delay requirements

|  |  |  |
| --- | --- | --- |
| Time phase | Target cell | Requirement for reselection delay (seconds) |
| T1 | Cell 2 (normal performance group) | 20.5 |
| T2 | Cell 3 (reduced performance group) | 193.3 |
| T3 | Cell 4 (reduced performance group) | 193.3 |
| T4 | Cell 1 (normal performance group) | 20.5 |

NOTE: The cell re-selection delay to a normal performance group cell can be expressed as: Kcarrier,normal \* Tevaluate,E-UTRAN\_Inter, + TSI , and to a reduced performance group cell can be expressed as: 6\* Kcarrier,reduced \* Tevaluate,E-UTRAN\_Inter, + TSI,

This gives a total of 20.48 s for normal performance group reselection and 193.28 s for reduced performance group reselection, allow 20.5 s for normal performance group and 193.3 s for reduced performance group in the test case. At least 90% of reselections to the reduced performance group shall be within the required time, and at least 90% of reselections to the normal performance group shall be within the required time, with a successful reselection counted if it is within the required time regardless of the carrier frequencies involved.

### A.4.2.11 E-UTRAN TDD – TDD reselection using an increased number of carriers

#### A.4.2.11.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter-frequency cell reselection requirements for increased UE carrier monitoring specified in clause 4.2.2.4.

The test scenario comprises of indicating 8 E-UTRA TDD interfrequency cells on 8 different carriers in the neighbour list of cell 1 as given in tables A.4.2.11.1-1 and A.4.2.11.1-2. Each repetition of the test consists of five successive time periods, with time duration of T0, T1, T2, T3 and T4 respectively. In the initialisation phase and at the start of each repetition of T0, the test equipment provides signals for cell 1 (serving cell), and selects frequencies for cells 2, 3 and 4 which are chosen from the 8 intefrequency layers which are configured in the UE neighbour cell list as described in general and cell specific parameters. The neighbour lists of cells 2, 3 and 4 shall include the frequency of cell 1 in the normal performance group as well as the other frequencies configured to the UE in the test.

Cell 1, 2, 3 and 4 are identified by the UE during time phase T0. Cell 1, cell 2, cell 3 and cell 4 all belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2, 3 or 4. Cells 1, 2, 3 and 4 all have equal absolute priority.

Table A.4.2.11.1-1: General test parameters for TDD-TDD inter frequency cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| T0 | Active cell |  | Cell1 | T0 is repeated on each repetition of the test. In T0 the test equipment selects frequencies for cell 2,3,4 and then time is allowed for the UE to identify the neighbour cells. See cell specific parameters for detailed settings. |
| T1 start condition | Active cell |  | Cell 1 |  |
| T1 end condition | Active cell |  | Cell 2 | UE shall perform reselection to cell 2 during T1 |
| Neighbour cell |  | Cell 1, cell 3, cell 4 |  |
| T2 end condition | Active cell |  | Cell 3 | UE shall perform reselection to cell 3 during T2 |
| Neighbour cell |  | Cell 1, cell 2, cell 4 |  |
| T3 end condition | Active cell |  | Cell4 | UE shall perform reselection to cell 4 during T3 |
| Neighbour cell |  | Cell 1, cell 2, cell 3 |  |
| T4 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 during T4 |
|  | Neighbour cell |  | Cell 2, cell 3, cell 4 |  |
| UE configured E-UTRA RF Channel Number | |  | 1, 2,3,4,5,6,7,8,9 | Serving cell and eight xDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6,7,8 and 9 are indicated to have reduced performance |
| Test eqipment configuration | |  | Cell 1 uses UTRA RF channel number 1  Cells 2,3,4 are randomly selected to use different frequencies selected from frequencies 2,3,4,5,6,7,8,9 |  |
| PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 [16] |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T0 | | s | (Test equipment frequency selection and configuration time) + 960 | T0 is defined so that the Test equipment selects frequencies and configures the cells, then the UE cell detection time is taken into account. |
| T1 | | s | 25 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 200 | T2 need to be defined so that cell re-selection reaction time is taken into account |
| T3 | | s | 200 | T3 need to be defined so that cell re-selection reaction time is taken into account. |
| T4 | | s | 25 | T4 need to be defined so that cell re-selection reaction time is taken into account |

Table A.4.2.11.1-2: Cell specific test parameters for TDD-TDD inter-frequency cell reselection test case in AWGN

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | | Cell 3 | | | | | Cell 4 | | | | |
| T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel number |  | 1 | | | | | Randomly selected from 2,3,4 such that cell 2 is in the normal performance group | | | | | Randomly selected from 5,6,7,8,9 such that cell 3 is in the reduced performance group | | | | | Randomly selected from 5,6,7,8,9 such that cell 4 is in the reduced performance group | | | | |
| BWchannel | MHz | 5MHz: NRB = 25  10MHz: NRB = 50 | | | | | 5MHz: NRB,= 25  10MHz: NRB,= 50 | | | | | 5MHz: NRB = 25  10MHz: NRB = 50 | | | | | 5MHz: NRB= 25  10MHz: NRB, = 50 | | | | |
| OCNG Patterns |  | 5MHz: OP.10 TDD  10MHz: OP.2 TDD | | | | | 5MHz: OP.10 TDD  10MHz: OP.2 TDD | | | | | 5MHz: OP.10 TDD  10MHz: OP.2 TDD | | | | | 5MHz: OP.10 TDD  10MHz: OP.2 TDD | | | | |
| PBCH\_RA | dB | 0 | | | | | 0 | | | | | 0 | | | | | 0 | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | | | -140 | | | | | -140 | | | | | -140 | | | | |
| Note 2 | dBm15 kHz | -98 | | | | | -98 | | | | | -98 | | | | | -98 | | | | |
|  | dB | 14 | 8 | 8 | 8 | 14 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 |
|  | dB | 14 | 8 | 8 | 8 | 14 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 |
| RSRP Note 3 | dBm/15 kHz | -84 | -90 | -90 | -90 | -84 | -90 | -84 | -90 | -90 | -90 | -90 | -90 | -84 | -90 | -90 | -90 | -90 | -90 | -84 | -90 |
| TreselectionEUTRAN | s | 0 | | | | | 0 | | | | | 0 | | | | | 0 | | | | |
| Snonintrasearch | dB | 62 | | | | | 62 | | | | | 62 | | | | | 62 | | | | |
| Propagation Condition |  | AWGN | | | | | AWGN | | | | | AWGN | | | | | AWGN | | | | |
| Antenna Configuration |  | 1x2 | | | | | 1x2 | | | | | 1x2 | | | | | 1x2 | | | | |
| Timing offset to Cell 1 |  | - | | | | | 3ms | | | | | 3ms | | | | | 3ms | | | | |
| 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | | | | | | | | | | | |

#### A.4.2.11.2 Test Requirements

The cell reselection delay is defined as the time from the beginning of a relevant time period, to the moment when the UE camps on the target cell, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on the target cell.

The reselection delays shall meet the requirements in table A.4.2.11.2-1

Table A.4.2.11.2-1 : Reselection delay requirements

|  |  |  |
| --- | --- | --- |
| Time phase | Target cell | Requirement for reselection delay (seconds) |
| T1 | Cell 2 (normal performance group) | 20.5 |
| T2 | Cell 3 (reduced performance group) | 193.3 |
| T3 | Cell 4 (reduced performance group) | 193.3 |
| T4 | Cell 1 (normal performance group) | 20.5 |

NOTE: The cell re-selection delay to a normal performance group cell can be expressed as: Kcarrier,normal \* Tevaluate,E-UTRAN\_Inter, + TSI , and to a reduced performance group cell can be expressed as: 6\* Kcarrier,reduced \* Tevaluate,E-UTRAN\_Inter, + TSI,

This gives a total of 20.48 s for normal performance group reselection and 193.28 s for reduced performance group reselection, allow 20.5 s for normal performance group and 193.3 s for reduced performance group in the test case. At least 90% of reselections to the reduced performance group shall be within the required time, and at least 90% of reselections to the normal performance group shall be within the required time, with a successful reselection counted if it is within the required time regardless of the carrier frequencies involved.

### A.4.2.12 E-UTRAN FDD – FDD Intra frequency case for Cat-M1 UE in normal coverage

#### A.4.2.12.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency cell reselection requirements for category M1 UE in normal coverage specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.4.2.12.1-1 and A.4.2.12.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

Table A.4.2.12.1-1: General test parameters for FDD intra frequency cell reselection test case for Cat-M1 UE in normal coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 |  |
| Neighbour cells |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| Final condition | Visited cell |  | Cell1 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Configuration | |  | PRACH\_2CE | Refer to A.3.16 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.12.1-2: Cell specific test parameters for FDD intra frequency cell reselection test case for Cat-M1 UE in normal coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | | | | |
| BWchannel | MHz | 10 | | | | | |
| OCNG Patterns |  | OP.6 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 |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | RSRP | | | RSRP | | |
| Note2 | dBm/15 kHz | -98 | | | | | |
|  | dB | 16 | 12 | 16 | -infinity | 16 | 12 |
|  | dB | 16 | -4.11 | 3.73 | -infinity | 3.73 | -4.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -86 | -82 | -infinity | -82 | -86 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

#### A.4.2.12.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 8 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Intra + TSI-EUTRA-M1-NC, and to an already detected cell can be expressed as: Tevaluate,EUTRAN\_Intra + TSI-EUTRA-M1-NC,

Where:

Tdetect,EUTRAN\_Intra See Table 4.2.2.3-1 in clause 4.2.2.3

Tevaluate,EUTRAN\_Intra See Table 4.2.2.3-1 in clause 4.2.2.3

TSI-EUTRA-M1-NC Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s, allow 8 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.13 E-UTRAN HD – FDD Intra frequency case for Cat-M1 UE in normal coverage

#### A.4.2.13.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-M1 UE specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA carrier and 2 cells as given in tables A.4.2.13.1-1 and A.4.2.13.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

Table A.4.2.13.1-1: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-M1 UE in normal coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 |  |
| Neighbour cells |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| Final condition | Visited cell |  | Cell1 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Configuration | |  | PRACH\_2CE | Refer to A.3.16 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.13.1-2: Cell specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-M1 UE in normal coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | | | | |
| BWchannel | MHz | 10 | | | | | |
| OCNG Patterns |  | OP.6 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 |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | RSRP | | | RSRP | | |
| Note2 | dBm/15 kHz | -98 | | | | | |
|  | dB | 16 | 12 | 16 | -infinity | 16 | 12 |
|  | dB | 16 | -4.11 | 3.73 | -infinity | 3.73 | -4.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -86 | -82 | -infinity | -82 | -86 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

#### A.4.2.13.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 8 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Intra + TSI-EUTRA-M1-NC, and to an already detected cell can be expressed as: Tevaluate,EUTRAN\_Intra + TSI-EUTRA-M1-NC,

Where:

Tdetect,EUTRAN\_Intra See Table 4.2.2.3-1 in clause 4.2.2.3

Tevaluate,EUTRAN\_Intra See Table 4.2.2.3-1 in clause 4.2.2.3

TSI-EUTRA-M1-NC Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s, allow 8 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.14 E-UTRAN TDD – TDD Intra frequency case for Cat-M1 UE in normal coverage

#### A.4.2.14.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency cell reselection requirements for Cat-M1 UE specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.4.2.14.1-1 and A.4.2.14.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.14.1-1: General test parameters for TDD intra frequency cell re-selection test case for Cat-M1 UE

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 |  |
| Neighbour cells |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| Final condition | Visited cell |  | Cell1 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH Configuration | |  | PRACH\_2CE | Refer to A.3.16 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.14.1-2: Cell specific test parameters for TDD intra frequency cell re-selection test case for Cat-M1 UE in AWGN in normal coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | | | | |
| BWchannel | MHz | 10 | | | | | |
| OCNG Patterns |  | OP.2 TDD | | | OP.2 TDD | | |
| 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 |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | RSRP | | | RSRP | | |
| Note2 | dBm/15 kHz | -98 | | | | | |
|  | dB | 16 | 12 | 16 | -infinity | 16 | 12 |
|  | dB | 16 | -4.11 | 3.73 | -infinity | 3.73 | -4.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -86 | -82 | -infinity | -82 | -86 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | μs | - | | | 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

#### A.4.2.14.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay shall be less than 8 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Intra + TSI-EUTRA-M1-NC, and to an already detected cell can be expressed as: Tevaluate, E-UTRAN\_ intra + TSI-EUTRA-M1-NC,

Where:

Tdetect,EUTRAN\_Intra See Table 4.2.2.3-1 in clause 4.2.2.3

Tevaluate,EUTRAN\_ intra See Table 4.2.2.3-1 in clause 4.2.2.3

TSI-EUTRA-M1-NC Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s, allow 8 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.15 E-UTRAN FDD – FDD Intra frequency case for Cat-M1 UE in enhanced coverage

#### A.4.2.15.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency cell reselection requirements for category M1 UE in enhanced coverage specified in clause 4.2.2.11.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.4.2.15.1-1 and A.4.2.15.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

Table A.4.2.15.1-1: General test parameters for FDD intra frequency cell reselection test case for Cat-M1 UE in enhanced coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 |  |
| Neighbour cells |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| Final condition | Visited cell |  | Cell1 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Parameters | |  | PRACH\_4CE | Refer to A.3.16 |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤340 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 20 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.15.1-2: Cell specific test parameters for FDD intra frequency cell reselection test case for Cat-M1 UE in enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | | | | |
| BWchannel | MHz | 10 | | | | | |
| OCNG Patterns |  | OP.6 FDD | | | OP.6 FDD | | |
| PBCH\_RA | dB | -3 | | | -3 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_PB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | RSRP | | | RSRP | | |
| Note2 | dBm/15 kHz | -98 | | | | | |
|  | dB | -7 | -12 | -7 | -infinity | -7 | -12 |
|  | dB | -7 | -12.79 | -7.27 | -infinity | -7.27 | -12.79 |
| RSRP Note3 | dBm/15 kHz | -105 | -110 | -105 | -infinity | -105 | -110 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

#### A.4.2.15.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 338 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 18 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Intra + TSI, and to an already detected cell can be expressed as: Tevaluate,EUTRAN\_Intra + TSI,

Where:

Tdetect,EUTRAN\_Intra See Table 4.2.2.11-1 in clause 4.2.2.11

Tevaluate,EUTRAN\_Intra See Table 4.2.2.11-1 in clause 4.2.2.11

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 6400 ms is assumed in this test case.

This gives a total of 337.36 s, allow 338 s for the cell re-selection delay to a newly detectable cell and 17.36 s, allow 18 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.16 E-UTRAN HD – FDD Intra frequency case for Cat-M1 UE in enhanced coverage

#### A.4.2.16.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-M1 UE specified in clause 4.2.2.11.

The test scenario comprises of 1 E-UTRA carrier and 2 cells as given in tables A.4.2.16.1-1 and A.4.2.16.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

Table A.4.2.16.1-1: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-M1 UE in enhanced coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 |  |
| Neighbour cells |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| Final condition | Visited cell |  | Cell1 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Parameters | |  | PRACH\_4CE | Refer to A.3.16 |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤340 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | ≤20 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.16.1-2: Cell specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-M1 UE in enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | | | | |
| BWchannel | MHz | 10 | | | | | |
| OCNG Patterns |  | OP.6 FDD | | | OP.6 FDD | | |
| PBCH\_RA | dB | -3 | | | -3 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_PB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | RSRP | | | RSRP | | |
| Note2 | dBm/15 kHz | -98 | | | | | |
|  | dB | -7 | -12 | -7 | -infinity | -7 | -12 |
|  | dB | -7 | -12.79 | -7.27 | -infinity | -7.27 | -12.79 |
| RSRP Note3 | dBm/15 kHz | -105 | -110 | -105 | -infinity | -105 | -110 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

#### A.4.2.16.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 338 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 18 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Intra + TSI, and to an already detected cell can be expressed as: Tevaluate,EUTRAN\_Intra + TSI,

Where:

Tdetect,EUTRAN\_Intra See Table 4.2.2.11-1 in clause 4.2.2.11

Tevaluate,EUTRAN\_Intra See Table 4.2.2.11-1 in clause 4.2.2.11

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 6400 ms is assumed in this test case.

This gives a total of 337.36 s, allow 338 s for the cell re-selection delay to a newly detectable cell and 17.36 s, allow 18 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.17 E-UTRAN TDD – TDD Intra frequency case for Cat-M1 UE in enhanced coverage

#### A.4.2.17.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency cell reselection requirements for Cat-M1 UE specified in clause 4.2.2.11.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.4.2.17.1-1 and A.4.2.17.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.17.1-1: General test parameters for TDD intra frequency cell re-selection test case for Cat-M1 UE

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 |  |
| Neighbour cells |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| Final condition | Visited cell |  | Cell1 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH Parameters | |  | PRACH\_4CE | Refer to A.3.16 |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤340 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | ≤20 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.17.1-2: Cell specific test parameters for TDD intra frequency cell re-selection test case for Cat-M1 UE in AWGN in enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | | | | |
| BWchannel | MHz | 10 | | | | | |
| OCNG Patterns |  | OP.2 TDD | | | OP.2 TDD | | |
| PBCH\_RA | dB | -3 | | | -3 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_PB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | RSRP | | | RSRP | | |
| Note2 | dBm/15 kHz | -98 | | | | | |
|  | dB | -7 | -12 | -7 | -infinity | -7 | -12 |
|  | dB | -7 | -12.79 | -7.27 | -infinity | -7.27 | -12.79 |
| RSRP Note3 | dBm/15 kHz | -105 | -110 | -105 | -infinity | -105 | -110 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | μs | - | | | 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

#### A.4.2.17.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 338 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 18 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Intra + TSI, and to an already detected cell can be expressed as: Tevaluate,EUTRAN\_Intra + TSI,

Where:

Tdetect,EUTRAN\_Intra See Table 4.2.2.11-1 in clause 4.2.2.11

Tevaluate,EUTRAN\_Intra See Table 4.2.2.11-1 in clause 4.2.2.11

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 6400 ms is assumed in this test case.

This gives a total of 337.36 s, allow 338 s for the cell re-selection delay to a newly detectable cell and 17.36 s, allow 18 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.18 HD – FDD Intra frequency case for UE Category NB1 In-Band mode in normal coverage

#### A.4.2.18.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.2.

The test scenario comprises of 1 E-UTRA carrier with two ecells of different cell ID and one NB-IoT carrier with 2 ncells of different physical cell ID, as given in tables A.4.2.18.1-1, A.4.2.18.1-2 and A.4.2.18.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

Table A.4.2.18.1-1: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NB-IOT operational mode | |  | In-band |  |
| Initial condition | Active cell |  | nCell1 |  |
| Neighbour cells |  | eCell1, eCell2, nCell2 |  |
| T2 end condition | Active cell |  | nCell2 |  |
| Neighbour cells |  | eCell1, eCell2, nCell1 |  |
| Final condition | Visited cell |  | nCell1 |  |
| E-UTRA RF Channel Number | |  | 1 | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| NPRACH Configuration | |  | NPRACH.R-1 | Refer to A.3.18 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 60 | T2 is defined so that cell re-selection time is taken into account. Once the UE has reselected to nCell2 (within T2) T3 starts |
| T3 | | s | 15 | T3 is defined so that cell re-selection time is taken into account. |

Table A.4.2.18.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | nCell 1 | | | nCell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | kHz | 180 | | | 180 | | |
| PRB location within eCell | **-** | eCell 1 BWchannel 5MHz: 17  eCell 1 BWchannel 10MHz: 30 | | | eCell 2 BWchannel 5MHz: 17  eCell 2 BWchannel 10MHz: 30 | | |
| NPBCH\_RA | dB | -3 | | | -3 | | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote 1 | dB |
| NOCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | NRSRP | | | NRSRP | | |
|  | dBm/15 kHz | Specified in Table A.4.2.18.1-3 | | | | | |
|  | dB | 17 | 13 | 17 | -infinity | 17 | 13 |
| Note2 | dB | 17 | -4.09 | 3.79 | -infinity | 3.79 | -4.09 |
| NRSRP Note2 | dBm/15 kHz | -81 | -85 | -81 | -infinity | -81 | -85 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | ms | - | | | 3 | | |
| Note 1: NOCNG 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: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

Table A.4.2.18.1-3: eCell 1 and eCell2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | MHz | 5 or 10 | | | 5 or 10 | | |
| NOCNG Pattern defined in clause D.3 | **-** | BWchannel 5MHz: NOP.4 FDD  BWchannel 10MHz: NOP.1 FDD | | | BWchannel 5MHz: NOP.4 FDD  BWchannel 10MHz: NOP.1 FDD | | |
| PBCH\_RA | | dB | -3 | | | -3 | | |
| PBCH\_RB | | dB |
| PSS\_RA | | dB |
| SSS\_RA | | dB |
| PDCCH\_RA | | dB |
| PDCCH\_RB | | dB |
| PDSCH\_RA | | dB |
| PDSCH\_RB | | dB |
| OCNG\_RANote 1 | | dB |
| OCNG\_RBNote 1 | | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Note2 | dBm/15 kHz | -98 | | | -98 | | |
| Note2 | dBm | 3 | 3 | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to eCell 1 | ms | - | | | 3 | | |
| 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.  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 .  Note 3: Void | | | | | | | |

#### A.4.2.18.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 59.32 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 14.82 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,NB\_Intra\_NB-IoT-NC + TSI, and to an already detected cell can be expressed as: Tevaluate, NB\_intra\_NB-IoT-NC + TSI,

Where:

Tdetect,NB\_Intra\_NB-IoT-NC See Table 4.6.2.2-1 in clause 4.6.2.2

Tevaluate, NB\_intra\_NB-IoT-NC See Table 4.6.2.2-1 in clause 4.6.2.2

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 59.32 s, allow 60 s for the cell re-selection delay to a newly detectable cell and 14.82 s, allow 15s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.19 HD – FDD Intra frequency case for UE Category NB1 In-Band mode in enhanced coverage

#### A.4.2.19.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.4.

The test scenario comprises of 1 E-UTRA carrier and a total of 4 cells as given in tables A.4.2.19.1-1, A.4.2.19.1-2 and A.4.2.19.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

Table A.4.2.19.1-1: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NB-IOT operational mode | |  | In-band |  |
| Initial condition | Active cell |  | nCell1 |  |
| Neighbour cells |  | eCell1, eCell2, nCell2 |  |
| T2 end condition | Active cell |  | nCell2 |  |
| Neighbour cells |  | eCell1, eCell2, nCell1 |  |
| Final condition | Visited cell |  | nCell1 |  |
| E-UTRA RF Channel Number | |  | 1 | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| NPRACH Configuration | |  | NPRACH.R-1 | Refer to A.3.18 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 67 | T2 is defined so that cell re-selection time is taken into account. Once the UE has reselected to nCell2 (within T2) T3 starts |
| T3 | | s | 22 | T3 is defined so that cell re-selection time is taken into account. |

Table A.4.2.19.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | nCell 1 | | | nCell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | kHz | 180 | | | 180 | | |
| PRB location within eCell | **-** | eCell 1 BWchannel 5MHz: 17  eCell 1 BWchannel 10MHz: 30 | | | eCell 2 BWchannel 5MHz: 17  eCell 2 BWchannel 10MHz: 30 | | |
| NPBCH\_RA | dB | -3 | | | -3 | | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote 1 | dB |
| NOCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -156 | -156 | -156 | -156 | -156 | -156 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | NRSRP | | | NRSRP | | |
|  | dBm/15 kHz | Specified in Table A.4.2.19.1-3 | | | | | |
|  | dB | -9 | -9 | -0.7 | -infinity | -0.7 | -9 |
| Note2 | dB | -9 | -11.67 | -1.21 | -infinity | -1.21 | -11.67 |
| NRSRP Note2 | dBm/15 kHz | -107 | -107 | -98.7 | -infinity | -98.7 | -107 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | ms | - | | | 3 | | |
| Note 1: NOCNG 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: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

Table A.4.2.19.1-3: eCell 1 and eCell2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | MHz | 5 or 10 | | | 5 or 10 | | |
| NOCNG Pattern | **-** | BWchannel 5MHz: NOP.4 FDD  BWchannel 10MHz: NOP.1 FDD | | | BWchannel 5MHz: NOP.4 FDD  BWchannel 10MHz: NOP.1 FDD | | |
| PBCH\_RA | | dB | -3 | | | -3 | | |
| PBCH\_RB | | dB |
| PSS\_RA | | dB |
| SSS\_RA | | dB |
| PDCCH\_RA | | dB |
| PDCCH\_RB | | dB |
| PDSCH\_RA | | dB |
| PDSCH\_RB | | dB |
| OCNG\_RANote 1 | | dB |
| OCNG\_RBNote 1 | | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Note2 | dBm/15 kHz | -98 | | | -98 | | |
| Note2 | dBm | 3 | 3 | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to eCell 1 | ms | - | | | 3 | | |
| 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.  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 .  Note 3: Void | | | | | | | |

#### A.4.2.19.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 66.32 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 21.12 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,NB\_Intra\_NB-IoT-EC + TSI, and to an already detected cell can be expressed as: Tevaluate, NB\_intra\_NB-IoT-EC + TSI,

Where:

Tdetect,NB\_Intra\_NB-IoT-EC See Table 4.6.2.4-1 in clause 4.6.2.4

Tevaluate, NB\_intra\_NB-IoT-EC See Table 4.6.2.4-1 in clause 4.6.2.4

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32s is assumed in this test case.

This gives a total of 66.32 s, allow 67 s for the cell re-selection delay to a newly detectable cell and 21.12s, allow 22s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.20 E-UTRAN FDD – FDD Intra frequency case for UE Category 1bis

#### A.4.2.20.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency cell reselection requirements for UE category 1bis specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.4.2.20.1-1 and A.4.2.20.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

Table A.4.2.20.1-1: General test parameters for FDD intra frequency cell reselection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 |  |
| Neighbour cells |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| Final condition | Visited cell |  | Cell1 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.20.1-2: Cell specific test parameters for FDD intra frequency cell reselection test case in AWGN

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | Cell 2 | | |
| T1 | T2 | T3 | | T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | | | 1 | | |
| BWchannel | MHz | 10 | | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 |  | OP.2 FDD | | | | OP.2 FDD | | |
| PBCH\_RA | dB | 0 | | | | 0 | | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote 1 |
| OCNG\_RBNote 1 |
| Qrxlevmin | dBm | -140 | | | | -140 | | |
| Pcompensation | dB | 0 | | | | 0 | | |
| Qhysts | dB | 0 | | | | 0 | | |
| Qoffsets, n | dB | 0 | | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | RSRP | | | | RSRP | | |
| Note2 | dBm/15 kHz | -98 | | | | | | |
|  | dB | 17 | 13 | 17 | | -infinity | 17 | 13 |
|  | dB | 17 | -4.09 | 3.79 | | -infinity | 3.79 | -4.09 |
| RSRP Note3 | dBm/15 kHz | -81 | -85 | -81 | | -infinity | -81 | -85 |
| Treselection | s | 0 | | | | 0 | | |
| Sintrasearch | dB | Not sent | | | | Not sent | | |
| Propagation Condition |  | AWGN | | | AWGN | | | |
| Antenna Configuration |  | 1x1 | | | 1x1 | | | |
| Timing offset to Cell 1  Asynchronous cells | ms | - | | | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | |

#### A.4.2.20.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 8 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Intra + TSI, and to an already detected cell can be expressed as: TevaluateFDD,intra + TSI,

Where:

Tdetect,EUTRAN\_Intra See Table 4.2.2.3-1 in clause 4.2.2.3

TevaluateFDD,intra See Table 4.2.2.3-1 in clause 4.2.2.3

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s, allow 8 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.21 E-UTRAN TDD – TDD Intra frequency case for UE Category 1bis

#### A.4.2.21.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency cell reselection requirements for UE category 1bis specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.4.2.21.1-1 and A.4.2.21.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.21.1-1: General test parameters for TDD intra frequency cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 |  |
| Neighbour cells |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| Final condition | Visited cell |  | Cell1 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.21.1-2: Cell specific test parameters for TDD intra frequency cell re-selection test case in AWGN

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | |
| BWchannel | MHz | 10 | | | 10 | | |
| OCNG Pattern defined in A.3.2.2.2 |  | OP.2 TDD | | | OP.2 TDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote 1 |
| OCNG\_RBNote 1 |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| Qhysts | dB | 0 | | | 0 | | |
| Qoffsets, n | dB | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | RSRP | | | RSRP | | |
| Note2 | dBm/15 kHz | -98 | | | | | |
|  | dB | 17 | 13 | 17 | -infinity | 17 | 13 |
|  | dB | 17 | -4.09 | 3.79 | -infinity | 3.79 | -4.09 |
| RSRP Note3 | dBm/15 kHz | -81 | -85 | -81 | -infinity | -81 | -85 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 1x1 | | | 1x1 | | |
| Timing offset to Cell 1  Synchronous cells | μs | - | | | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

#### A.4.2.21.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay shall be less than 8 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Intra + TSI-EUTRA, and to an already detected cell can be expressed as: Tevaluate, E-UTRAN\_ intra + TSI-EUTRA,

Where:

Tdetect,EUTRAN\_Intra See Table 4.2.2.3-1 in clause 4.2.2.3

Tevaluate,E-UTRAN\_ intra See Table 4.2.2.3-1 in clause 4.2.2.3

TSI-EUTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s, allow 8 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.22 E-UTRAN FDD – FDD Intra frequency case for UE configured with highSpeedEnhancedMeasFlag

#### A.4.2.22.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency cell reselection requirements for UE configured with *highSpeedEnhancedMeasFlag* specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.4.2.22.1-1 and A.4.2.22.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. *highSpeedEnhancedMeasFlag* is broadcasted to UE. Only Cell 1 is already identified by the UE prior to the start of the test, i.e., Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

Table A.4.2.22.1-1: General test parameters for E-UTRAN FDD – FDD Intra frequency case for UE configured with highSpeedEnhancedMeasFlag

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 |  |
| Neighbour cells |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| Final condition | Visited cell |  | Cell1 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤20 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | ≤8 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.22.1-2: Cell specific test parameters for E-UTRAN FDD – FDD Intra frequency case for UE configured with highSpeedEnhancedMeasFlag

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | |
| BWchannel | MHz | 5MHz: NRB,c = 25  10MHz: NRB,c = 50  20MHz: NRB,c = 100 | | | 5MHz: NRB,c = 25  10MHz: NRB,c = 50  20MHz: NRB,c = 100 | | |
| OCNG Patterns defined in A.3.2.1 |  | 5MHz: OP.16 FDD  10MHz: OP.2 FDD  20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD  10MHz: OP.2 FDD  20MHz: OP.12 FDD | | |
| PBCH\_RA | dB | -3 | | | -3 | | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote 1 |
| OCNG\_RBNote 1 |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| Qhysts | dB | 0 | | | 0 | | |
| Qoffsets, n | dB | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | RSRP | | | RSRP | | |
| Note2 | dBm/15 kHz | -98 | | | | | |
|  | dB | 16 | 13 | 16 | -infinity | 16 | 13 |
|  | dB | 16 | -3.11 | 2.79 | -infinity | 2.79 | -3.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -85 | -82 | -infinity | -82 | -85 |
| Treselection | s | 0 | | | 0 | | |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition |  | AWGN | | | AWGN 1750Hz Note4 | | |
| Antenna Configuration |  | 2x2 | | | 2x2 | | |
| 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The AWGN 1750Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1750Hz. | | | | | | | |

#### A.4.2.22.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 15 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 6 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Intra + TSI, and to an already detected cell can be expressed as: TevaluateFDD,intra + TSI,

Where:

Tdetect,EUTRAN\_Intra See Table 4.2.2.3-3 in clause 4.2.2.3

TevaluateFDD,intra See Table 4.2.2.3-3 in clause 4.2.2.3

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 14.08 s, allow 15 s for the cell re-selection delay to a newly detectable cell and 5.12 s, allow 6 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.23 E-UTRAN TDD – TDD Intra frequency case for UE configured with highSpeedEnhancedMeasFlag

#### A.4.2.23.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency cell reselection requirements for UE configured with *highSpeedEnhancedMeasFlag* specified specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.4.2.23.1-1 and A.4.2.23.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. *highSpeedEnhancedMeasFlag* is broadcasted to UE. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.23.1-1: General test parameters for E-UTRAN TDD – TDD Intra frequency case for UE configured with highSpeedEnhancedMeasFlag

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 |  |
| Neighbour cells |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| Final condition | Visited cell |  | Cell1 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤20 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | ≤8 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.23.1-2: Cell specific test parameters for E-UTRAN TDD – TDD Intra frequency case for UE configured with highSpeedEnhancedMeasFlag

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | |
| BWchannel | MHz | 5MHz: NRB,c = 25  10MHz: NRB,c = 50  20MHz: NRB,c = 100 | | | 5MHz: NRB,c = 25  10MHz: NRB,c = 50  20MHz: NRB,c = 100 | | |
| OCNG Pattern defined in A.3.2.2 |  | 5MHz: OP.10 TDD  10MHz: OP.2 TDD  20MHz: OP.8 FDD | | | 5MHz: OP.10 TDD  10MHz: OP.2 TDD  20MHz: OP.8 FDD | | |
| PBCH\_RA | dB | -3 | | | -3 | | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote 1 |
| OCNG\_RBNote 1 |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| Qhysts | dB | 0 | | | 0 | | |
| Qoffsets, n | dB | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | RSRP | | | RSRP | | |
| Note2 | dBm/15 kHz | -98 | | | | | |
|  | dB | 16 | 13 | 16 | -infinity | 16 | 13 |
|  | dB | 16 | -3.11 | 2.79 | -infinity | 2.79 | -3.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -85 | -82 | -infinity | -82 | -85 |
| Treselection | s | 0 | | | 0 | | |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition |  | AWGN | | | AWGN 1750Hz Note4 | | |
| Antenna Configuration |  | 2x2 | | | 2x2 | | |
| 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The AWGN 1750Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1750Hz. | | | | | | | |

#### A.4.2.23.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 15 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay shall be less than 6 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Intra + TSI-EUTRA, and to an already detected cell can be expressed as: Tevaluate, E-UTRAN\_ intra + TSI-EUTRA,

Where:

Tdetect,EUTRAN\_Intra See Table 4.2.2.3-3 in clause 4.2.2.3

Tevaluate,E-UTRAN\_ intra See Table 4.2.2.3-3 in clause 4.2.2.3

TSI-EUTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 14.08 s, allow 15 s for the cell re-selection delay to a newly detectable cell and 5.12 s, allow 6 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.24 HD – FDD Inter frequency case for UE Category NB1 In-Band mode in enhanced coverage

#### A.4.2.24.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD inter frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.6.

The test scenario comprises of 1 E-UTRA carrier and a total of 3 cells as given in tables A.4.2.24.1-1, A.4.2.24.1-2 and A.4.2.24.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

Table A.4.2.24.1-1: General test parameters for HD-FDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NB-IOT operational mode | |  | In-band |  |
| Initial condition | Active cell |  | nCell1 |  |
| Neighbour cells |  | eCell1, nCell2 |  |
| T2 end condition | Active cell |  | nCell2 |  |
| Neighbour cells |  | eCell1, nCell1 |  |
| Final condition | Visited cell |  | nCell1 |  |
| E-UTRA RF Channel Number | |  | 1 | One carrier frequency is used for eCell. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Configuration | |  | 1 | Refer to A.3.16 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 67 | T2 is defined so that cell re-selection time is taken into account. |
| T3 | | s | 22 | T3 is defined so that cell re-selection time is taken into account. |

Table A.4.2.24.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | nCell 1 | | | nCell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | kHz | 180 | | | 180 | | |
| PRB location within eCell | **-** | eCell 1 BWchannel 5MHz: 17  eCell 1 BWchannel 10MHz: 30 | | | eCell 1 BWchannel 5MHz: 22  eCell 1 BWchannel 10MHz: 35 | | |
| NPBCH\_RA | dB | -3 | | | -3 | | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote 1 | dB |
| NOCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| Qhysts | dB | 0 | | | 0 | | |
| Qoffsets, n | dB | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | NRSRP | | | NRSRP | | |
|  | dBm/15 kHz | Specified in Table A.4.2.24.1-3 | | | | | |
|  | dB | -12 | -12 | -2.7 | -infinity | -2.7 | -12 |
| Note2 | dB | -12 | -12 | -2.7 | -infinity | -2.7 | -12 |
| NRSRP Note2 | dBm/15 kHz | -110 | -110 | -100.7 | -infinity | -100.7 | -110 |
| Treselection | s | 0 | | | 0 | | |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | ms | 0 | | | | | |
| Note 1: NOCNG 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: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

Table A.4.2.24.1-3: eCell 1 specific test parameters for HD-FDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | eCell 1 | | |
|  |  | T1 | T2 | T3 |
| BWchannel | MHz | 5 or 10 | | |
| OCNG Pattern | **-** | BWchannel 5MHz: NOP.4 FDD  BWchannel 10MHz: NOP.1 FDD | | |
| PBCH\_RA | dB | -3 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | |
| Pcompensation | dB | 0 | | |
| Qhysts | dB | 0 | | |
| Qoffsets, n | dB | 0 | | |
|  | dBm/15 kHz | -98 | | |
|  | dB | 3 | 3 | 3 |
| Treselection | s | 0 | | |
| Propagation Condition |  | AWGN | | |
| Antenna Configuration |  | 2x1 | | |
| Note 1: OCNG shall be used such that the eCell is 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 . | | | | |

#### A.4.2.24.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 66.32 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 21.12 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,NB\_Inter\_EC + TSI, and to an already detected cell can be expressed as: Tevaluate, NB\_Inter\_EC + TSI,

Where:

Tdetect,NB\_Inter\_EC See Table 4.6.2.6-1 in clause 4.6.2.6

Tevaluate, NB\_Inter\_EC See Table 4.6.2.6-1 in clause 4.6.2.6

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 66.32 s, allow 67 s for the cell re-selection delay to a newly detectable cell and 21.12 s, allow 22 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.25 E-UTRAN FDD – FDD Inter frequency case for Cat-M1 UE in normal coverage

#### A.4.2.25.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter frequency cell reselection requirements for category M1 UE in normal coverage specified in clause 4.7.2.1.3.

The test scenario comprises of 2 E-UTRA FDD cells on 2 different carriers as given in tables A.4.2.25.1-1 and A.4.2.25.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.25.1-1: General test parameters for FD-FDD inter frequency cell reselection test case for Cat-M1 UE in normal coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 during T1 |
| Neighbour cell |  | Cell2 |  |
| Final condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T3 |
| E-UTRA RF Channel Number | |  | 1, 2 | Two FDD carrier frequencies are used. |
| PRACH configuration | |  | PRACH\_2CE | See table in A.3.16 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.25.1-2: Cell specific test parameters for FD-FDD inter frequency cell reselection test case for Cat-M1 UE in normal coverage

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | | |
| T1 | T2 | | T3 | | T1 | | | T2 | | T3 |
| E-UTRA RF Channel number |  | 1 | | | | | 2 | | | | | |
| BWchannel | MHz | 10 | | | | | 10 | | | | | |
| OCNG Patterns defined in A.3.2.1.6 |  | OP.6 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 |
| Qrxlevmin | dBm | -140 | | | | | -140 | | | | | |
| Note 2 | dBm/15 kHz | -98 | | | | | | | | | | |
|  | dB | 14 | 14 | 14 | | | -4 | | -infinity | | 12 | |
|  | dB | 14 | 14 | 14 | | | -4 | -infinity | | | 12 | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 | | | -102 | -infinity | | | -86 | |
| TreselectionEUTRAN | s | 0 | | | | | 0 | | | | | |
| Snonintrasearch | dB | 50 | | | | | Not sent | | | | | |
| Threshx, high | dB | 48 | | | | | 48 | | | | | |
| Threshserving, low | dB | 44 | | | | | 44 | | | | | |
| Threshx, low | dB | 50 | | | | | 50 | | | | | |
| Propagation Condition |  | AWGN | | | | | | | | | | |
| Antenna Configuration |  | 2x1 | | | | 2x1 | | | | | | |
| Timing offset to Cell 1 | ms | - | | | | 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | | |

#### A.4.2.25.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

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

NOTE: The cell re-selection delay to higher priority cell can be expressed as: Thigher\_priority\_search + TevaluateFDD,inter + TSI , and to lower priority cell can be expressed as: TevaluateFDD,inter + TSI,

Where:

Thigher\_priority\_search See clause 4.7.2.1.3

Tevaluate, E-UTRAN\_Inter\_NC See Table 4.7.2.1.3-1 in clause 4.7.2.1.3

TSI-EUTRA-M1-NC Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

### A.4.2.26 E-UTRAN HD – FDD Inter frequency case for Cat-M1 UE in normal coverage

#### A.4.2.26.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD inter frequency cell reselection requirements for category M1 UE in normal coverage specified in clause 4.7.2.1.3.

The test scenario comprises of 2 E-UTRA FDD cells on 2 different carriers as given in tables A.4.2.26.1-1 and A.4.2.26.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.26.1-1: General test parameters for HD-FDD inter frequency cell reselection test case for Cat-M1 UE in normal coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 during T1 |
| Neighbour cell |  | Cell2 |  |
| Final condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T3 |
| E-UTRA RF Channel Number | |  | 1, 2 | Two FDD carrier frequencies are used. |
| PRACH configuration | |  | PRACH\_2CE | See table in A.3.16 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.26.1-2: Cell specific test parameters for HD-FDD inter frequency cell reselection test case for Cat-M1 UE in normal coverage

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | | |
| T1 | T2 | | T3 | | T1 | | | T2 | | T3 |
| E-UTRA RF Channel number |  | 1 | | | | | 2 | | | | | |
| BWchannel | MHz | 10 | | | | | 10 | | | | | |
| OCNG Patterns defined in A.3.2.1.6 |  | OP.6 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 |
| Qrxlevmin | dBm | -140 | | | | | -140 | | | | | |
| Note 2 | dBm/15 kHz | -98 | | | | | | | | | | |
|  | dB | 14 | 14 | 14 | | | -4 | | -infinity | | 12 | |
|  | dB | 14 | 14 | 14 | | | -4 | -infinity | | | 12 | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 | | | -102 | -infinity | | | -86 | |
| TreselectionEUTRAN | s | 0 | | | | | 0 | | | | | |
| Snonintrasearch | dB | 50 | | | | | Not sent | | | | | |
| Threshx, high | dB | 48 | | | | | 48 | | | | | |
| Threshserving, low | dB | 44 | | | | | 44 | | | | | |
| Threshx, low | dB | 50 | | | | | 50 | | | | | |
| Propagation Condition |  | AWGN | | | | | | | | | | |
| Antenna Configuration |  | 2x1 | | | | 2x1 | | | | | | |
| Timing offset to Cell 1 | ms | - | | | | 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | | |

#### A.4.2.26.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

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

NOTE: The cell re-selection delay to higher priority cell can be expressed as: Thigher\_priority\_search + TevaluateFDD,inter + TSI , and to lower priority cell can be expressed as: TevaluateFDD,inter + TSI,

Where:

Thigher\_priority\_search See clause 4.7.2.1.3

Tevaluate, E-UTRAN\_Inter\_NC See Table 4.7.2.1.3-1 in clause 4.7.2.1.3

TSI-EUTRA-M1-NC Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

### A.4.2.27 E-UTRAN TDD – FDD Inter frequency case for Cat-M1 UE in normal coverage

#### A.4.2.27.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter frequency cell reselection requirements for category M1 UE in normal coverage specified in clause 4.7.2.1.3.

The test scenario comprises of 2 E-UTRA TDD cells on 2 different carriers as given in tables A.4.2.27.1-1 and A.4.2.27.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.27.1-1: General test parameters for TDD-TDD inter frequency cell reselection test case for Cat-M1 UE in normal coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 during T1 |
| Neighbour cell |  | Cell2 |  |
| Final condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T3 |
| E-UTRA RF Channel Number | |  | 1, 2 | Two FDD carrier frequencies are used. |
| PRACH configuration | |  | PRACH\_2CE | See table in A.3.16 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-1 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.27.1-2: Cell specific test parameters for TDD-TDD inter frequency cell reselection test case for Cat-M1 UE in normal coverage

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | | |
| T1 | T2 | | T3 | | T1 | | | T2 | | T3 |
| E-UTRA RF Channel number |  | 1 | | | | | 2 | | | | | |
| BWchannel | MHz | 10 | | | | | 10 | | | | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) |  | OP.2 TDD | | | | | OP.2 TDD | | | | | |
| 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 |
| Qrxlevmin | dBm | -140 | | | | | -140 | | | | | |
| Note 2 | dBm/15 kHz | -98 | | | | | | | | | | |
|  | dB | 14 | 14 | 14 | | | -4 | | -infinity | | 12 | |
|  | dB | 14 | 14 | 14 | | | -4 | -infinity | | | 12 | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 | | | -102 | -infinity | | | -86 | |
| TreselectionEUTRAN | s | 0 | | | | | 0 | | | | | |
| Snonintrasearch | dB | 50 | | | | | Not sent | | | | | |
| Threshx, high | dB | 48 | | | | | 48 | | | | | |
| Threshserving, low | dB | 44 | | | | | 44 | | | | | |
| Threshx, low | dB | 50 | | | | | 50 | | | | | |
| Propagation Condition |  | AWGN | | | | | | | | | | |
| Antenna Configuration |  | 2x1 | | | | 2x1 | | | | | | |
| Timing offset to Cell 1 | μs | - | | | | 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | | |

#### A.4.2.27.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

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

NOTE: The cell re-selection delay to higher priority cell can be expressed as: Thigher\_priority\_search + TevaluateFDD,inter + TSI , and to lower priority cell can be expressed as: TevaluateFDD,inter + TSI,

Where:

Thigher\_priority\_search See clause 4.7.2.1.3

Tevaluate, E-UTRAN\_Inter\_NC See Table 4.7.2.1.3-1 in clause 4.7.2.1.3

TSI-EUTRA-M1-NC Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

### A.4.2.28 E-UTRAN FDD – FDD Inter frequency case for Cat-M1 UE in enhanced coverage

#### A.4.2.28.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter frequency cell reselection requirements for category M1 UE in enhanced coverage specified in clause 4.7.2.2.3.

The test scenario comprises of 2 E-UTRA FDD cells on 2 different carriers as given in tables A.4.2.28.1-1 and A.4.2.28.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

Table A.4.2.28.1-1: General test parameters for FD-FDD inter frequency cell reselection test case for Cat-M1 UE in enhanced coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial condition | Active cell |  | Cell1 |  |
| Neighbour cells |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| Final condition | Visited cell |  | Cell1 |  |
| E-UTRA RF Channel Number | |  | 1, 2 | Two FDD carrier frequencies are used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Parameters | |  | PRACH\_4CE | Refer to A.3.16 |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤340 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 20 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.28.1-2: Cell specific test parameters for FD-FDD inter frequency cell reselection test case for Cat-M1 UE in enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number |  | 1 | | | 2 | | |
| BWchannel | MHz | 10 for 10 MHz cell BW:  5 for 5 MHz cell BW | | | 10 for 10 MHz cell BW:  5 for 5 MHz cell BW | | |
| OCNG Patterns defined in A.3.2.1.6 |  | OP.6 FDD for 10 MHz cell BW:  OP.19 FDD for 5 MHz cell BW | | | OP.6 FDD for 10 MHz cell BW:  OP.19 FDD for 5 MHz cell BW | | |
| 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 |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Note 2 | dBm/15 kHz | -98 | | | -98 | | |
|  | dB | -5 | -12 | -5 | -infinity | -5 | -12 |
|  | dB | -5 | -12 | -5 | -infinity | -5 | -12 |
| RSRP Note 3 | dBm/15 KHz | -103 | -110 | -103 | -infinity | -103 | -110 |
| TreselectionEUTRAN | s | 0 | | | 0 | | |
| Snonintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

#### A.4.2.28.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 337 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 17 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Inter\_EC + TSI-EUTRA-M1-EC ,and to an already detected cell can be expressed as: Tevaluate,EUTRAN\_Inter\_EC + TSI\_M1\_EC,

Where:

Tdetect,EUTRAN\_Inter\_EC See Table 4.7.2.2.3-1 in clause 4.7.2.2.3

Tevaluate,EUTRAN\_Inter\_EC See Table 4.7.2.2.3-1 in clause 4.7.2.2.3

TSI-EUTRA-M1-EC Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 6400 ms is assumed in this test case.

This gives a total of 336.64 s, allow 337 s for the cell re-selection delay to a newly detectable cell and 16.64 s, allow 17 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.29 E-UTRAN HD – FDD Inter frequency case for Cat-M1 UE in enhanced coverage

#### A.4.2.29.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD inter frequency cell reselection requirements for category M1 UE in enhanced coverage specified in clause 4.7.2.2.3.

The test scenario comprises of 2 E-UTRA FDD cells on 2 different carriers as given in tables A.4.2.29.1-1 and A.4.2.29.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

Table A.4.2.29.1-1: General test parameters for HD-FDD inter frequency cell reselection test case for Cat-M1 UE in enhanced coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial condition | Active cell |  | Cell1 |  |
| Neighbour cells |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| Final condition | Visited cell |  | Cell1 |  |
| E-UTRA RF Channel Number | |  | 1, 2 | Two FDD carrier frequencies are used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Parameters | |  | PRACH\_4CE | Refer to A.3.16 |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤340 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 20 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.29.1-2: Cell specific test parameters for HD-FDD inter frequency cell reselection test case for Cat-M1 UE in enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number |  | 1 | | | 2 | | |
| BWchannel | MHz | 10 for 10 MHz cell BW:  5 for 5 MHz cell BW | | | 10 for 10 MHz cell BW:  5 for 5 MHz cell BW | | |
| OCNG Patterns defined in A.3.2.1.6 |  | OP.6 FDD for 10 MHz cell BW:  OP.19 FDD for 5 MHz cell BW | | | OP.6 FDD for 10 MHz cell BW:  OP.19 FDD for 5 MHz cell BW | | |
| 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 |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Note 2 | dBm/15 kHz | -98 | | | -98 | | |
|  | dB | -5 | -12 | -5 | -infinity | -5 | -12 |
|  | dB | -5 | -12 | -5 | -infinity | -5 | -12 |
| RSRP Note 3 | dBm/15 KHz | -103 | -110 | -103 | -infinity | -103 | -110 |
| TreselectionEUTRAN | s | 0 | | | 0 | | |
| Snonintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

#### A.4.2.29.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 337 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 17 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Inter\_EC + TSI-EUTRA-M1-EC ,and to an already detected cell can be expressed as: Tevaluate,EUTRAN\_Inter\_EC + TSI\_M1\_EC,

Where:

Tdetect,EUTRAN\_Inter\_EC See Table 4.7.2.2.3-1 in clause 4.7.2.2.3

Tevaluate,EUTRAN\_Inter\_EC See Table 4.7.2.2.3-1 in clause 4.7.2.2.3

TSI-EUTRA-M1-EC Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 6400 ms is assumed in this test case.

This gives a total of 336.64 s, allow 337 s for the cell re-selection delay to a newly detectable cell and 16.64 s, allow 17 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.30 E-UTRAN TDD Inter frequency case for Cat-M1 UE in enhanced coverage

#### A.4.2.30.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter frequency cell reselection requirements for category M1 UE in enhanced coverage specified in clause 4.7.2.2.3.

The test scenario comprises of 2 E-UTRA TDD cells on 2 different carriers as given in tables A.4.2.30.1-1 and A.4.2.30.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

Table A.4.2.30.1-1: General test parameters for TDD-TDD inter frequency cell reselection test case for Cat-M1 UE in enhanced coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 |  |
| Neighbour cells |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| Final condition | Visited cell |  | Cell1 |  |
| E-UTRA RF Channel Number | |  | 1, 2 | Two TDD carrier frequencies are used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-1 in TS 36.211 |
| PRACH Parameters | |  | PRACH\_4CE | Refer to A.3.16 |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤340 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 20 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.30.1-2: Cell specific test parameters for TDD-TDD inter frequency cell reselection test case for Cat-M1 UE in enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number |  | 1 | | | 2 | | |
| BWchannel | MHz | 10 for 10 MHz cell BW:  5 for 5 MHz cell BW | | | 10 for 10 MHz cell BW:  5 for 5 MHz cell BW | | |
| OCNG Patterns defined in A.3.2.1.6 |  | OP.2 TDD for 10 MHz cell BW:  OP.10 TDD for 5 MHz cell BW | | | OP.2 TDD for 10 MHz cell BW:  OP.10 TDD for 5 MHz cell BW | | |
| 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 |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Note 2 | dBm/15 kHz | -98 | | | -98 | | |
|  | dB | -5 | -12 | -5 | -infinity | -5 | -12 |
|  | dB | -5 | -12 | -5 | -infinity | -5 | -12 |
| RSRP Note 3 | dBm/15 KHz | -103 | -110 | -103 | -infinity | -103 | -110 |
| TreselectionEUTRAN | s | 0 | | | 0 | | |
| Snonintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

#### A.4.2.30.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 337 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 17 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,EUTRAN\_Inter\_EC + TSI-EUTRA-M1-EC ,and to an already detected cell can be expressed as: Tevaluate,EUTRAN\_Inter\_EC + TSI\_M1\_EC,

Where:

Tdetect,EUTRAN\_Inter\_EC See Table 4.7.2.2.3-1 in clause 4.7.2.2.3

Tevaluate,EUTRAN\_Inter\_EC See Table 4.7.2.2.3-1 in clause 4.7.2.2.3

TSI-EUTRA-M1-EC Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 6400 ms is assumed in this test case.

This gives a total of 336.64 s, allow 337 s for the cell re-selection delay to a newly detectable cell and 16.64 s, allow 17 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.31 E-UTRAN FDD – FDD Inter frequency case for UE Category 1bis

#### A.4.2.31.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter-frequency cell reselection requirements for UE category 1bis specified in clause 4.2.2.4.

The test scenario comprises of 2 E-UTRA FDD cells on 2 different carriers as given in tables A.4.2.31.1-1 and A.4.2.31.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.31.1-1: General test parameters for FDD-FDD inter frequency cell re-selection test case for UE Category 1bis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 during T1 |
| Neighbour cell |  | Cell2 |  |
| Final condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T3 |
| E-UTRA RF Channel Number | |  | 1, 2 | Two FDD carrier frequencies are used. |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.31.1-2: Cell specific test parameters for FDD-FDD inter-frequency cell reselection test case in AWGN for UE Category 1bis

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | | |
| T1 | T2 | | T3 | T1 | | | T2 | | T3 |
| E-UTRA RF Channel number |  | 1 | | | | 2 | | | | | |
| BWchannel | MHz | 10 | | | | 10 | | | | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) |  | OP.2 FDD | | | | OP.2 FDD | | | | | |
| PBCH\_RA | dB | 0 | | | | 0 | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | | -140 | | | | | |
| Note 2 | dBm/15 kHz | -98.5 | | | | -98.5 | | | | | |
| RSRP Note 3 | dBm/15 KHz | -83.5 | -83.5 | -83.5 | | -102.5 | | -infinity | | -85.5 | |
|  | dB | 15 | 15 | 15 | | -4 | | -infinity | | 13 | |
|  | dB | 15 | 15 | 15 | | -4 | -infinity | | | 13 | |
| TreselectionEUTRAN | s | 0 | | | | 0 | | | | | |
| Snonintrasearch | dB | 50 | | | | Not sent | | | | | |
| Threshx, high | dB | 48 | | | | 48 | | | | | |
| Threshserving, low | dB | 44 | | | | 44 | | | | | |
| Threshx, low | dB | 50 | | | | 50 | | | | | |
| Propagation Condition |  | AWGN | | | | AWGN | | | | | |
| Antenna Configuration |  | 1x1 | | | | 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.4.2.31.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

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

NOTE: The cell re-selection delay to higher priority cell can be expressed as: Thigher\_priority\_search + TevaluateFDD,inter + TSI , and to lower priority cell can be expressed as: TevaluateFDD,inter + TSI,

Where:

Thigher\_priority\_search See clause 4.2.2

TevaluateFDD,inter See Table 4.2.2.4-1 in clause 4.2.2.4

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

### A.4.2.32 E-UTRAN FDD – TDD Inter frequency case for UE Category 1bis

#### A.4.2.32.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-TDD inter-frequency cell reselection requirements for UE Category 1bis specified in clause 4.2.2.4.

The test scenario comprises of 1 E-UTRA FDD cell and 1 E-UTRA TDD cell as given in tables A.4.2.32.1-1 and A.4.2.32.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.32.1-1: General test parameters for FDD-TDD inter frequency cell re-selection test case for UE Category 1bis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 during T1 |
| Neighbour cell |  | Cell2 |  |
| Final condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T3 |
| Cell 1 E-UTRA RF Channel Number | |  | 1 | One FDD carrier frequency is used. And Cell 1 is on RF channel number 1. |
| Cell 2 E-UTRA RF Channel Number | |  | 2 | One TDD carrier frequencies is used. And Cell 2 is on RF channel number 2. |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| E-UTRA FDD PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E-UTRA TDD PRACH configuration | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| E-UTRA FDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| E-UTRA TDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.32.1-2: Cell specific test parameters for FDD-TDD inter-frequency cell reselection test case in AWGN for UE Category 1bis

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | | |
| T1 | T2 | | T3 | T1 | | | T2 | | T3 |
| E-UTRA RF Channel number |  | 1 | | | | 2 | | | | | |
| BWchannel | MHz | 10 | | | | 10 | | | | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) and A.3.2.2.2 (OP.2 TDD) |  | OP.2 FDD | | | | OP.2 TDD | | | | | |
| PBCH\_RA | dB | 0 | | | | 0 | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | | -140 | | | | | |
| Note 2 | dBm/15 kHz | -98.5 | | | | -98.5 | | | | | |
| RSRP Note 3 | dBm/15 KHz | -83.5 | -83.5 | -83.5 | | -102.5 | | -infinity | | -85.5 | |
|  | dB | 15 | 15 | 15 | | -4 | | -infinity | | 13 | |
|  | dB | 15 | 15 | 15 | | -4 | -infinity | | | 13 | |
| TreselectionEUTRAN | s | 0 | | | | 0 | | | | | |
| Snonintrasearch | dB | 50 | | | | Not sent | | | | | |
| Threshx, high | dB | 48 | | | | 48 | | | | | |
| Threshserving, low | dB | 44 | | | | 44 | | | | | |
| Threshx, low | dB | 50 | | | | 50 | | | | | |
| Propagation Condition |  | AWGN | | | | AWGN | | | | | |
| Antenna Configuration |  | 1x1 | | | | 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.4.2.32.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

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

NOTE: The cell re-selection delay to higher priority cell can be expressed as: Thigher\_priority\_search + Tevaluate,E-UTRAN\_inter  + TSI-EUTRA , and to lower priority cell can be expressed as: Tevaluate,E-UTRAN\_inter  + TSI-EUTRA,

Where:

Thigher\_priority\_search See clause 4.2.2

Tevaluate,E-UTRAN\_inter  See Table 4.2.2.4-1 in clause 4.2.2.4

TSI-EUTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

### A.4.2.33 E-UTRAN TDD – FDD Inter frequency case for UE Category 1bis

#### A.4.2.33.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-FDD inter-frequency cell reselection requirements for UE Category 1bis specified in clause 4.2.2.4.

The test scenario comprises of 1 E-UTRA TDD cell and 1 E-UTRA FDD cell as given in tables A.4.2.33.1-1 and A.4.2.33.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.33.1-1: General test parameters for TDD-FDD inter frequency cell re-selection test case for UE Category 1bis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 during T1 |
| Neighbour cell |  | Cell2 |  |
| Final condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T3 |
| Cell 1 E-UTRA RF Channel Number | |  | 1 | One TDD carrier frequency is used. And Cell 1 is on RF channel number 1. |
| Cell 2 E-UTRA RF Channel Number | |  | 2 | One FDD carrier frequencies is used. And Cell 2 is on RF channel number 2. |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| E-UTRA TDD PRACH configuration | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| E-UTRA FDD PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E-UTRA FDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| E-UTRA TDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.33.1-2: Cell specific test parameters for TDD-FDD inter-frequency cell reselection test case in AWGN for UE Category 1bis

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | | |
| T1 | T2 | | T3 | T1 | | | T2 | | T3 |
| E-UTRA RF Channel number |  | 1 | | | | 2 | | | | | |
| BWchannel | MHz | 10 | | | | 10 | | | | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) and A.3.2.2.2 (OP.2 TDD) |  | OP.2 TDD | | | | OP.2 FDD | | | | | |
| PBCH\_RA | dB | 0 | | | | 0 | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | | -140 | | | | | |
| Note 2 | dBm/15 kHz | -98.5 | | | | -98.5 | | | | | |
| RSRP Note 3 | dBm/15 KHz | -83.5 | -83.5 | -83.5 | | -102.5 | | -infinity | | -85.5 | |
|  | dB | 15 | 15 | 15 | | -4 | | -infinity | | 13 | |
|  | dB | 15 | 15 | 15 | | -4 | -infinity | | | 13 | |
| TreselectionEUTRAN | s | 0 | | | | 0 | | | | | |
| Snonintrasearch | dB | 50 | | | | Not sent | | | | | |
| Threshx, high | dB | 48 | | | | 48 | | | | | |
| Threshserving, low | dB | 44 | | | | 44 | | | | | |
| Threshx, low | dB | 50 | | | | 50 | | | | | |
| Propagation Condition |  | AWGN | | | | AWGN | | | | | |
| Antenna Configuration |  | 1x1 | | | | 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.4.2.33.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

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

NOTE: The cell re-selection delay to higher priority cell can be expressed as: Thigher\_priority\_search + Tevaluate,E-UTRAN\_inter  + TSI-EUTRA , and to lower priority cell can be expressed as: Tevaluate,E-UTRAN\_inter  + TSI-EUTRA,

Where:

Thigher\_priority\_search See clause 4.2.2

Tevaluate,E-UTRAN\_inter  See Table 4.2.2.4-1 in clause 4.2.2.4

TSI-EUTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

### A.4.2.34 E-UTRAN TDD – TDD: Inter frequency case for UE Category 1bis

#### A.4.2.34.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter-frequency cell reselection requirements for UE Category 1bis specified in clause 4.2.2.4.

The test scenario comprises of 2 E-UTRA TDD cells on 2 different carriers as given in tables A.4.2.34.1-1 and A.4.2.34.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.4.2.34.1-1: General test parameters for TDD-TDD inter frequency cell reselection test case for UE Category 1bis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cells |  | Cell1 | UE shall perform reselection to cell 1 during T1 |
| Neighbour cell |  | Cell2 |  |
| Final condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T3 |
| E-UTRA RF Channel Number | |  | 1, 2 | Two TDD carrier frequencies are used. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.2.34.1-2: Cell specific test parameters for TDD-TDD inter-frequency cell reselection test case in AWGN for UE Category 1bis

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | |
| T1 | T2 | T3 | T1 | T2 | T3 | |
| E-UTRA RF Channel number |  | 1 | | | 2 | | | |
| BWchannel | MHz | 10 | | | 10 | | | |
| OCNG Pattern defined in A.3.2.2.2 (OP.2 TDD) |  | OP.2 TDD | | | OP.2 TDD | | | |
| PBCH\_RA | dB | 0 | | | 0 | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | -140 | | | |
| Note 2 | dBm/15 kHz | -98.5 | | | -98.5 | | | |
| RSRP Note 3 | dBm/15 KHz | -83.5 | -83.5 | -83.5 | -102.5 | -infinity | | -85.5 |
|  | dB | 15 | 15 | 15 | -4 | -infinity | | 13 |
|  | dB | 15 | 15 | 15 | -4 | -infinity | | 13 |
| TreselectionEUTRAN | S | 0 | | | 0 | | | |
| Snonintrasearch | dB | 50 | | | Not sent | | | |
| Threshx, high | dB | 48 | | | 48 | | | |
| Threshserving, low | dB | 44 | | | 44 | | | |
| Threshx, low | dB | 50 | | | 50 | | | |
| Propagation Condition |  | AWGN | | | AWGN | | | |
| Antenna Configuration |  | 1x1 | | | 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.4.2.34.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

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

NOTE: The cell re-selection delay to higher priority cell can be expressed as: Thigher\_priority\_search + Tevaluate,E-UTRAN\_inter  + TSI-EUTRA , and to lower priority cell can be expressed as: Tevaluate,E-UTRAN\_inter  + TSI-EUTRA,

Where:

Thigher\_priority\_search See clause 4.2.2

Tevaluate,E-UTRAN\_inter  See Table 4.2.2.4-1 in clause 4.2.2.4

TSI-EUTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

### A.4.2.35 E-UTRAN TDD - TDD Intra frequency case for UE Category NB1 In-Band mode in normal coverage

#### A.4.2.35.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.2.

The test scenario comprises of 1 E-UTRA carrier with two ecells of different cell ID and one NB-IoT carrier with 2 ncells of different physical cell ID, as given in tables A.4.2.35.1-1, A.4.2.35.1-2 and A.4.2.35.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

Table A.4.2.35.1-1: General test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NB-IOT operational mode | |  | In-band |  |
| Initial condition | Active cell |  | nCell1 |  |
| Neighbour cells |  | eCell1, eCell2, nCell2 |  |
| T2 end condition | Active cell |  | nCell2 |  |
| Neighbour cells |  | eCell1, eCell2, nCell1 |  |
| Final condition | Visited cell |  | nCell1 |  |
| E-UTRA RF Channel Number | |  | 1 | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| NPRACH Configuration | |  | NPRACH.R-2 | As specified in A.3.18 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 60 | T2 is defined so that cell re-selection time is taken into account. Once the UE has reselected to nCell2 (within T2) T3 starts |
| T3 | | s | 15 | T3 is defined so that cell re-selection time is taken into account. |

Table A.4.2.35.1-2: nCell 1, nCell 2 specific test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | nCell 1 | | | nCell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | kHz | 180 | | | 180 | | |
| PRB location within eCell | **-** | eCell 1 BWchannel 10MHz: 30 | | | eCell 2 BWchannel 10MHz: 30 | | |
| NPBCH\_RA | dB | -3 | | | -3 | | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote 1 | dB |
| NOCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | NRSRP | | | NRSRP | | |
|  | dBm/15 kHz | Specified in Table A.4.2.35.1-3 | | | | | |
|  | dB | 17 | 13 | 17 | -infinity | 17 | 13 |
| Note2 | dB | 17 | -4.09 | 3.79 | -infinity | 3.79 | -4.09 |
| NRSRP Note2 | dBm/15 kHz | -81 | -85 | -81 | -infinity | -81 | -85 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | μs | - | | | 3 | | |
| Note 1: NOCNG 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: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

Table A.4.2.35.1-3: eCell 1 and eCell2 specific test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | MHz | 10 | | | 10 | | |
| NOCNG Pattern defined in clause D.3 | **-** | BWchannel 10MHz: NOP.1 TDD | | | BWchannel 10MHz: NOP.1 TDD | | |
| PBCH\_RA | | dB | -3 | | | -3 | | |
| PBCH\_RB | | dB |
| PSS\_RA | | dB |
| SSS\_RA | | dB |
| PDCCH\_RA | | dB |
| PDCCH\_RB | | dB |
| PDSCH\_RA | | dB |
| PDSCH\_RB | | dB |
| OCNG\_RANote 1 | | dB |
| OCNG\_RBNote 1 | | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Note2 | dBm/15 kHz | -98 | | | -98 | | |
| Note2 | dBm | 3 | 3 | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to eCell 1 | μs | - | | | 3 | | |
| 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.  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 . | | | | | | | |

#### A.4.2.35.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 59.32 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 14.82 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,NB\_Intra\_NB-IoT-NC + TSI, and to an already detected cell can be expressed as: Tevaluate, NB\_intra\_NB-IoT-NC + TSI,

Where:

Tdetect,NB\_Intra\_NB-IoT-NC See Table 4.6.2.2-1 in clause 4.6.2.2

Tevaluate, NB\_intra\_NB-IoT-NC See Table 4.6.2.2-1 in clause 4.6.2.2

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 59.32 s, allow 60 s for the cell re-selection delay to a newly detectable cell and 14.82 s, allow 15 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.36 E-UTRAN TDD – TDD Intra frequency case for UE Category NB1 In-Band mode in enhanced coverage

#### A.4.2.36.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.4.

The test scenario comprises of 1 E-UTRA carrier and a total of 4 cells as given in tables A.4.2.36.1-1, A.4.2.36.1-2 and A.4.2.36.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

Table A.4.2.36.1-1: General test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NB-IOT operational mode | |  | In-band |  |
| Initial condition | Active cell |  | nCell1 |  |
| Neighbour cells |  | eCell1, eCell2, nCell2 |  |
| T2 end condition | Active cell |  | nCell2 |  |
| Neighbour cells |  | eCell1, eCell2, nCell1 |  |
| Final condition | Visited cell |  | nCell1 |  |
| E-UTRA RF Channel Number | |  | 1 | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| NPRACH Configuration | |  | NPRACH.R-2 | Refer to A.3.18 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 67 | T2 is defined so that cell re-selection time is taken into account. Once the UE has reselected to nCell2 (within T2) T3 starts |
| T3 | | s | 22 | T3 is defined so that cell re-selection time is taken into account. |

Table A.4.2.36.1-2: nCell 1, nCell 2 specific test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | nCell 1 | | | nCell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | kHz | 180 | | | 180 | | |
| PRB location within eCell | **-** | eCell 1 BWchannel 10MHz: 30 | | | eCell 2 BWchannel 10MHz: 30 | | |
| NPBCH\_RA | dB | -3 | | | -3 | | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote 1 | dB |
| NOCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -156 | -156 | -156 | -156 | -156 | -156 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | NRSRP | | | NRSRP | | |
|  | dBm/15 kHz | Specified in Table A.4.2.36.1-3 | | | | | |
|  | dB | -9 | -9 | -0.7 | -infinity | -0.7 | -9 |
| Note2 | dB | -9 | -11.67 | -1.21 | -infinity | -1.21 | -11.67 |
| NRSRP Note2 | dBm/15 kHz | -107 | -107 | -98.7 | -infinity | -98.7 | -107 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | ms | - | | | 3 | | |
| Note 1: NOCNG 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: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

Table A.4.2.36.1-3: eCell 1 and eCell2 specific test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | MHz | 10 | | | 10 | | |
| NOCNG Pattern | **-** | BWchannel 10MHz: NOP.1 TDD | | | BWchannel 10MHz: NOP.1 TDD | | |
| PBCH\_RA | | dB | -3 | | | -3 | | |
| PBCH\_RB | | dB |
| PSS\_RA | | dB |
| SSS\_RA | | dB |
| PDCCH\_RA | | dB |
| PDCCH\_RB | | dB |
| PDSCH\_RA | | dB |
| PDSCH\_RB | | dB |
| OCNG\_RANote 1 | | dB |
| OCNG\_RBNote 1 | | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Note2 | dBm/15 kHz | -98 | | | -98 | | |
| Note2 | dBm | 3 | 3 | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to eCell 1 | ms | - | | | 3 | | |
| 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.  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 . | | | | | | | |

#### A.4.2.36.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 66.32 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 21.12 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,NB\_Intra\_NB-IoT-EC + TSI, and to an already detected cell can be expressed as: Tevaluate, NB\_intra\_NB-IoT-EC + TSI,

Where:

Tdetect,NB\_Intra\_NB-IoT-EC See Table 4.6.2.4-1 in clause 4.6.2.4

Tevaluate, NB\_intra\_NB-IoT-EC See Table 4.6.2.4-1 in clause 4.6.2.4

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32s is assumed in this test case.

This gives a total of 66.32 s, allow 67 s for the cell re-selection delay to a newly detectable cell and 21.12s, allow 22s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.37 E-UTRAN TDD – TDD Inter frequency case for UE Category NB1 In-Band mode in enhanced coverage

#### A.4.2.37.1 Test Purpose and Environment

This test is to verify the requirement for the TDD inter frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.6.

The test scenario comprises of 1 E-UTRA carrier and a total of 3 cells as given in tables A.4.2.37.1-1, A.4.2.37.1-2 and A.4.2.37.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

Table A.4.2.37.1-1: General test parameters for TDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NB-IOT operational mode | |  | In-band |  |
| Initial condition | Active cell |  | nCell1 |  |
| Neighbour cells |  | eCell1, nCell2 |  |
| T2 end condition | Active cell |  | nCell2 |  |
| Neighbour cells |  | eCell1, nCell1 |  |
| Final condition | Visited cell |  | nCell1 |  |
| E-UTRA RF Channel Number | |  | 1 | One carrier frequency is used for eCell. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| NPRACH Configuration | |  | NPRACH.R-2 | Refer to A.3.18 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 67 | T2 is defined so that cell re-selection time is taken into account. |
| T3 | | s | 22 | T3 is defined so that cell re-selection time is taken into account. |

Table A.4.2.37.1-2: nCell 1, nCell 2 specific test parameters for TDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | nCell 1 | | | nCell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | kHz | 180 | | | 180 | | |
| PRB location within eCell | **-** | eCell 1 BWchannel 10MHz: 30 | | | eCell 1 BWchannel 10MHz: 35 | | |
| NPBCH\_RA | dB | -3 | | | -3 | | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote 1 | dB |
| NOCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| Qhysts | dB | 0 | | | 0 | | |
| Qoffsets, n | dB | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | NRSRP | | | NRSRP | | |
|  | dBm/15 kHz | Specified in Table A.4.2.37.1-3 | | | | | |
|  | dB | -12 | -12 | -2.7 | -infinity | -2.7 | -12 |
| Note2 | dB | -12 | -12 | -2.7 | -infinity | -2.7 | -12 |
| NRSRP Note2 | dBm/15 kHz | -110 | -110 | -100.7 | -infinity | -100.7 | -110 |
| Treselection | s | 0 | | | 0 | | |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | ms | 0 | | | | | |
| Note 1: NOCNG 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: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

Table A.4.2.37.1-3: eCell 1 specific test parameters for TDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | eCell 1 | | |
|  |  | T1 | T2 | T3 |
| BWchannel | MHz | 10 | | |
| OCNG Pattern | **-** | BWchannel 10MHz: NOP.1 TDD | | |
| PBCH\_RA | dB | -3 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | |
| Pcompensation | dB | 0 | | |
| Qhysts | dB | 0 | | |
| Qoffsets, n | dB | 0 | | |
|  | dBm/15 kHz | -98 | | |
|  | dB | 3 | 3 | 3 |
| Treselection | s | 0 | | |
| Propagation Condition |  | AWGN | | |
| Antenna Configuration |  | 2x1 | | |
| Note 1: OCNG shall be used such that the eCell is 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 . | | | | |

#### A.4.2.37.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 66.32 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 21.12 s.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,NB\_Inter\_EC + TSI, and to an already detected cell can be expressed as: Tevaluate, NB\_Inter\_EC + TSI,

Where:

Tdetect,NB\_Inter\_EC See Table 4.6.2.6-1 in clause 4.6.2.6

Tevaluate, NB\_Inter\_EC See Table 4.6.2.6-1 in clause 4.6.2.6

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 66.32 s, allow 67 s for the cell re-selection delay to a newly detectable cell and 21.12 s, allow 22 s for the cell re-selection delay to an already detected cell in the test case.

### A.4.2.38 HD – FDD Intra frequency case for UE Category NB1 In-Band mode in normal coverage with serving cell RRM measurement relaxation

#### A.4.2.38.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.1A when UE is configured to monitor WUS according to Table A.4.2.38.1-1 and under the serving cell RRM measurement relaxation according to the subclause 4.6.2.1A and under the intra-frequency neighbor cell measurement relaxation according to the subclause 4.6.2.2.

The test scenario comprises of 1 E-UTRA carrier with two eCells of different cell ID and one NB-IoT carrier with 2 nCells of different physical cell ID, as given in tables A.4.2.38.1-1, A.4.2.38.1-2 and A.4.2.38.1-3. The test consists of two successive time periods, with time duration of T1 and T2, respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

Table A.4.2.38.1-1: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NB-IOT operational mode | |  | In-band |  |
| Initial condition | Active cell |  | nCell1 |  |
| Neighbour cells |  | eCell1, eCell2, nCell2 |  |
| T2 end condition | Active cell |  | nCell2 |  |
| Neighbour cells |  | eCell1, eCell2, nCell1 |  |
| Final condition | Visited cell |  | nCell1 |  |
| E-UTRA RF Channel Number | |  | 1 | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| NPRACH Configuration | |  | NPRACH.R-1 | Refer to A.3.18 |
| SSearchDeltaP | | dB | 6 | Threshold for relaxed monitoring criterion as specified in 5.2.4.12.1 in [1] |
| Rmax | |  | [128] |  |
| maxDurationFactor | |  | [one4th] | WUS config. Wmax = 32 (=1/4\*Rmax) |
| numPOs | |  | [n1] | WUS config. Single PO mapped to each WUS occasion |
| timeOffsetDRX | |  | [ms40] | WUS config. Gap between the end of WUS duration to the associated PO |
| numDRX-CycleRelaxed | |  | [4] | Serving cell RRM measurement is relaxed by |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >[30] | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | [70] | T2 is defined so that cell re-selection time is taken into account. |

Table A.4.2.38.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | nCell 1 | | nCell 2 | |
| T1 | T2 | T1 | T2 |
| BWchannel | kHz | 180 | | 180 | |
| PRB location within eCell | **-** | eCell 1 BWchannel 5MHz: 18  eCell 1 BWchannel 10MHz: 30 | | eCell 2 BWchannel 5MHz: 18  eCell 2 BWchannel 10MHz: 30 | |
| NPBCH\_RA | dB | -3 | | -3 | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote 1 | dB |
| NOCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | NRSRP | | NRSRP | |
|  | dBm/15 kHz | Specified in Table A.4.2.18.1-3 | | | |
|  | dB | 17 | 7 | -infinity | 11 |
| Note2 | dB | 17 | 4.33 | -infinity | 3.21 |
| NRSRP Note2 | dBm/15 kHz | -81 | 91 | -infinity | 87 |
| Treselection | s | 0 | 0 | 0 | 0 |
| Propagation Condition |  | AWGN | | AWGN | |
| Antenna Configuration |  | 2x1 | | 2x1 | |
| Timing offset to nCell 1 | ms | - | | 3 | |
| Note 1: NOCNG 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: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

Table A.4.2.38.1-3: eCell 1 and eCell2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | eCell 1 | | eCell 2 | |
|  |  | T1 | T2 | T1 | T2 |
| BWchannel | MHz | 5 or 10 | | 5 or 10 | |
| NOCNG Pattern defined in clause D.3 | **-** | BWchannel 5MHz: NOP.4 FDD  BWchannel 10MHz: NOP.1 FDD | | BWchannel 5MHz: NOP.4 FDD  BWchannel 10MHz: NOP.1 FDD | |
| PBCH\_RA | | dB | -3 | | -3 | |
| PBCH\_RB | | dB |
| PSS\_RA | | dB |
| SSS\_RA | | dB |
| PDCCH\_RA | | dB |
| PDCCH\_RB | | dB |
| PDSCH\_RA | | dB |
| PDSCH\_RB | | dB |
| OCNG\_RANote 1 | | dB |
| OCNG\_RBNote 1 | | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 |
| Note2 | dBm/15 kHz | -98 | | -98 | |
| Note2 | dBm | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | 0 | 0 | 0 |
| Propagation Condition |  | AWGN | | AWGN | |
| Antenna Configuration |  | 2x1 | | 2x1 | |
| Timing offset to eCell 1 | ms | - | | 3 | |
| 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.  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 .  Note 3: Void | | | | | |

#### A.4.2.38.2 Test Requirements

Before the beginning of T2, UE is under relaxed monitoring where the serving cell measurement is performed every 5.12 s and the infra-frequency measurement for the neighbor cells is relaxed according to subclause 5.2.4.12.0 in TS 36.304 [1].

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than [69.56] s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tevaluate, serv\_NB-NC + Tdetect,NB\_Intra\_NB-IoT-NC + TSI.

Where:

Tdetect,NB\_Intra\_NB-IoT-NC See Table 4.6.2.2-1 in clause 4.6.2.2, based on the configured DRX cycle

Tevaluate, serv\_NB-NC See Table 4.6.2.2-1 in clause 4.6.2.2, based on the effective DRX cycle after relaxation; [10.24] s is assumed in this test case.

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of [69.56] s, allow [70] s for the cell re-selection delay to a newly detectable in the test case.

## A.4.3 E-UTRAN to UTRAN Cell Re-Selection

### A.4.3.1 E-UTRAN FDD – UTRAN FDD:

#### A.4.3.1.1 EUTRA FDD-UTRA FDD cell reselection: UTRA FDD is of higher priority

##### A.4.3.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRA FDD- UTRA FDD inter-RAT cell reselection requirements specified in clause 4.2.2.5 when the UTRA cell is of higher priority.

The test scenario comprises of one E-UTRA FDD and one UTRA FDD cells as given in tables A.4.3.1.1.1-1, A.4.3.1.1.1-2 and A.4.3.1.1.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. E-UTRA cell 1 is already identified by the UE prior to the start of the test. Cell 2 is of higher priority than cell 1.

Table A.4.3.1.1.1-1: General test parameters for E-UTRA FDD- higher priority UTRA FDD inter RAT cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell 1 | UE is on cell 1 in the initialisation phase, so that reselection to cell 2 occurs during T2 |
| T2 end condition | Active cell |  | Cell 2 | UE shall perform reselection to cell 2 during T2 |
| Neighbour cell |  | Cell 1 |  |
| T3 end condition | Active cell |  | Cell 1 | UE shall perform reselection to cell 1 during T3 |
| Neighbour cell |  | Cell 2 |  |
| E-UTRA PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E\_UTRA Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >20 | During T1, cell 2 shall be powered off, and during the off time the primary scrambling code shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T2. |
| T2 | | s | 85 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 25 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.3.1.1.1-2: Cell specific test parameters for cell 1(E-UTRA)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | |
| T1 | T2 | T3 |
| E-UTRA RF Channel number |  | 1 | | |
| BWchannel | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) |  | OP.2 FDD | | |
| PBCH\_RA | dB | 0 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qqualmin for UTRA neighbour cell | dB | -20 | | |
| Qrxlevmin for UTRA neighbour cell | dBm | -115 | | |
| Qrxlevmin | dBm | -140 | | |
|  | dBm/15 kHz | -98 | | |
| RSRP | dBm/15 KHz | -84 | -84 | -84 |
|  | dB | 14 | 14 | 14 |
|  | dB | 14 | 14 | 14 |
| TreselectionEUTRAN | S | 0 | | |
| Snonintrasearch | dB | 50 | | |
| Threshx, high (Note 2) | dB | 40 | | |
| Propagation Condition |  | AWGN | | |
| 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: This refers to the value of Thresh**x, high** which is included in E-UTRA system information, and is a threshold for the UTRA target cell | | | | |

Table A.4.3.1.1.1-3: Cell specific test parameters for cell 2(UTRA)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (UTRA) | | |
|  |  | T1 | T2 | T3 |
| UTRA RF Channel Number |  | Channel 2 | | |
| CPICH\_Ec/Ior | dB | -10 | | |
| PCCPCH\_Ec/Ior | dB | -12 | | |
| SCH\_Ec/Ior | dB | -12 | | |
| PICH\_Ec/Ior | dB | -15 | | |
| OCNS\_Ec/Ior | dB | -0.941 | | |
|  | dB | -Infinity | 11 | -5 |
|  | dBm/3,84 MHz | -70 | | |
| CPICH\_Ec/Io | dB | -Infinity | -10.33 | -16.19 |
| CPICH\_RSCP | dBm | -Infinity | -69 | -85 |
| Propagation Condition |  | AWGN | | |
| Qqualmin | dB | -20 | | |
| Qrxlevmin | dBm | -115 | | |
| QrxlevminEUTRA | dBm | -140 | | |
| UE\_TXPWR\_MAX\_RACH | dBm | 21 | | |
| Treselection | s | 0 | | |
| Sprioritysearch1 | dB | 62 | | |
| Sprioritysearch2 | dB | 0 | | |
| Threshserving, low | dB | 36 | | |
| Threshx, low (Note 1) | dB | 50 | | |
| Note 1 : his refers to the value of Thresh**x, low** which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | |

##### A.4.3.1.1.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message on cell 2.

The cell re-selection delay to higher priority shall be less than 81 s.

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

NOTE: The cell re-selection delay to higher priority cell can be expressed as: Thigher\_priority\_search +TevaluateUTRA\_FDD + TSI-UTRA

Where:

Thigher\_priority\_search See clause 4.2.2; 60s is assumed in this test case

TevaluateUTRA-FDD See Table 4.2.2.5.1-1

TSI-UTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 80.48 s for higher priority cell search, allow 81 s for higher priority cell reselection in the test case.

#### A.4.3.1.2 EUTRA FDD-UTRA FDD cell reselection: UTRA FDD is of lower priority

##### A.4.3.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the EUTRA FDD- UTRA FDD inter-RAT cell reselection requirements specified in clause 4.2.2.5.1 when the UTRA cell is of lower priority.

The test scenario comprises of one UTRA FDD and one E-UTRA FDD cells as given in tables A.4.3.1.2.1-1, A.4.3.1.2.1-2 and A.4.3.1.2.1-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both E-UTRA cell 1 and UTRA cell 2 are already identified by the UE prior to the start of the test. Cell 2 is of lower priority than cell 1.

Table A.4.3.1.2.1-1: General test parameters for EUTRA FDD- lower priority UTRA FDD inter RAT cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 | E-UTRAN cell |
| T1 end condition | Active cells |  | Cell1 | UE shall perform reselection to cell 1 during T1 for subsequent iterations of the test |
| Neighbour cell |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T2 |
| Neighbour cell |  | Cell1 |  |
| E-UTRA PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E\_UTRA Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 85 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 25 | T2 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.3.1.2.1-2: Cell specific test parameters for cell 1 (E-UTRA)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | |
| T1 | | T2 |
| E-UTRA RF Channel number |  | 1 | | |
| BWchannel | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) |  | OP.2 FDD | | |
| PBCH\_RA | dB | 0 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qqualmin for UTRA neighbour cell | dB | -20 | | |
| Qrxlevmin for UTRA neighbour cell | dBm | -115 | | |
| Qrxlevmin | dBm | -140 | | |
|  | dBm/15 kHz | -98 | | |
| RSRP | dBm/15 KHz | -86 | -102 | |
|  | dB | 12 | -4 | |
|  | dB | 12 | -4 | |
| TreselectionEUTRAN | s | 0 | | |
| Snonintrasearch | dB | Not sent | | |
| Threshserving, low | dB | 44 | | |
| Threshx, low (Note 2) | dB | 42 | | |
| Propagation Condition |  | AWGN | | |
| 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 : This refers to the value of Thresh**x, low** which is included in E-UTRA system information, and is a threshold for the UTRA target cell | | | | |

Table A.4.3.1.2.1-3: Cell specific test parameters for cell 2 (UTRA)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (UTRA) | |
|  |  | T1 | T2 |
| UTRA RF Channel Number |  | Channel 2 | |
| CPICH\_Ec/Ior | dB | -10 | |
| PCCPCH\_Ec/Ior | dB | -12 | |
| SCH\_Ec/Ior | dB | -12 | |
| PICH\_Ec/Ior | dB | -15 | |
| OCNS\_Ec/Ior | dB | -0.941 | |
|  | dB | 13 | 13 |
|  | dBm/3,84 MHz | ‑70 | |
| CPICH\_Ec/Io | dB | -10.21 | -10.21 |
| CPICH\_RSCP | dBm | -67 | -67 |
| Propagation Condition |  | AWGN | |
| Qqualmin | dB | -20 | |
| Qrxlevmin | dBm | -115 | |
| QrxlevminEUTRA | dBm | -140 | |
| UE\_TXPWR\_MAX\_RACH | dBm | 21 | |
| Treselection | s | 0 | |
| Sprioritysearch1 | dB | 42 | |
| Sprioritysearch2 | dB | 0 | |
| Threshx, high (Note 1) | dB | 48 | |
| Note 1 : This refers to the value of Thresh**x, high** which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | |

##### A.4.3.1.2.2 Test Requirements

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message on cell 2.

The cell re-selection delay to lower priority shall be less than 21 s.

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

NOTE: The cell re-selection delay to lower priority cell can be expressed as: TevaluateUTRA\_FDD + TSI-UTRA

Where:

TevaluateUTRA-FDD See Table 4.2.2.5.1-1

TSI-UTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 20.48 s for lower priority cell reselection, allow 21 s.

#### A.4.3.1.3 EUTRA FDD-UTRA FDD cell reselection in fading propagation conditions: UTRA FDD is of lower priority

##### A.4.3.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the EUTRA FDD- UTRA FDD inter-RAT cell reselection requirements specified in clause 4.2.2.5.1 when the UTRA cell is of lower priority, and to verify the robustness of the UE measurement filtering in a fading environment. The E-UTRA cell is in fading propagation conditions and the UTRA cell is in AWGN propagation conditions.

The test scenario comprises of one UTRA FDD and one E-UTRA FDD cells as given in tables A.4.3.1.3.1-1, A.4.3.1.3.1-2 and A.4.3.1.3.1-3. The test consists of four successive time periods, with time duration of T1 T2, T3 and T4 respectively. Both E-UTRA cell 1 and UTRA cell 2 are already identified by the UE prior to the start of the test. Cell 2 is of lower priority than cell 1.

Table A.4.3.1.3.1-1: General test parameters for EUTRA FDD- lower priority UTRA FDD inter RAT cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 | E-UTRAN cell |
| T1 end condition | Active cells |  | Cell1 | UE shall perform reselection to cell 1 during T1 for subsequent iterations of the test |
| Neighbour cell |  | Cell2 |  |
| T3 end condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T3 |
| Neighbour cell |  | Cell1 |  |
| E-UTRA PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E\_UTRA Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | <85 | T1 need to be defined so that cell re-selection reaction time is taken into account. T1 is terminated when the UE starts to send preambles to cell 1 |
| T2 | | s | 64 | The start of T2 is defined as the time when the UE starts to send PRACH preambles to cell 1 |
| T3 | | s | <25 | T3 need to be defined so that cell re-selection reaction time is taken into account. T3 is terminated when the UE starts to send preambles to cell 2 |
| T4 | | s | 64 | The start of T4 is defined as the time when the UE starts to send PRACH preambles to cell 2 |

Table A.4.3.1.3.1-2: Cell specific test parameters for cell 1 (E-UTRA)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | | |
| T1 | T2 | T3 | T4 | | |
| E-UTRA RF Channel number |  | | 1 | | | |
| BWchannel | MHz | | 10 | | | |
| Correlation Matrix and Antenna Configuration |  | | 1x2 Low | | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) |  | | OP.2 FDD | | | |
| PSS\_RA | dB | | 0 | | | |
| SSS\_RA | dB | | 0 | | | |
| PCFICH\_RB | dB | | 0 | | | |
| PHICH\_RA | dB | | 0 | | | |
| PHICH\_RB | dB | | 0 | | | |
| PDCCH\_RA | dB | | 0 | | | |
| PDCCH\_RB | dB | | 0 | | | |
| PDSCH\_RA | dB | | 0 | | | |
| PDSCH\_RB | dB | | 0 | | | |
| OCNG\_RANote 1 | dB | | 0 | | | |
| OCNG\_RBNote 1 | dB | | 0 | | | |
| Qqualmin for UTRA neighbour cell | dB | | -20 | | | |
| Qrxlevmin for UTRA neighbour cell | dBm | | -115 | | | |
| Qrxlevmin | dBm | | -140 | | | |
|  | dBm/15 kHz | | -104 | | | |
| RSRP | dBm/15 KHz | | -82 | -82 | -107 | -107 |
|  | dB | | 22 | 22 | -3 | -3 |
|  | dB | | 22 | 22 | -3 | -3 |
| TreselectionEUTRAN | s | | 0 | | | |
| Snonintrasearch | dB | | Not sent | | | |
| Threshserving, low | dB | | 44 | | | |
| Threshx, low (Note 2) | dB | | 42 | | | |
| Propagation Condition |  | | ETU70 | | | |
| 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: This refers to the value of Thresh**x, low** which is included in E-UTRA system information, and is a threshold for the UTRA target cell. | | | | | | |

Table A.4.3.1.3.1-3: Cell specific test parameters for cell 2 (UTRA)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (UTRA) | | | |
|  |  | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number |  | Channel 2 | | | |
| CPICH\_Ec/Ior | dB | -10 | | | |
| PCCPCH\_Ec/Ior | dB | -12 | | | |
| SCH\_Ec/Ior | dB | -12 | | | |
| PICH\_Ec/Ior | dB | -15 | | | |
| OCNS\_Ec/Ior | dB | -0.941 | | | |
|  | dB | 13 | 13 | 13 | 13 |
|  | dBm/3,84 MHz | ‑70 | | | |
| CPICH\_Ec/Io | dB | -10.21 | -10.21 | -10.21 | -10.21 |
| CPICH\_RSCP | dBm | -67 | -67 | -67 | -67 |
| Propagation Condition |  | AWGN | | | |
| Qqualmin | dB | -20 | | | |
| Qrxlevmin | dBm | -115 | | | |
| QrxlevminEUTRA | dBm | -140 | | | |
| UE\_TXPWR\_MAX\_RACH | dBm | 21 | | | |
| Treselection | s | 0 | | | |
| Sprioritysearch1 | dB | 42 | | | |
| Sprioritysearch2 | dB | 0 | | | |
| Threshx, high (Note 1) | dB | 44 | | | |
| Note 1 : This refers to the value of Thresh**x, high** which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | |

##### A.4.3.1.3.2 Test Requirements

The probability of reselection from cell 1to cell 2 during T2 observed during testing shall be less than 10%

The probability of reselection from cell 2 to cell 1 during T4 observed during testing shall be less than 10%

The cell reselection delay to lower priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message on cell 2. In order to evaluate reselection delay, the system simulator first needs to verify that the UE is camped on cell 1 at the start of T3

The cell re-selection delay to lower priority shall be less than 21 s.

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

NOTE: The cell re-selection delay to lower priority cell can be expressed as: TevaluateUTRA\_FDD + TSI-UTRA

Where:

TevaluateUTRA-FDD See Table 4.2.2.5.1-1

TSI-UTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 20.48 s for lower priority cell reselection, allow 21 s.

#### A.4.3.1.4 EUTRA FDD-UTRA FDD cell reselection: UTRA FDD is of lower priority for 5MHz bandwidth

##### A.4.3.1.4.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.4.3.1.2.1

The parameters of this test are the same as defined in Subclause A.4.3.1.2.1 except that the values of the parameters in the Table A.4.3.1.4.1-2 will replace the values of the corresponding parameters in A.4.3.1.2.1-2.

This is according to the principle defined in section A.3.7.2.

Table A.4.3.1.4.1-2: Cell specific test parameters for cell 1 (E-UTRA) for 5MHz bandwidth

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| BWchannel | MHz | 5 | |
| OCNG Patterns defined in A.3.2.1.16 (OP.16 FDD) |  | OP.16 FDD | |
| Note 1: See Table A.4.3.1.2.1-2 for the other parameters. | | | |

##### A.4.3.1.4.2 Test Requirements

The test requirements defined in section A.4.3.1.2.1 shall apply to this test case.

#### A.4.3.1.5 Idle mode FDD to UTRA FDD interRAT reselection

##### A.4.3.1.5.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRA FDD-UTRA FDD inter-RAT cell reselection requirements for increased UE carrier monitoring specified in clause 4.2.2.4.

The test scenario comprises of indicating 8 UTRA FDD interfrequency cells on 6 different carriers in the neighbour list of cell 1 as given in table A.4.3.1.5-1 and cells 2 and 3 as given in table A.4.3.1.5-2. Each repetition of the test consists of five successive time periods, with time duration of T0, T1, T2, T3 and T4 respectively. In the initialisation phase and at the start of each repetition of T0, the test equipment provides signals for cell 1 (serving cell), and selects frequencies for cells 2 and 3 which are chosen from the 6 inter-RAT layers which are configured in the UE neighbour cell list as described in general and cell specific parameters. The neighbour lists of cells 2 and 3 shall include the frequency of cell 1 in the normal performance group and shall exclude the other frequencies configured to the UE in the test.

Cell 1, 2 and 3 are identified by the UE during time period T0. Cell 1, cell 2 and cell 3 all belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2 or 3. Cells 2 and 3 all have lower absolute priority than cell 1.

Table A.4.3.1.5-1: General test parameters for E-UTRAN FDD- UTRAN FDD inter frequency cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| T0 | Active cell |  | Cell 1 | T0 is repeated on each repetition of the test. In T0 the test equipment selects frequencies for cell 2 and 3, and then time is allowed for the UE to identify the neighbour cells. See cell specific parameters for detailed settings. |
| T1 start condition | Active cell |  | Cell 1 |  |
| T1 end condition | Active cell |  | Cell 2 | UE shall perform reselection to cell 2 during T1 |
| Neighbour cell |  | Cell 1, cell 3 |  |
| T2 end condition | Active cell |  | Cell 1 | UE shall perform reselection to cell 1 during T2 |
| Neighbour cell |  | Cell 2, cell 3 |  |
| T3 end condition | Active cell |  | Cell 3 | UE shall perform reselection to cell 3 during T3 |
| Neighbour cell |  | Cell 1, cell 2 |  |
| T4 end condition | Active cell |  | Cell 1 | UE shall perform reselection to cell 1 during T4 |
|  | Neighbour cell |  | Cell 2, cell 3 |  |
| UE configured E-UTRA RF Channel Number | |  | 1 | Serving cell and six UTRA FDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6 and 7 are indicated to have reduced performance |
| UE configured UTRA RF Channel Number | |  | 2,3,4,5,6,7 |  |
| Test eqipment configuration | |  | Cell 1 uses E-UTRA RF channel number 1  Cells 2,3,4 are randomly selected to use different frequencies selected from frequencies 2,3,4,5,6,7 |  |
| PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T0 | | s | (test equipment frequency selection and configuration time) + 960 | Initialisation time need to be defined so that cell detection time is taken into account. |
| T1 | | s | 60 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 25 | T2 need to be defined so that cell re-selection reaction time is taken into account |
| T3 | | s | 350 | T3 need to be defined so that cell re-selection reaction time is taken into account. |
| T4 | | s | 25 | T4 need to be defined so that cell re-selection reaction time is taken into account |

Table A.4.3.1.5-2: Cell specific test parameters for E-UTRAN FDD- UTRAN FDD inter-RAT cell reselection test case in AWGN cell 1 (E-UTRAN)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | |
| T0 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel number |  | 1 | | | | |
| BWchannel | MHz | 5MHz: NRB = 25  10MHz: NRB = 50 | | | | |
| Io | dBm/4.5MHz(25RB)  dBm/9Mhz (50RB) | -59.06  -56.05 | -71.77  -68.76 | -59.06  -56.05 | -71.77  -68.76 | -59.06  -56.05 |
| PDSCH parameters:  DL Reference Measurement Channel |  | OP.16 FDD (5MHz)  OP.2 FDD (10MHz) | | | | |
| PBCH RA | dB | 0 | | | | |
| PBCH RB | dB |
| PSS RA | dB |
| SSS RA | dB |
| PCFICH RB | dB |
| PHICH RA | dB |
| PHICH RB | dB |
| PDCCH RA | dB |  | | | | |
| PDCCH RB | dB |
| PDSCH RA | dB |
| PDSCH RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | | |
| Note 2 | dBm | -98 | | | | |
| RSRP Note 3 | dBm | -84 | -102 | -84 | -102 | -84 |
|  | dB | 14 | -4 | 14 | -4 | 14 |
|  | dB | 14 | -4 | 14 | -4 | 1 |
| TreselectionEUTRAN | s | 0 | | | | |
| Snonintrasearch | dB | 62 | | | | |
| Threshserving, low | dB | 44 | | | | |
| Threshx, low (Note 4) | dB | 40 | | | | |
| 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.  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.  Note 4: This refers to the value of Thresh**x, low** which is included in E-UTRA system information, and is a threshold for the UTRA target cell | | | | | | |

Table A.4.3.1.5-3: Cell specific test parameters for cells 2 and 3 (UTRA)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | | | | | Cell 3 | | | | |
| T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number |  | Randomly selected from 1, 2, 3 such that cell 2 is in the normal performance group | | | | | Randomly selected from 4, 5, 6 such that cell 3 is in the reduced performance group | | | | |
| CPICH\_Ec/Ior | dB | -10 | | | | | -10 | | | | |
| PCCPCH\_Ec/Ior | dB | -12 | | | | | -12 | | | | |
| SCH\_Ec/Ior | dB | -12 | | | | | -12 | | | | |
| PICH\_Ec/Ior | dB | -15 | | | | | -15 | | | | |
| OCNS\_Ec/Ior | dB | -0.941 | | | | | 0.941 | | | | |
|  | dB | +11 | +11 | +11 | -5 | +11 | +11 | -5 | +11 | +11 | +11 |
|  | dBm/3,84 MHz | -70 | | | | | -70 | | | | |
| CPICH\_Ec/Io | dB | -10.33 | -10.33 | -10.33 | -16.191 | -10.33 | -10.33 | -16.19 | -10.33 | -10.33 | -10.33 |
| CPICH\_RSCP | dBm | -69 | -69 | -69 | -85 | -69 | -69 | -85 | -69 | -69 | -69 |
| Propagation Condition |  | AWGN | | | | | AWGN | | | | |
| Qqualmin | dB | -20 | | | | | -20 | | | | |
| Qrxlevmin | dBm | -115 | | | | | -115 | | | | |
| QrxlevminEUTRA | dBm | -140 | | | | | -140 | | | | |
| UE\_TXPWR\_MAX\_RACH | dBm | 21 | | | | | 21 | | | | |
| Treselection | s | 0 | | | | | 0 | | | | |
| Sprioritysearch1 | dB | 40 | | | | | 40 | | | | |
| Sprioritysearch2 | dB | 0 | | | | | 0 | | | | |
| Threshx,high (Note 1) | dB | 50 | | | | | 50 | | | | |
| Note 1: This refers to the value of Thresh**x, high** which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | | | | | | | |

##### A.4.3.1.5.2 Test Requirements

The cell reselection delay is defined as the time from the beginning of a relevant time period, to the moment when the UE camps on the target cell, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on the target cell.

The reselection delays shall meet the requirements in table A.4.3.1.5.2-1

Table A.4.3.1.5.2-1

|  |  |  |
| --- | --- | --- |
| Time phase | Target cell | Requirement for reselection delay (seconds) |
| T0 | Cell 1 |  |
| T1 | Cell 2 (normal performance group) | 59 |
| T2 | Cell 1 (normal performance group) | 21 |
| T3 | Cell 3 (reduced performance group) | 347 |
| T4 | Cell 1 (normal performance group) | 21 |

NOTE: The cell re-selection delay to a normal performance group cell can be expressed as: (NUTRA\_carrier,normal) \* TevaluateUTRA\_FDD + TSI-UTRA and to a reduced performance group cell can be expressed as: 6 \* NUTRA\_carrier,reduced \* TevaluateUTRA\_FDD + TSI-UTRA.

Where:

TevaluateUTRA-FDD See Table 4.2.2.5.1-1

TSI-UTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 58.88 s for normal performance group reselection, allow 21 s, and gives a total of 346.88 s for reduced performance group reselection, allow 347 s for reduced performance group in the test case. For reselections back to cell 1 since only one frequency is configured, the requirement is Tevaluate,E-UTRAN + TSI = 20.48 s, allow 21 s.

### A.4.3.2 E-UTRAN FDD – UTRAN TDD:

#### A.4.3.2.1 Test Purpose and Environment

##### A.4.3.2.1.1 Void

##### A.4.3.2.1.2 1.28Mcps TDD option

This test is to verify the requirement for the E-UTRA FDD to UTRA TDD inter-RAT cell reselection requirements specified in clause 4.2.2.5.2 when the UTRA cell is of lower priority.

This test scenario comprised of 1 E-UTRA FDD serving cell (Cell 1), and 1 UTRA TDD cell (Cell 2) to be re-selected. Test parameters are given in table A.4.3.2.1.2-1, A.4.3.2.1.2-2, and A.4.3.2.1.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Cell 2 is of lower priority than cell 1.

The ranking of the cells shall be made according to the cell reselection criteria specified in TS36.304.

Table A.4.3.2.1.2-1: General test parameters for E-UTRA FDD to UTRA (1.28 Mcps TDD OPTION) Cell Re-selection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 | E-UTRAN cell |
| T1 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 during T1 for subsequent iterations of the test |
| Neighbour cell |  | Cell2 | 1.28 Mcps TDD OPTION cell |
| T2 end condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T2 |
| Neighbour cell |  | Cell1 | E-UTRA FDD cell |
| CP length of cell 1 | |  | normal |  |
| E-UTRA PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure. |
| Treselection | | s | 0 |  |
| DRX cycle length | | s | 1,28 |  |
| HCS | |  | Not used |  |
| T1 | | s | 85 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 25 |  |

Table A.4.3.2.1.2-2: Cell specific test parameters for cell re-selection E-UTRA FDD to UTRA TDD test case (cell 1)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| PBCH\_RA | dB | 0 | 0 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote1 | dB |
| OCNG\_RBNote1 | dB |
| Qrxlevmin | dBm/15kHz | -140 | -140 |
|  | dBm/15kHz | -98 | |
| RSRP | dBm/15kHz | -87 | -101 |
|  | dB | 11 | -3 |
| Snonintrasearch | dB | Not sent | |
| Threshserving, low | dB | 46 (-94dBm) | |
| Threshx, low (Note2) | dB | 24 (-79dBm) | |
| Propagation Condition |  | AWGN | |
| Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note2: This refers to the value of Threshx, low which is included in E-UTRA system information, and is a threshold for the UTRA TDD target cell | | | |

Table A.4.3.2.1.2-3: Cell specific test parameters for cell re-selection E-UTRA FDD to UTRA TDD test case (cell 2)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 (UTRA) | | | | |
| Timeslot Number | |  | 0 | | | DwPTS | |
|  |  | | T1 | | T2 | T1 | T2 |
| UTRA RF Channel Number (Note1) |  | | Channel 2 | | | | |
| PCCPCH\_Ec/Ior | dB | | -3 | | -3 |  |  |
| DwPCH\_Ec/Ior | dB | |  | |  | 0 | 0 |
| OCNS\_Ec/Ior | dB | | -3 | | -3 |  |  |
|  | dB | | 11 | | 11 | 11 | 11 |
|  | dBm/1.28 MHz | | -80 | | | | |
| PCCPCH RSCP | dBm | | -72 | -72 | | n.a. | n.a. |
| Propagation Condition |  | | AWGN | | | | |
| Qrxlevmin | dBm | | -103 | | | | |
| Qoffset1s,n | dB | | C1, C2: 0 | | | | |
| Qhyst1s | dB | | 0 | | | | |
| Threshx, high (Note2) | dB | | 46 (-94dBm) | | | | |
| Note1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency’s channel number.  Note2: This refers to the value of Thresh**x, high** which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | | | |

##### A.4.3.2.1.3 Void

#### A.4.3.2.2 Test Requirements

##### A.4.3.2.2.1 1.28Mcps TDD option

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send the SYNCH-UL sequence in the UpPTS for sending the RRC CONNECTION REQUEST message on cell 2.

The cell re-selection delay to lower priority shall be less than 21 s.

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

NOTE: The cell re-selection delay to lower priority cell can be expressed as: TevaluateUTRA\_TDD + TSI-UTRA

Where:

TevaluateUTRA\_TDD 19.2s, See table table 4.2.2.5.2-1

TSI-UTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 20.48 s, allow 21 s for lower priority cell reselection in the test case.

A.4.3.2.2.2.3 Void

### A.4.3.2A E-UTRA FDD to UTRA TDD cell re-selection for IncMon

#### A.4.3.2A.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRA FDD to UTRA TDD inter-RAT cell reselection requirements for increased UE carrier monitoring specified in clause 4.2.2.4. UTRA TDD cells are of lower priority than E-UTRA serving cell.

The test scenario comprises of indicating 7 UTRA TDD inter-RAT cells on 7 different carriers in the neighbour list of cell 1 as given in tables A.4.3.2A.1-1, A.4.3.2A.1-2 and A.4.3.2A.1-3. Each repetition of the test consists of five successive time periods, with time duration of T0, T1, T2, T3, and T4 respectively. In the initialisation phase and at the start of each repetition of T0, the test equipment provides signals for cell 1 (E-UTRA serving cell), and selects frequencies for cells 2 and 3 which are chosen from the 7 inter-RAT layers which are configured in the UE neighbour cell list as described in general and cell specific parameters. The neighbour lists of cells 2 and 3 shall include the frequency of cell 1 in the normal performance group and shall exclude the other UTRA TDD frequencies configured to the UE in the test.

Cell 1, 2 and 3 are identified by the UE during time phase T0. Cell 1, cell 2 and cell 3 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2 or 3.

Table A.4.3.2A.1-1: General test parameters for E-UTRA FDD to UTRA TDD inter-RAT cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| T0 | Active cell |  | Cell1 | T0 is repeated on each repetition of the test. In T0 the test equipment selects frequencies for cell 2, 3 and then time is allowed for the UE to identify the neighbour cells. See cell specific parameters for detailed settings. |
| T1 start condition | Active cell |  | Cell 1 |  |
| T1 end condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T1 |
| Neighbour cell |  | Cell1 |
| T2 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 during T2 |
| T3 end condition | Active cell |  | Cell3 | UE shall perform reselection to cell 3 during T3 |
| Neighbour cell |  | Cell1 |
| T4 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 in T4 so that next repetition of test can start from T0 |
| UE configured UTRA RF Channel Number | |  | 1, 2, 3, 4, 5, 6, 7 | **Seven UTRA TDD carrier frequencies are used in the UE neighbour cell list. Frequencies 4, 5, 6, and 7 are indicated to have reduced performance** |
| Test eqipment configuration | |  | Cell 1, 2, 3 | Cell 1 uses E-UTRA RF channel number 1  Cells 2 is randomly selected to use different frequencies selected from UTRA frequencies 1, 2, 3.  Cells 3 is randomly selected to use different frequencies selected from UTRA frequencies 4, 5, 6, 7. |
| CP length of cell 1 | |  | normal |  |
| PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 [16] |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Treselection | | s | 0 |  |
| HCS | |  | Not used |  |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T0 | | s | (Test equipment frequency selection and configuration time) + 960 | T0 is defined so that the Test equipment selects frequencies and configures the cells, then the UE cell detection time is taken into account. |
| T1 | | s | 60 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 25 | T2 need to be defined so that cell re-selection reaction time is taken into account |
| T3 | | s | 500 | T3 need to be defined so that cell re-selection reaction time is taken into account. |
| T4 | | s | 25 | T4 need to be defined so that cell re-selection reaction time is taken into account |

Table A.4.3.2A.1-2: E-UTRA Cell specific test parameters for E-UTRA FDD to UTRA TDD inter-RAT cell reselection test case in AWGN

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | |
| T0 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel number |  | 1 | | | | |
| BWchannel | MHz | 5MHz: NRB = 25  10MHz: NRB = 50 | | | | |
| OCNG Patterns |  | 5MHz: OP.16 FDD  10MHz: OP.2 FDD | | | | |
| PBCH\_RA | dB | 0 | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RA NOTE 1 | dB |
| OCNG\_RB NOTE 1 | dB |
| NOTE 2 | dBm/15kHz | -98 | | | | |
|  | dB | 11 | -3 | 11 | -3 | 11 |
| NOTE 3 | dB | 11 | -3 | 11 | -3 | 11 |
| RSRP NOTE 3 | dBm/15kHz | -87 | -101 | -87 | -101 | -87 |
| Qrxlevmin | dBm/15kHz | -140 | | | | |
| Snonintrasearch | dB | Not sent | | | | |
| Threshserving, low | dB | 46 (-94dBm) | | | | |
| Threshx, low NOTE 4 | dB | 24 (-79dBm) | | | | |
| Propagation Condition |  | AWGN | | | | |
| Antenna Configuration |  | 1x2 | | | | |
| 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: This refers to the value of Threshx, low which is included in E-UTRA system information, and is a threshold for the UTRA TDD target cell. | | | | | | |

Table A.4.3.2A.1-3: UTRA TDD Cell specific test parameters for E-UTRA FDD to UTRA TDD inter-RAT cell reselection test case in AWGN

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (UTRA TDD) | | | | | | | | | |
| Timeslot Number |  | 0 | | | | | DwPTS | | | | |
|  |  | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number NOTE 1 |  | Randomly selected from 1, 2, 3 such that cell 2 is in the normal performance group | | | | | | | | | |
| PCCPCH\_Ec/Ior | dB | -3 | | | | |  | | | | |
| DwPCH\_Ec/Ior | dB |  | | | | | 0 | | | | |
| OCNS\_Ec/Ior | dB | -3 | | | | |  | | | | |
|  | dBm/ 1.28 MHz | -80 | | | | | | | | | |
|  | dB | -3 | 11 | -3 | -3 | -3 | -3 | 11 | -3 | -3 | -3 |
| PCCPCH RSCP | dBm | -86 | -72 | -86 | -86 | -86 | n.a. | | | | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| Qrxlevmin | dBm | -103 | | | | | | | | | |
| Qoffset1s,n | dB | C1, C2: 0 | | | | | | | | | |
| Qhyst1s | dB | 0 | | | | | | | | | |
| Sprioritysearch1 | dB | 24 (-79dBm) | | | | | | | | | |
| Sprioritysearch2 | dB | 0 | | | | | | | | | |
| Threshx, high NOTE 2 | dB | 46 (-94dBm) | | | | | | | | | |
| SsearchE-UTRA | dB | Not send | | | | | | | | | |
| Time offset to cell1 | ms | 3 | | | | | | | | | |
| NOTE 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency’s channel number.  NOTE 2: This refers to the value of Threshx, high which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | | | | | | | |

Table A.4.3.2A.1-4:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 3 (UTRA TDD) | | | | | | | | | |
| Timeslot Number |  | 0 | | | | | DwPTS | | | | |
|  |  | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number NOTE 1 |  | Randomly selected from 4, 5, 6, 7 such that cell 3 is in the reduced performance group | | | | | | | | | |
| PCCPCH\_Ec/Ior | dB | -3 | | | | |  | | | | |
| DwPCH\_Ec/Ior | dB |  | | | | | 0 | | | | |
| OCNS\_Ec/Ior | dB | -3 | | | | |  | | | | |
|  | dBm/ 1.28 MHz | -80 | | | | | | | | | |
|  | dB | -3 | -3 | -3 | 11 | -3 | -3 | -3 | -3 | 11 | -3 |
| PCCPCH RSCP | dBm | -86 | -86 | -86 | -72 | -86 | n.a. | | | | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| Qrxlevmin | dBm | -103 | | | | | | | | | |
| Qoffset1s,n | dB | C1, C2: 0 | | | | | | | | | |
| Qhyst1s | dB | 0 | | | | | | | | | |
| Sprioritysearch1 | dB | 24 (-79dBm) | | | | | | | | | |
| Sprioritysearch2 | dB | 0 | | | | | | | | | |
| Threshx, high NOTE 2 | dB | 46 (-94dBm) | | | | | | | | | |
| SsearchE-UTRA | dB | Not send | | | | | | | | | |
| Time offset to cell1 | ms | 3 | | | | | | | | | |
| Time offset to cell2 | μs | 3 | | | | | | | | | |
| NOTE 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency’s channel number.  NOTE 2: This refers to the value of Threshx, high which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | | | | | | | |

#### A.4.3.2A.2 Test Requirements

The cell reselection delay is defined as the time from the beginning of a relevant time period, to the moment when the UE camps on the target cell, and starts to send the SYNCH-UL sequence in the UpPTS on cell 2, 3 for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on the target cell.

The reselection delays shall meet the requirements in table A.4.3.2A.2-1

Table A.4.3.2A.2-1: Test requirements for E-UTRA FDD to UTRA TDD inter-RAT cell reselection

|  |  |  |
| --- | --- | --- |
| Time phase | Target cell | Requirement for reselection delay (seconds) |
| T1 | Cell 2 (normal performance group) | 58.9 |
| T3 | Cell 3 (reduced performance group) | 462.1 |

The rate of correct cell reselections observed during repeated tests shall be at least 90%, with a successful reselection counted if it is within the required time regardless of the carrier frequencies involved. At least 90% of reselections to the reduced performance group shall be within the required time, and at least 90% of reselections to the normal performance group shall be within the required time.

NOTE: The cell re-selection delay to a normal performance group cell can be expressed as: NUTRA\_carrier\_TDD,normal \*TevaluateUTRA\_TDD + TSI\_UTRA, and to a reduced performance group cell can be expressed as: 6 \* NUTRA\_carrier\_TDD,reduced \* TevaluateUTRA\_TDD + TSI\_UTRA,

Where:

TevaluateUTRA\_TDD 19.2s, See Table 4.2.2.5.2-1

TSI\_UTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 3 \* 19.2 + 1.28 = 58.88 s for normal performance group reselection and 6 \* 4 \* 19.2 + 1.28 = 462.08s for reduced performance group reselection, allow 58.9s for normal performance group and 462.1s for reduced performance group in the test case.

Since only one E-UTRA frequency is configured and signal level of UTRA cell is lower than threshold of Sprioritysearch, the UE shall select back to cell 1 (E-UTRA cell) within Kcarrier \* TevaluateEUTRA + TSI = 19.2 + 1.28 = 20.48s.

#### A.4.3.3 E-UTRAN TDD – UTRAN FDD:

#### A.4.3.3.1 Test Purpose and Environment

This test is to verify the requirement for the EUTRA TDD- UTRA FDD inter-RAT cell reselection requirements specified in clause 4.2.2.5.1 when the UTRA cell is of lower priority.

The test scenario comprises of one UTRA FDD and one E-UTRA TDD cells as given in tables A.4.3.3.1-1, A.4.3.3.1-2 and A.4.3.3.1-3. The test consists of two successive time periods, with time duration of T1 andT2 respectively. Both E-UTRA cell 1 and UTRA cell 2 are already identified by the UE prior to the start of the test. Cell 2 is of lower priority than cell 1.

Table A.4.3.3.1-1: General test parameters for EUTRA TDD- lower priority UTRA FDD inter RAT cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 | E-UTRAN cell |
| T1 end condition | Active cells |  | Cell1 | UE shall perform reselection to cell 1 during T1 for subsequent iterations of the test |
| Neighbour cell |  | Cell2 |  |
| T2 end condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T2 |
| Neighbour cell |  | Cell1 |  |
| E-UTRA PRACH configuration | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Uplink-downlink configuration of cell 1 | |  | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | |  | 6 | As specified in table 4.2.1 in TS 36.211 |
| E\_UTRA Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 85 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 25 | T2 need to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.3.3.1-2: Cell specific test parameters for cell 1(E-UTRA)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | |
| T1 | | T2 |
| E-UTRA RF Channel number |  | 1 | | |
| BWchannel | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.2.2 (OP.2 TDD) |  | OP.2 TDD | | |
| PBCH\_RA | dB | 0 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANOTE 1 | dB |
| OCNG\_RBNOTE 1 | dB |
| Qqualmin for UTRA neighbour cell | dB | -20 | | |
| Qrxlevmin for UTRA neighbour cell | dBm | -115 | | |
| Qrxlevmin | dBm | -140 | | |
|  | dBm/15 kHz | -98 | | |
| RSRP | dBm/15 KHz | -86 | -102 | |
|  | dB | 12 | -4 | |
|  | dB | 12 | -4 | |
| TreselectionEUTRAN | s | 0 | | |
| Snonintrasearch | dB | Not sent | | |
| Threshserving, low | dB | 44 | | |
| Threshx, low (NOTE 2) | dB | 42 | | |
| Propagation Condition |  | AWGN | | |
| 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 : This refers to the value of Thresh**x, low** which is included in E-UTRA system information, and is a threshold for the UTRA target cell | | | | |

Table A.4.3.3.1-3: Cell specific test parameters for cell 2 (UTRA)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (UTRA) | |
|  |  | T1 | T2 |
| UTRA RF Channel Number |  | Channel 2 | |
| CPICH\_Ec/Ior | dB | -10 | |
| PCCPCH\_Ec/Ior | dB | -12 | |
| SCH\_Ec/Ior | dB | -12 | |
| PICH\_Ec/Ior | dB | -15 | |
| OCNS\_Ec/Ior | dB | -0.941 | |
|  | dB | 13 | 13 |
|  | dBm/3,84 MHz | ‑70 | |
| CPICH\_Ec/Io | dB | -10.21 | -10.21 |
| CPICH\_RSCP | dBm | -67 | -67 |
| Propagation Condition |  | AWGN | |
| Qqualmin | dB | -20 | |
| Qrxlevmin | dBm | -115 | |
| QrxlevminEUTRA | dBm | -140 | |
| UE\_TXPWR\_MAX\_RACH | dBm | 21 | |
| Treselection | s | 0 | |
| Sprioritysearch1 | dB | 42 | |
| Sprioritysearch2 | dB | 0 | |
| Threshx, high (NOTE 1) | dB | 48 | |
| NOTE 1 : This refers to the value of Thresh**x, high** which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | |

#### A.4.3.3.2 Test Requirements

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message on cell 2.

The cell re-selection delay to lower priority shall be less than 21 s.

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

NOTE: The cell re-selection delay to lower priority cell can be expressed as: TevaluateUTRA\_FDD + TSI-UTRA

Where:

TevaluateUTRA-FDD See Table 4.2.2.5.1-1

TSI-UTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 20.48 s for lower priority cell reselection, allow 21 s.

### A.4.3.3A Idle mode TDD to UTRA FDD interRAT reselection

#### A.4.3.3A.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRA TDD-UTRA FDD inter-RAT cell reselection requirements for increased UE carrier monitoring specified in clause 4.2.2.4.

The test scenario comprises of indicating 8 UTRA FDD interfrequency cells on 6 different carriers in the neighbour list of cell 1 as given in table A.4.3.3A.1-2 and table A.4.3.3A.1-3 and cells 2 and 3 as given in table A.4.3.3A.1-4. Each repetition of the test consists of five successive time periods, with time duration of T0, T1, T2, T3 and T4 respectively. In the initialisation phase and at the start of each repetition of T0, the test equipment provides signals for cell 1 (serving cell), and selects frequencies for cells 2 and 3 which are chosen from the 6 inter-RAT layers which are configured in the UE neighbour cell list as described in general and cell specific parameters. The neighbour lists of cells 2 and 3 shall include the frequency of cell 1 in the normal performance group and shall exclude the other frequencies configured to the UE in the test.

Cell 1, 2 and 3 4 are identified by the UE during time period T0. Cell 1, cell 2 and cell 3 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2 or 3. Cells 1, 2 and 3 4 all have lower absolute priority than cell 1.

Table A.4.3.3A.1-1: General test parameters for E-UTRAN TDD- UTRAN FDD inter frequency cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| T0 | Active cell |  | Cell 1 | T0 is repeated on each repetition of the test. In T0 the test equipment selects frequencies for cell 2, 3 and then time is allowed for the UE to identify the neighbour cells. See cell specific parameters for detailed settings. |
| T1 start condition | Active cell |  | Cell 1 |  |
| T1 end condition | Active cell |  | Cell 2 | UE shall perform reselection to cell 2 during T1 |
| Neighbour cell |  | Cell 1, cell 3 |  |
| T2 end condition | Active cell |  | Cell 1 | UE shall perform reselection to cell 1 during T2 |
| Neighbour cell |  | Cell 2, cell 3 |  |
| T3 end condition | Active cell |  | Cell 3 | UE shall perform reselection to cell 3 during T3 |
| Neighbour cell |  | Cell 1, cell 2 |  |
| T4 end condition | Active cell |  | Cell 1 | UE shall perform reselection to cell 1 during T4 |
|  | Neighbour cell |  | Cell 2, cell 3 |  |
| UE configured E-UTRA RF Channel Number | |  | 1 | Serving cell and six UTRA FDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6 and 7 are indicated to have reduced performance |
| UE configured UTRA RF Channel Number | |  | 2,3,4,5,6,7 |  |
| Test eqipment configuration | |  | Cell 1 uses E-UTRA RF channel number 1  Cells 2,3,4 are randomly selected to use different frequencies selected from frequencies 2,3,4,5,6,7 |  |
| PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T0 | | s | (test equipment frequency selection and configuration time) + 960 | Initialisation time need to be defined so that cell detection time is taken into account. |
| T1 | | s | 60 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 25 | T2 need to be defined so that cell re-selection reaction time is taken into account |
| T3 | | s | 350 | T3 need to be defined so that cell re-selection reaction time is taken into account. |
| T4 | | s | 25 | T4 need to be defined so that cell re-selection reaction time is taken into account |

Table A.4.3.3A.1-2: General test parameters for EUTRA TDD- UTRA FDD inter RAT cell re-selection test case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| Uplink-downlink configuration of cell 1 |  | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 |  | 6 | As specified in table 4.2.1 in TS 36.211 |

Table A.4.3.3A.1-3: Cell specific test parameters for E-UTRAN TDD- UTRAN FDD inter-RAT cell reselection test case in AWGN cell 1 (E-UTRAN)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | |
| T0 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel number |  | 1 | | | | |
| BWchannel | MHz | 5MHz: NRB = 25  10MHz: NRB = 50 | | | | |
| Io | dBm/4.5MHz(25RB)  dBm/9Mhz (50RB) | -59.06  -56.05 | -71.77  -68.76 | -59.06  -56.05 | -71.77  -68.76 | -59.06  -56.05 |
| PDSCH parameters:  DL Reference Measurement Channel |  | OP.10 TDD(5MHz)  OP.2 TDD (10MHz) | | | | |
| PBCH RA | dB | 0 | | | | |
| PBCH RB | dB |
| PSS RA | dB |
| SSS RA | dB |
| PCFICH RB | dB |
| PHICH RA | dB |
| PHICH RB | dB |
| PDCCH RA | dB |  | | | | |
| PDCCH RB | dB |
| PDSCH RA | dB |
| PDSCH RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | | |
| Note 2 | dBm | -98 | | | | |
| RSRP Note 3 | dBm | -84 | -102 | -84 | -102 | -84 |
|  | dB | 14 | -4 | 14 | -4 | 14 |
|  | dB | 14 | -4 | 14 | -4 | 14 |
| TreselectionEUTRAN | s | 0 | | | | |
| Snonintrasearch | dB | 62 | | | | |
| Threshserving, low | dB | 44 | | | | |
| Threshx, low (Note 4) | dB | 40 | | | | |
| 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.  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.  Note 4: This refers to the value of Thresh**x, low** which is included in E-UTRA system information, and is a threshold for the UTRA target cell. | | | | | | |

Table A.4.3.3A.1-4: Cell specific test parameters for cells 2 and 3 (UTRA)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | | | | | Cell 3 | | | | |
| T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number |  | Randomly selected from 1, 2, 3 such that cell 2 is in the normal performance group | | | | | Randomly selected from 4, 5, 6 such that cell 3 is in the reduced performance group | | | | |
| CPICH\_Ec/Ior | dB | -10 | | | | | -10 | | | | |
| PCCPCH\_Ec/Ior | dB | -12 | | | | | -12 | | | | |
| SCH\_Ec/Ior | dB | -12 | | | | | -12 | | | | |
| PICH\_Ec/Ior | dB | -15 | | | | | -15 | | | | |
| OCNS\_Ec/Ior | dB | -0.941 | | | | | 0.941 | | | | |
|  | dB | +11 | +11 | +11 | -5 | +11 | +11 | -5 | +11 | +11 | +11 |
|  | dBm/3,84 MHz | -70 | | | | | -70 | | | | |
| CPICH\_Ec/Io | dB | -10.33 | -10.33 | -10.33 | -16.19 | -10.33 | -10.33 | -16.19 | -10.36 | -10.33 | -10.33 |
| CPICH\_RSCP | dBm | -69 | -69 | -69 | -85 | -69 | -69 | -85 | -69 | -69 | -69 |
| Propagation Condition |  | AWGN | | | | | AWGN | | | | |
| Qqualmin | dB | -20 | | | | | -20 | | | | |
| Qrxlevmin | dBm | -115 | | | | | -115 | | | | |
| QrxlevminEUTRA | dBm | -140 | | | | | -140 | | | | |
| UE\_TXPWR\_MAX\_RACH | dBm | 21 | | | | | 21 | | | | |
| Treselection | s | 0 | | | | | 0 | | | | |
| Sprioritysearch1 | dB | 40 | | | | | 40 | | | | |
| Sprioritysearch2 | dB | 0 | | | | | 0 | | | | |
| Threshx,high (Note 1) | dB | 50 | | | | | 50 | | | | |
| Note 1: This refers to the value of Thresh**x, high** which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | | | | | | | |

#### A.4.3.3A.2 Test Requirements

The cell reselection delay is defined as the time from the beginning of a relevant time period, to the moment when the UE camps on the target cell, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on the target cell.

The reselection delays shall meet the requirements in table A.4.3.1.5-1

Table A.4.3.3A.2-1

|  |  |  |
| --- | --- | --- |
| Time phase | Target cell | Requirement for reselection delay (seconds) |
| T0 | Cell 1 |  |
| T1 | Cell 2 (normal performance group) | 59 |
| T2 | Cell 1 (normal performance group) | 21 |
| T3 | Cell 3 (reduced performance group) | 347 |
| T4 | Cell 1 (normal performance group) | 21 |

NOTE: The cell re-selection delay to a normal performance group cell can be expressed as: (NUTRA\_carrier,normal) \* TevaluateUTRA\_FDD + TSI-UTRA and to a reduced performance group cell can be expressed as: 6 \* NUTRA\_carrier,reduced \* TevaluateUTRA\_FDD + TSI-UTRA.

Where:

TevaluateUTRA-FDD See Table 4.2.2.5.1-1

TSI-UTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 58.88 s for normal performance group reselection, allow 59 s, and gives a total of 346.88 s for reduced performance group reselection, allow 347 s for reduced performance group in the test case. For reselections back to cell 1 since only one frequency is configured, the requirement is Tevaluate,E-UTRAN + TSI = 20.48 s, allow 21 s.

### A.4.3.4 E-UTRAN TDD – UTRAN TDD:

#### A.4.3.4.1 E-UTRA to UTRA TDD cell re-selection: UTRA is of higher priority

##### A.4.3.4.1.1 Test Purpose and Environment

A.4.3.4.1.1.1 Void

A.4.3.4.1.1.2 1.28 Mcps TDD option

This test is to verify the requirement for the E-UTRA TDD to UTRA TDD inter-RAT cell re-selection requirements specified in clause 4.2.2.5 when the UTRA cell is of higher priority.

This test scenario comprised of 1 E-UTRA TDD serving cell, and 1 UTRA TDD cell to be re-selected. Test parameters are given in table A.4.3.4.1.1.2-1, A.4.3.4.1.1.2-2, and A.4.3.4.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. E-UTRA cell 1 is already identified by the UE prior to the start of the test. Cell 2 is of higher priority than cell 1.

The ranking of the cells shall be made according to the cell reselection criteria specified in TS36.304.

Table A.4.3.4.1.1.2-1: General test parameters for E-UTRAN to UTRAN (1.28 Mcps TDD OPTION) Cell Re-selection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell 1 | UE is on cell 1 in the initialisation phase, so that reselection to cell 2 occurs during T2 |
| T2 end condition | Active cell |  | Cell 2 | UE shall perform reselection to cell 2 during T2 |
| Neighbour cell |  | Cell 1 |  |
| T3 end condition | Active cell |  | Cell 1 | UE shall perform reselection to cell 1 during T3 |
| Neighbour cell |  | Cell 2 |  |
| Uplink-downlink configuration of cell 1 | |  | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | |  | 6 | As specified in table 4.2.1 in TS 36.211 |
| PRACH configuration of cell 1 | |  | 53 | As specified in table 4.7.1-3 in TS 36.211 |
| CP length of cell 1 | |  | Normal |  |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure. |
| Treselection | | s | 0 |  |
| DRX cycle length | | s | 1,28 |  |
| HCS | |  | Not used |  |
| T1 | | s | >20 | During T1, cell 2 shall be powered off, and during the off time the primary scrambling code shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T2. |
| T2 | | s | 85 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 25 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.4.3.4.1.1.2-2: Cell specific test parameters for cell re-selection E-UTRA TDD to UTRA TDD test case (cell 1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | |
| T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | |
| BWchannel | MHz | 10 | | |
| PBCH\_RA | dB | 0 | 0 | 0 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANOTE 1 | dB |
| OCNG\_RBNOTE 1 | dB |
| Qrxlevmin | dBm/15kHz | -140 | -140 | -140 |
|  | dBm/15kHz | -98 | | |
| RSRP | dBm/15kHz | -87 | -87 | -87 |
|  | dB | 11 | 11 | 11 |
| Threshx, high (NOTE 2) | dB | 24(-79dBm) | | |
| Snonintrasearch | dB | 46 | | |
| Propagation Condition |  | AWGN | | |
| NOTE 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 2: This refers to the value of Thresh**x, high** which is included in E-UTRA system information, and is a threshold for the UTRA target cell | | | | |

Table A.4.3.4.1.1.2-3: Cell specific test parameters for cell re-selection E-UTRA TDD to UTRA TDD test case (cell 2)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 (UTRA) | | | | | |
| Timeslot Number | |  | 0 | | | DwPTS | | |
|  |  | | T1 | T2 | T3 | T1 | T2 | T3 |
| UTRA RF Channel Number (NOTE 1) |  | | Channel 2 | | | | | |
| PCCPCH\_Ec/Ior | dB | | -3 | -3 | -3 |  |  |  |
| DwPCH\_Ec/Ior | dB | |  |  |  | 0 | 0 | 0 |
| OCNS\_Ec/Ior | dB | | -3 | -3 | -3 |  |  |  |
|  | dB | | -inf | 11 | -3 | -inf | 11 | -3 |
|  | dBm/1.28 MHz | | -80 | | | | | |
| PCCPCH RSCP | dBm | | -inf | -72 | -86 | n.a. | | |
| Propagation Condition |  | | AWGN | | | | | |
| Qrxlevmin | dBm | | -103 | | | | | |
| Qoffset1s,n | dB | | C1, C2: 0 | | | | | |
| Qhyst1s | dB | | 0 | | | | | |
| Snonintrasearch | dB | | Not sent | | | | | |
| Threshserving, low | dB | | 24 (-79dBm) | | | | | |
| Threshx, low (NOTE 2) | dB | | 46 (-94dBm) | | | | | |
| NOTE 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency’s channel number.  NOTE 2: This refers to the value of Thresh**x, low** which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | | | | |

A.4.3.4.1.1.3 Void

##### A.4.3.4.1.2 Test Requirements

A.4.3.4.1.2.1 Void

A.4.3.4.1.2.2 1.28 Mpcs TDD option

The cell reselection delay to higher priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send the SYNCH-UL sequence in the UpPTS for sending the RRC CONNECTION REQUEST message on cell 2.

The cell re-selection delay to higher priority shall be less than 81 s.

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

NOTE: The cell re-selection delay to higher priority cell can be expressed as: Thigher\_priority\_search + TevaluateUTRA\_TDD + TSI\_UTRA,

Where:

Thigher\_priority\_search 60s, See clause 4.2.2

TevaluateUTRA\_TDD 19.2s, See Table 4.2.2.5.2-1

TSI\_UTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 80.48 s, allow 81 s for higher priority cell reselection in the test case.

A.4.3.4.1.2.3 Void

#### A.4.3.4.2 E-UTRA to UTRA TDD cell re-selection: UTRA is of lower priority

##### A.4.3.4.2.1 Test Purpose and Environment

A.4.3.4.2.1.1 Void

A.4.3.4.2.1.2 1.28 Mcps TDD option

This test is to verify the requirement for the E-UTRA TDD to UTRA TDD inter-RAT cell re-selection requirements specified in clause 4.2.2.5 when the UTRA cell is of lower priority.

This test scenario comprised of 1 E-UTRA TDD serving cell (Cell 1), and 1 UTRA TDD cell (Cell 2) to be re-selected. Test parameters are given in table A.4.3.4.2.1.2-1, A.4.3.4.2.1.2-2, and A.4.3.4.2.1.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Cell 2 is of lower priority than cell 1.

The ranking of the cells shall be made according to the cell reselection criteria specified in TS36.304.

Table A.4.3.4.2.1.2-1: General test parameters for E-UTRAN to UTRAN (1.28 Mcps TDD OPTION) Cell Re-selection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell 1 | E-UTRAN cell |
| T1 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 during T1 for subsequent iterations of the test |
| Neighbour cell |  | Cell2 | 1.28 Mcps TDD OPTION cell |
| T2 end condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T2 |
| Neighbour cell |  | Cell1 | E-UTRA TDD cell |
| Uplink-downlink configuration of cell 1 | |  | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | |  | 6 | As specified in table 4.2.1 in TS 36.211 |
| PRACH configuration of cell 1 | |  | 53 | As specified in table 4.7.1-3 in TS 36.211 |
| CP length of cell 1 | |  | Normal |  |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure. |
| Treselection | | s | 0 |  |
| DRX cycle length | | s | 1,28 |  |
| HCS | |  | Not used |  |
| T1 | | s | 85 |  |
| T2 | | s | 25 |  |

Table A.4.3.4.2.1.2-2: Cell specific test parameters for cell re-selection E-UTRA TDD to UTRA TDD test case (cell 1)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| PBCH\_RA | dB | 0 | 0 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote1 | dB |
| OCNG\_RBNote1 | dB |
| Qrxlevmin | dBm/15kHz | -140 | -140 |
|  | dBm/15kHz | -98 | |
| RSRP | dBm/15kHz | -87 | -101 |
|  | dB | 11 | -3 |
| Snonintrasearch | dB | Not sent | |
| Threshserving, low | dB | 46 (-94dBm) | |
| Threshx, low (Note2) | dB | 24 (-79dBm) | |
| Propagation Condition |  | AWGN | |
| Note1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note2: This refers to the value of Thresh**x, low** which is included in E-UTRA system information, and is a threshold for the UTRA target cell | | | |

Table A.4.3.4.2.1.2-3: Cell specific test parameters for cell re-selection E-UTRA TDD to UTRA TDD test case (cell 2)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 (UTRA) | | | | |
| Timeslot Number | |  | 0 | | | DwPTS | |
|  |  | | T1 | | T2 | T1 | T2 |
| UTRA RF Channel Number (Note1) |  | | Channel 2 | | | | |
| PCCPCH\_Ec/Ior | dB | | -3 | | -3 |  |  |
| DwPCH\_Ec/Ior | dB | |  | |  | 0 | 0 |
| OCNS\_Ec/Ior | dB | | -3 | | -3 |  |  |
|  | dB | | 11 | | 11 | 11 | 11 |
|  | dBm/1.28 MHz | | -80 | | | | |
| PCCPCH RSCP | dBm | | -72 | -72 | | n.a. | n.a. |
| Propagation Condition |  | | AWGN | | | | |
| Qrxlevmin | dBm | | -103 | | | | |
| Qoffset1s,n | dB | | C1, C2: 0 | | | | |
| Qhyst1s | dB | | 0 | | | | |
| Threshx, high (Note2) | dB | | 46 (-94dBm) | | | | |
| Note1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency’s channel number.  Note2: This refers to the value of Thresh**x, high** which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | | | |

A.4.3.4.2.1.3 Void

##### A.4.3.4.2.2 Test Requirements

A.4.3.4.2.2.1 Void

A.4.3.4.2.2.2 1.28 Mpcs TDD option

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send the SYNCH-UL sequence in the UpPTS for sending the RRC CONNECTION REQUEST message on cell 2.

The cell re-selection delay to lower priority shall be less than 21 s.

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

NOTE: The cell re-selection delay to lower priority cell can be expressed as: TevaluateUTRA\_TDD + TSI\_UTRA,

Where:

TevaluateUTRA\_TDD 19.2s, See Table 4.2.2.5.2-1

TSI\_UTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 20.48 s, allow 21 s for lower priority cell reselection in the test case.

A.4.3.4.2.2.3 Void

#### A.4.3.4.3 EUTRA TDD-UTRA TDD cell reselection in fading propagation conditions: UTRA TDD is of lower priority

##### A.4.3.4.3.1 Test Purpose and Environment

This test is to verify the requirement for the EUTRA TDD- UTRA TDD inter-RAT cell reselection requirements specified in clause 4.2.2.5.2 when the UTRA cell is of lower priority, and to verify the robustness of the UE measurement filtering in a fading environment. The E-UTRA cell is in fading propagation conditions and the UTRA cell is in AWGN propagation conditions.

The test scenario comprises of one UTRA TDD and one E-UTRA TDD cells as given in tables A.4.3.4.3.1-1, A.4.3.4.3.1-2 and A.4.3.4.3.1-3. The test consists of four successive time periods, with time duration of T1 T2, T3 and T4 respectively. Both E-UTRA cell 1 and UTRA cell 2 are already identified by the UE prior to the start of the test. Cell 2 is of lower priority than cell 1.

Table A.4.3.4.3.1-1: General test parameters for EUTRA TDD- lower priority UTRA TDD inter RAT cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 | E-UTRAN cell |
| T1 end condition | Active cells |  | Cell1 | UE shall perform reselection to cell 1 during T1 for subsequent iterations of the test |
| Neighbour cell |  | Cell2 |  |
| T3 end condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T3 |
| Neighbour cell |  | Cell1 |  |
| E-UTRA PRACH configuration | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Uplink-downlink configuration of cell 1 | |  | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | |  | 6 | As specified in table 4.2.1 in TS 36.211 |
| E\_UTRA Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | <85 | T1 need to be defined so that cell re-selection reaction time is taken into account. T1 is terminated when the UE starts to send preambles to cell 1 |
| T2 | | s | 64 | The start of T2 is defined as the time when the UE starts to send PRACH preambles to cell 1 |
| T3 | | s | <25 | T3 need to be defined so that cell re-selection reaction time is taken into account. T3 is terminated when the UE starts to send PRACH preambles to cell 2 |
| T4 | | s | 64 | The start of T4 is defined as the time when the UE starts to send PRACH preambles to cell 2 |

Table A.4.3.4.3.1-2: Cell specific test parameters for cell 1 (E-UTRA)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | |
| T1 | T2 | T3 | T4 |
| E-UTRA RF Channel number |  | 1 | | | |
| BWchannel | MHz | 10 | | | |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low | | | |
| OCNG Patterns defined in A.3.2.2.2 (OP.2 TDD) |  | OP.2 TDD | | | |
| PSS\_RA | dB | 0 | | | |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin for UTRA neighbour cell | dBm | -103 | | | |
| Qrxlevmin | dBm | -140 | | | |
|  | dBm/15 kHz | -104 | | | |
| RSRP | dBm/15 KHz | -82 | -82 | -107 | -107 |
|  | dB | 22 | 22 | -3 | -3 |
|  | dB | 22 | 22 | -3 | -3 |
| TreselectionEUTRAN | s | 0 | | | |
| Snonintrasearch | dB | Not sent | | | |
| Threshserving, low | dB | 44 | | | |
| Threshx, low (Note 2) | dB | 24 | | | |
| Propagation Condition |  | ETU70 | | | |
| 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: This refers to the value of Threshx, low which is included in E-UTRA system information, and is a threshold for the UTRA target cell. | | | | | |

Table A.4.3.4.3.1-3: Cell specific test parameters for cell 2 (UTRA)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 (UTRA) | | | | | | | | | | |
| Timeslot Number | |  | 0 | | | | | | | DwPTS | | | |
|  |  | | T1 | | T2 | | T3 | | T4 | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number (Note1) |  | | Channel 2 | | | | | | | | | | |
| PCCPCH\_Ec/Ior | dB | | -3 | | | | | | |  | | | |
| DwPCH\_Ec/Ior | dB | |  | | | | | | | 0 | | | |
| OCNS\_Ec/Ior | dB | | -3 | | | | | | |  | | | |
|  | dB | | 13 | | 13 | | 13 | | 13 | 13 | 13 | 13 | 13 |
|  | dBm/1.28 MHz | | -80 | | | | | | | | | | |
| PCCPCH RSCP | dBm | | -70 | -70 | | -70 | | -70 | | n.a. | n.a. | n.a. | n.a. |
| Propagation Condition |  | | AWGN | | | | | | | | | | |
| Qrxlevmin | dBm | | -103 | | | | | | | | | | |
| QrxlevminEUTRA | dBm | | -140 | | | | | | | | | | |
| UE\_TXPWR\_MAX\_RACH | dBm | | 21 | | | | | | | | | | |
| Treselection | s | | 0 | | | | | | | | | | |
| Threshx, high (Note2) | dB | | 44 | | | | | | | | | | |
| Note1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency’s channel number.  Note2: This refers to the value of Threshx, high which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | | | | | | | | | |

##### A.4.3.4.3.2 Test Requirements

The probability of reselection from cell 1 to cell 2 during T2 observed during testing shall be less than 10%

The probability of reselection from cell 2 to cell 1 during T4 observed during testing shall be less than 10%

The cell reselection delay to lower priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send the SYNCH-UL sequene in the UpPTS for sending the RRC CONNECTION REQUEST message on cell 2. In order to evaluate reselection delay, the system simulator first needs to verify that the UE is camped on cell 1 at the start of T3

The cell re-selection delay to lower priority shall be less than 21 s.

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

NOTE: The cell re-selection delay to lower priority cell can be expressed as: TevaluateUTRA\_TDD + TSI-UTRA

Where:

TevaluateUTRA\_TDD 19.2s, See Table 4.2.2.5.2-1

TSI-UTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 20.48 s for lower priority cell reselection, allow 21 s.

#### A.4.3.4.4 E-UTRA TDD to UTRA TDD cell re-selection for IncMon

##### A.4.3.4.4.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRA TDD to UTRA TDD inter-RAT cell reselection requirements for increased UE carrier monitoring specified in clause 4.2.2.4. UTRA TDD cells are of lower priority than E-UTRA serving cell.

The test scenario comprises of indicating 7 UTRA TDD inter-RAT cells on 7 different carriers in the neighbour list of cell 1 as given in tables A.4.3.4.4.1-1, A.4.3.4.4.1-2 and A.4.3.4.4.1-3. Each repetition of the test consists of five successive time periods, with time duration of T0, T1, T2, T3, and T4 respectively. In the initialisation phase and at the start of each repetition of T0, the test equipment provides signals for cell 1 (E-UTRA serving cell), and selects frequencies for cells 2 and 3 which are chosen from the 7 inter-RAT layers which are configured in the UE neighbour cell list as described in general and cell specific parameters. The neighbour lists of cells 2 and 3 shall include the frequency of cell 1 in the normal performance group and shall exclude the other UTRA TDD frequencies configured to the UE in the test.

Cell 1, 2, and 3 are identified by the UE during time phase T0. Cell 1, cell 2, and cell 3 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2 or 3.

Table A.4.3.4.4.1-1: General test parameters for E-UTRA TDD to UTRA TDD inter-RAT cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| T0 | Active cell |  | Cell1 | T0 is repeated on each repetition of the test. In T0 the test equipment selects frequencies for cell 2, 3 and then time is allowed for the UE to identify the neighbour cells. See cell specific parameters for detailed settings. |
| T1 start condition | Active cell |  | Cell 1 |  |
| T1 end condition | Active cell |  | Cell2 | UE shall perform reselection to cell 2 during T1 |
| Neighbour cell |  | Cell1 |
| T2 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 during T2 |
| T3 end condition | Active cell |  | Cell3 | UE shall perform reselection to cell 3 during T3 |
| Neighbour cell |  | Cell1 |
| T4 end condition | Active cell |  | Cell1 | UE shall perform reselection to cell 1 in T4 so that next repetition of test can start from T0 |
| UE configured UTRA RF Channel Number | |  | 1, 2, 3, 4, 5, 6, 7 | **Seven UTRA TDD carrier frequencies are used in the UE neighbour cell list. Frequencies 4, 5, 6, and 7 are indicated to have reduced performance** |
| Test eqipment configuration | |  | Cell 1, 2, 3 | Cell 1 uses E-UTRA RF channel number 1  Cells 2 is randomly selected to use different frequencies selected from UTRA frequencies 1, 2, 3.  Cells 3 is randomly selected to use different frequencies selected from UTRA frequencies 4, 5, 6, 7. |
| Uplink-downlink configuration of cell 1 | |  | 1 | As specified in table 4.2.2 in TS 36.211 [16] |
| Special subframe configuration of cell 1 | |  | 6 | As specified in table 4.2.1 in TS 36.211 [16] |
| CP length of cell 1 | |  | normal |  |
| PRACH configuration | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 [16] |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Treselection | | s | 0 |  |
| HCS | |  | Not used |  |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T0 | | s | (Test equipment frequency selection and configuration time) + 960 | T0 is defined so that the Test equipment selects frequencies and configures the cells, then the UE cell detection time is taken into account. |
| T1 | | s | 60 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 25 | T2 need to be defined so that cell re-selection reaction time is taken into account |
| T3 | | s | 500 | T3 need to be defined so that cell re-selection reaction time is taken into account. |
| T4 | | s | 25 | T4 need to be defined so that cell re-selection reaction time is taken into account |

Table A.4.3.4.4.1-2: E-UTRA Cell specific test parameters for E-UTRA TDD to UTRA TDD inter-RAT cell reselection test case in AWGN

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | |
| T0 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel number |  | 1 | | | | |
| BWchannel | MHz | 5MHz: NRB = 25  10MHz: NRB = 50 | | | | |
| OCNG Patterns |  | 5MHz: OP.10 TDD  10MHz: OP.2 TDD | | | | |
| PBCH\_RA | dB | 0 | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RA Note 1 | dB |
| OCNG\_RB Note 1 | dB |
| Note 2 | dBm/15kHz | -98 | | | | |
|  | dB | 11 | -3 | 11 | -3 | 11 |
| Note 3 | dB | 11 | -3 | 11 | -3 | 11 |
| RSRP Note 3 | dBm/15kHz | -87 | -101 | -87 | -101 | -87 |
| Qrxlevmin | dBm/15kHz | -140 | | | | |
| Snonintrasearch | dB | Not sent | | | | |
| Threshserving, low | dB | 46 (-94dBm) | | | | |
| Threshx, low Note 4 | dB | 24 (-79dBm) | | | | |
| Propagation Condition |  | AWGN | | | | |
| Antenna Configuration |  | 1x2 | | | | |
| 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: This refers to the value of Threshx, low which is included in E-UTRA system information, and is a threshold for the UTRA TDD target cell. | | | | | | |

Table A.4.3.4.4.1-3: UTRA TDD Cell specific test parameters for E-UTRA TDD to UTRA TDD inter-RAT cell reselection test case in AWGN

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (UTRA TDD) | | | | | | | | | |
| Timeslot Number |  | 0 | | | | | DwPTS | | | | |
|  |  | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number Note1 |  | Randomly selected from 1, 2, 3 such that cell 2 is in the normal performance group | | | | | | | | | |
| PCCPCH\_Ec/Ior | dB | -3 | | | | |  | | | | |
| DwPCH\_Ec/Ior | dB |  | | | | | 0 | | | | |
| OCNS\_Ec/Ior | dB | -3 | | | | |  | | | | |
|  | dBm/ 1.28 MHz | -80 | | | | | | | | | |
|  | dB | -3 | 11 | -3 | -3 | -3 | -3 | 11 | -3 | -3 | -3 |
| PCCPCH RSCP | dBm | -86 | -72 | -86 | -86 | -86 | n.a. | | | | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| Qrxlevmin | dBm | -103 | | | | | | | | | |
| Qoffset1s,n | dB | C1, C2: 0 | | | | | | | | | |
| Qhyst1s | dB | 0 | | | | | | | | | |
| Sprioritysearch1 | dB | 24 (-79dBm) | | | | | | | | | |
| Sprioritysearch2 | dB | 0 | | | | | | | | | |
| Threshx, low Note2 | dB | 46 (-94dBm) | | | | | | | | | |
| SsearchE-UTRA | dB | Not send | | | | | | | | | |
| Time offset to cell1 | ms | 3 | | | | | | | | | |
| Note1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency’s channel number.  Note2: This refers to the value of Threshx, low which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | | | | | | | |

Table A.4.3.4.4.1-4:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 3 (UTRA TDD) | | | | | | | | | |
| Timeslot Number |  | 0 | | | | | DwPTS | | | | |
|  |  | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number Note1 |  | Randomly selected from 4, 5, 6, 7 such that cell 3 is in the reduced performance group | | | | | | | | | |
| PCCPCH\_Ec/Ior | dB | -3 | | | | |  | | | | |
| DwPCH\_Ec/Ior | dB |  | | | | | 0 | | | | |
| OCNS\_Ec/Ior | dB | -3 | | | | |  | | | | |
|  | dBm/ 1.28 MHz | -80 | | | | | | | | | |
|  | dB | -3 | -3 | -3 | 11 | -3 | -3 | -3 | -3 | 11 | -3 |
| PCCPCH RSCP | dBm | -86 | -86 | -86 | -72 | -86 | n.a. | | | | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| Qrxlevmin | dBm | -103 | | | | | | | | | |
| Qoffset1s,n | dB | C1, C2: 0 | | | | | | | | | |
| Qhyst1s | dB | 0 | | | | | | | | | |
| Sprioritysearch1 | dB | 24 (-79dBm) | | | | | | | | | |
| Sprioritysearch2 | dB | 0 | | | | | | | | | |
| Threshx, high Note2 | dB | 46 (-94dBm) | | | | | | | | | |
| SsearchE-UTRA | dB | Not send | | | | | | | | | |
| Time offset to cell1 | ms | 3 | | | | | | | | | |
| Time offset to cell2 | μs | 3 | | | | | | | | | |
| Note1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency’s channel number.  Note2: This refers to the value of Threshx, high which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | | | | | | | |

##### A.4.3.4.4.2 Test Requirements

The cell reselection delay is defined as the time from the beginning of a relevant time period, to the moment when the UE camps on the target cell, and starts to send the SYNCH-UL sequence in the UpPTS on cell 2, 3 for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on the target cell.

The reselection delays shall meet the requirements in table A.4.3.4.4.2-1

Table A.4.3.4.4.2-1: Test requirements for E-UTRA TDD to UTRA TDD inter-RAT cell reselection

|  |  |  |
| --- | --- | --- |
| Time phase | Target cell | Requirement for reselection delay (seconds) |
| T1 | Cell 2 (normal performance group) | 58.9 |
| T3 | Cell 3 (reduced performance group) | 462.1 |

The rate of correct cell reselections observed during repeated tests shall be at least 90%, with a successful reselection counted if it is within the required time regardless of the carrier frequencies involved. At least 90% of reselections to the reduced performance group shall be within the required time, and at least 90% of reselections to the normal performance group shall be within the required time.

NOTE: The cell re-selection delay to a normal performance group cell can be expressed as: NUTRA\_carrier\_TDD,normal \*TevaluateUTRA\_TDD + TSI\_UTRA, and to a reduced performance group cell can be expressed as: 6 \* NUTRA\_carrier\_TDD,reduced \* TevaluateUTRA\_TDD + TSI\_UTRA,

Where:

TevaluateUTRA\_TDD 19.2s, See Table 4.2.2.5.2-1

TSI\_UTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 3 \* 19.2 + 1.28 = 58.88 s for normal performance group reselection and 6 \* 4 \* 19.2 + 1.28 = 462.08s for reduced performance group reselection, allow 58.9s for normal performance group and 462.1s for reduced performance group in the test case.

Since only one E-UTRA frequency is configured and signal level of UTRA cell is lower than threshold of Sprioritysearch, the UE shall select back to cell 1 (E-UTRA cell) within Kcarrier \* TevaluateEUTRA + TSI = 19.2 + 1.28 = 20.48s, allow 21s.

## A.4.4 E-UTRAN to GSM Cell Re-Selection

### A.4.4.1 E-UTRAN FDD – GSM:

#### A.4.4.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to GSM cell re-selection delay reported in clause 4.2.2.5.

This scenario implies the presence of 1 E-UTRAN serving cell, and 1 GSM cell to be re-selected. The UE is requested to monitor neighbouring cells on 1 E-UTRA carrier and 12 GSM cells. Test parameters are given in Table, A.4.4.1-1, A.4.4.1-2, A.4.4.1-3. E-UTRA FDD cell (Cell 1) and GSM cell (cell 2) shall belong to different Location Areas. The test comprises two successive time periods, T1 and T2. During initialization before the start of the test, the UE is camped on cell 1. By the end of T1, the UE has identified BSIC on the GSM BCCH carrier of cell 2 but the signal levels do not meet the reselection criterion during T1. At the start of T2, the signal levels change such that cell 2 satisfies reselection criterion. The GSM layer is configured at a lower priority than the serving E-UTRA FDD layer.

Table A.4.4.1-1: General test parameters for E-UTRA FDD GSM cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 | UE shall be forced to cell 1 in the initialisation phase and shall be able to detect and monitor the 4 strongest GSM BCCH carriers in T1 . Cell 1 is an E-UTRA FDD cell. |
| Final condition | Neighbour cell |  | Cell2 | UE shall perform reselection to cell 2 during T2. Cell 2 is a GSM cell. |
| E-UTRA RF Channel Number | |  | 1 | 1 E-UTRA FDD carrier frequency |
| GSM ARFCN | |  | 1 | 12 GSM BCCH carriers are used |
| PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| CP length of cell 1 | |  | Normal |  |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 35 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 35 | T2 need to be defined so that the higher layer search periodicity and cell re-selection reaction time are taken into account. |
| Propagation channel | |  | AWGN |  |

Table A.4.4.1-2: Cell-specific test parameters for Cell 1 – E-UTRA FDD cell

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) |  | OP.2 FDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -89 | -102 |
|  | dB | 9 | -4 |
|  | dB | 9 | -4 |
| TreselectionEUTRAN | s | 0 | |
| Snonintrasearch | dB | Not sent | |
| Threshserving, low | dB | 44 | |
| Threshx, low (Note 2) | dB | 24 | |
| 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: This refers to Threshx, low which is included in E-UTRA system information, and is a threshold for GSM target cell. | | | | |

Table A.4.4.1-3: Cell-specific test parameters for Cell 2 – GSM cell

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 (GSM) | |
| T1 | T2 | |
| Absolute RF Channel Number |  | | ARFCN 1 | |
| RXLEV | dBm | | -90 | -75 |
| RXLEV\_ACCESS\_MIN | dBm | | -105 | |
| MS\_TXPWR\_MAX\_CCH | dBm | | 24 | |

#### A.4.4.1.2 Test Requirements

The cell re-selection delay is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send the RR Channel Request message for location update to Cell 2.

The cell re-selection delay shall be less than 26 s + TBCCH, where TBCCH is the maximum time allowed to read BCCH data from GSM cell [8].

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

NOTE: The cell re-selection delay can be expressed as: 4\* TmeasureGSM + TBCCH, where:

TmeasureGSM See Table 4.2.2.5.3-1 in clause 4.2.2.5.3.

TBCCH Maximum time allowed to read BCCH data from GSM cell [8].   
According to [8], the maximum time allowed to read the BCCH data, when being synchronized to a BCCH carrier, is 1.9 s.

This gives a total of 25.6 s + TBCCH, allow 26 s + TBCCH in the test case.

#### A.4.4.2 E-UTRAN TDD – GSM:

#### A.4.4.2.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN TDD to GSM cell re-selection delay reported in clause 4.2.2.5.

This scenario implies the presence of 1 E-UTRAN serving cell, and 1 GSM cell to be re-selected. The UE is requested to monitor neighbouring cells on 1 E-UTRA carrier and 12 GSM cells. Test parameters are given in Table, A.4.4.2-1, A.4.4.2-2, A.4.4.2-3. E-UTRA TDD cell (Cell 1) and GSM cell (cell 2) shall belong to different Location Areas. The test comprises two successive time periods, T1 and T2. During initialization before the start of the test, the UE is camped on cell 1. By the end of T1, the UE has identified BSIC on the GSM BCCH carrier of cell 2 but the signal levels do not meet the reselection criterion during T1. At the start of T2, the signal levels change such that cell 2 satisfies reselection criterion. The GSM layer is configured at a lower priority than the serving E-UTRA TDD layer.

Table A.4.4.2-1: General test parameters for E-UTRA TDD GSM cell re-selection test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell1 | UE shall be forced to cell 1 in the initialisation phase and shall be able to detect and monitor the 4 strongest GSM BCCH carriers in T1. Cell 1 is an E-UTRA TDD cell. |
| Final condition | Neighbour cell |  | Cell2 | UE shall perform reselection to cell 2 during T2. Cell 2 is a GSM cell. |
| E-UTRA RF Channel Number | |  | 1 | 1 E-UTRA TDD carrier frequency |
| GSM ARFCN | |  | 1 | 12 GSM BCCH carriers are used |
| Uplink-downlink configuration of cell 1 | |  | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration for cell 1 | |  | 6 | As specified in table 4.2.1 in TS 36.211 |
| PRACH configuration for cell 1 | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| CP length of cell 1 | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 35 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 35 | T2 need to be defined so that the higher layer search periodicity and cell re-selection reaction time are taken into account. |
| Propagation channel | |  | AWGN |  |

Table A.4.4.2-2: Cell-specific test parameters for Cell 1 – E-UTRA TDD cell

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in A.3.2.2.2 (OP.2 TDD) |  | OP.2 TDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -89 | -102 |
|  | dB | 9 | -4 |
|  | dB | 9 | -4 |
| TreselectionEUTRAN | s | 0 | |
| Snonintrasearch | dB | Not sent | |
| Threshserving, low | dB | 44 | |
| Threshx, low (Note 2) | dB | 24 | |
| 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: This refers to Threshx, low which is included in E-UTRA system information, and is a threshold for GSM target cell. | | | | |

Table A.4.4.2-3: Cell-specific test parameters for Cell 2 – GSM cell

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 (GSM) | |
| T1 | T2 | |
| Absolute RF Channel Number |  | | ARFCN 1 | |
| RXLEV | dBm | | -90 | -75 |
| RXLEV\_ACCESS\_MIN | dBm | | -105 | |
| MS\_TXPWR\_MAX\_CCH | dBm | | 24 | |

#### A.4.4.2.2 Test Requirements

The cell re-selection delay is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send the RR Channel Request message for location update to Cell 2.

The cell re-selection delay shall be less than 26 s + TBCCH, where TBCCH is the maximum time allowed to read BCCH data from GSM cell [8].

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

NOTE: The cell re-selection delay can be expressed as: 4\* TmeasureGSM + TBCCH, where:

TmeasureGSM See Table 4.2.2.5.3-1 in clause 4.2.2.5.3.

TBCCH Maximum time allowed to read BCCH data from GSM cell [8].   
According to [8], the maximum time allowed to read the BCCH data, when being synchronized to a BCCH carrier, is 1.9 s.

This gives a total of 25.6 s + TBCCH, allow 26 s + TBCCH in the test case.

## A.4.5 E-UTRAN to HRPD Cell Re-Selection

### A.4.5.1 E-UTRAN FDD – HRPD

#### A.4.5.1.1 E-UTRAN FDD – HRPD Cell Reselection: HRPD is of Lower Priority

##### A.4.5.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD- HRPD inter-RAT cell reselection requirements specified in clause 4.2.2.5.4 when the HRPD cell is of lower priority.

The test scenario comprises of one HRPD and one E-UTRAN FDD cells as given in tables A.4.5.1.1.1-1, A.4.5.1.1.1-2 and A.4.5.1.1.1-3.

The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both E-UTRAN FDD cell 1 and HRPD cell 2 are already identified by the UE prior to the start of the test. At T1 the UE is camped on to cell 1. Cell 2 is of lower priority than cell 1. Cell 1 and cell 2 shall belong to different tracking areas.

Table A.4.5.1.1.1-1: General Test Parameters for E-UTRAN FDD - lower priority HRPD Cell Re-selection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell 1 | E-UTRAN FDD cell |
| Neighbour cell |  | Cell 2 | HRPD cell |
| Final condition | Active cell |  | Cell 2 | HRPD cell is selecting during T2 |
| DRX cycle length | | s | 1.28 |  |
| E-UTRA FDD RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| E-UTRA FDD Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| HRPD RF Channel Number | |  | 1 | Only one HRPD carrier frequency is used. |
| E-UTRA FDD PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E\_UTRA FDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T1 | | s | 30 |  |
| T2 | | s | 30 |  |

Table A.4.5.1.1.1-2: Cell Specific Test Parameters for E-UTRAN FDD (Cell # 1)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) |  | OP.2 FDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -89 | -102 |
|  | dB | 9 | -4 |
|  | dB | 9 | -4 |
| TreselectionEUTRAN | S | 0 | |
| Snonintrasearch | dB | Not sent | |
| cellReselectionPriority | - | 1 | |
| Qrxlevmin | dBm | -140 | |
| Qrxlevminoffset | dB | 0 | |
| Pcompensation | dB | 0 | |
| SServingCell | dB | 51 | 38 |
| Threshserving, low | dB | 44 | |
| Propagation Condition |  | AWGN | |
| 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. | | | |

Table A.4.5.1.1.1-3: Cell Specific Test Parameters for HRPD (cell # 2)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
|  |  | T1 | T2 |
| HRPD RF Channel Number |  | 1 | |
| (38.4 kbps) | dB | 21 | |
| (76.8 kbps) | dB | 18 | |
|  | dB | 0 | 0 |
|  | dBm/ 1.2288 MHz | -55 | |
| CDMA2000 HRPD Pilot Strength | dB | -3 | -3 |
| Propagation Condition |  | AWGN | |
| SnonServingCell,x |  | -6 | |
| Treselection | s | 0 | |
| hrpd-CellReselectionPriority | - | 0 | |
| Threshx, low |  | -14 | |

#### A.4.5.1.1.2 Test Requirements

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2 and starts to send access probe preambles on the Access Channel on cell 2.

The cell re-selection delay to the lower priority cell 2 shall be less than 21 s.

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

NOTE: The cell re-selection delay to lower priority cell can be expressed as: TevaluateHRPD + TSI-HRPD

Where:

TevaluatHRPD See Table 4.2.2.5.4-1

TSI-HRPD Maximum repetition period of relevant system information blocks that need to be received by the UE to camp on cell 2; 1704 ms is assumed in this test case.

This gives a total of 20.904 s for the lower priority cell reselection, allow 21 s in the test case.

### A.4.5.2 E-UTRAN TDD – HRPD

#### A.4.5.2.1 E-UTRAN TDD – HRPD Cell Reselection: HRPD is of Lower Priority

##### A.4.5.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN TDD- HRPD inter-RAT cell reselection requirements specified in clause 4.2.2.5.4 when the HRPD cell is of lower priority.

The test scenario comprises of one HRPD and one E-UTRAN TDD cells as given in tables A.4.5.2.1.1-1, A.4.5.2.1.1-2 and A.4.5.2.1.1-3.

The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both E-UTRAN TDD cell 1 and HRPD cell 2 are already identified by the UE prior to the start of the test. At T1 the UE is camped on to cell 1. Cell 2 is of lower priority than cell 1. Cell 1 and cell 2 shall belong to different tracking areas.

Table A.4.5.2.1.1-1: General Test Parameters for E-UTRAN TDD - lower priority HRPD Cell Re-selection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell 1 | E-UTRAN TDD cell |
| Neighbour cell |  | Cell 2 | HRPD cell |
| Final condition | Active cell |  | Cell 2 | HRPD cell is selecting during T2 |
| Uplink-downlink configuration of cell 1 | |  | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | |  | 6 | As specified in table 4.2.1 in TS 36.211 |
| CP length of cell 1 | |  | Normal |  |
| DRX cycle length | | s | 1.28 |  |
| E-UTRA TDD RF Channel Number | |  | 1 | Only one TDD carrier frequency is used. |
| E-UTRA TDD Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| HRPD RF Channel Number | |  | 1 | Only one HRPD carrier frequency is used. |
| E-UTRA TDD PRACH configuration of cell 1 | |  | 53 | As specified in table 4.7.1-3 in TS 36.211 |
| E\_UTRA TDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T1 | | s | 30 |  |
| T2 | | s | 30 |  |

Table A.4.5.2.1.1-2: Cell Specific Test Parameters for E-UTRAN TDD (Cell # 1)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in A.3.2.2.2 (OP.2 TDD) |  | OP.2 TDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -89 | -102 |
|  | dB | 9 | -4 |
|  | dB | 9 | -4 |
| TreselectionEUTRAN | S | 0 | |
| Snonintrasearch | dB | Not sent | |
| cellReselectionPriority | - | 1 | |
| Qrxlevmin | dBm | -140 | |
| Qrxlevminoffset | dB | 0 | |
| Pcompensation | dB | 0 | |
| SServingCell | dB | 51 | 38 |
| Threshserving, low | dB | 44 | |
| Propagation Condition |  | AWGN | |
| 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. | | | |

Table A.4.5.2.1.1-3: Cell Specific Test Parameters for HRPD (cell # 2)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
|  |  | T1 | T2 |
| HRPD RF Channel Number |  | 1 | |
| (38.4 kbps) | dB | 21 | |
| (76.8 kbps) | dB | 18 | |
|  | dB | 0 | 0 |
|  | dBm/ 1.2288 MHz | -55 | |
| CDMA2000 HRPD Pilot Strength | dB | -3 | -3 |
| Propagation Condition |  | AWGN | |
| SnonServingCell,x |  | -6 | |
| Treselection | s | 0 | |
| hrpd-CellReselectionPriority | - | 0 | |
| Threshx, low |  | -14 | |

##### A.4.5.2.1.2 Test Requirements

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2 and starts to send access probe preambles on the Access Channel on cell 2.

The cell re-selection delay to the lower priority cell 2 shall be less than 21 s.

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

NOTE: The cell re-selection delay to lower priority cell can be expressed as: TevaluateHRPD + TSI-HRPD

Where:

TevaluatHRPD See Table 4.2.2.5.4-1

TSI-HRPD Maximum repetition period of relevant system information blocks that need to be received by the UE to camp on cell 2; 1704 ms is assumed in this test case.

This gives a total of 20.904 s for the lower priority cell reselection, allow 21 s in the test case.

## A.4.6 E-UTRAN to cdma2000 1X Cell Re-Selection

#### A.4.6.1 E-UTRAN FDD – cdma2000 1X

#### A.4.6.1.1 E-UTRAN FDD – cdma2000 1X Cell Reselection: cdma2000 1X is of Lower Priority

#### A.4.6.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD- cdma2000 1X inter-RAT cell reselection requirements specified in clause 4.2.2.5.5 when the cdma2000 1X cell is of lower priority.

The test scenario comprises of one cdma2000 1X and one E-UTRAN FDD cells as given in tables A.4.6.1.1.1-1, A.4.6.1.1.1-2 and A.4.6.1.1.1-3.

The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both E-UTRAN FDD cell 1 and cdma2000 1X cell 2 are already identified by the UE prior to the start of the test. At T1 the UE is camped on to cell 1. Cell 2 is of lower priority than cell 1. Cell 1 and cell 2 shall belong to different tracking areas.

Table A.4.6.1.1.1-1: General Test Parameters for E-UTRAN FDD - lower priority cdma2000 1X Cell Re-selection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell 1 | E-UTRAN FDD cell |
| Neighbour cell |  | Cell 2 | cdma2000 1X cell |
| Final condition | Active cell |  | Cell 2 | cdma2000 1X cell is selecting during T2 |
| DRX cycle length | | s | 1.28 |  |
| E-UTRA FDD RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| E-UTRA FDD Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| cdma2000 1X RF Channel Number | |  | 1 | Only one cdma2000 1X carrier frequency is used. |
| E-UTRA FDD PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E\_UTRA FDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T1 | | s | 30 |  |
| T2 | | s | 30 |  |

Table A.4.6.1.1.1-2: Cell Specific Test Parameters for E-UTRAN FDD (Cell # 1)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) |  | OP.2 FDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Note 2 | dBm/15 kHz | -98 | |
| RSRP Note 3 | dBm/15 KHz | -89 | -102 |
|  | dB | 9 | -4 |
|  | dB | 9 | -4 |
| TreselectionEUTRAN | S | 0 | |
| Snonintrasearch | dB | Not sent | |
| cellReselectionPriority | - | 1 | |
| Qrxlevmin | dBm | -140 | |
| Qrxlevminoffset | dB | 0 | |
| Pcompensation | dB | 0 | |
| SServingCell | dB | 51 | 38 |
| Threshserving, low | dB | 44 | |
| Propagation Condition |  | AWGN | |
| 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. | | | |

Table A.4.6.1.1.1-3: Cell Specific Test Parameters for cdma2000 1X (cell # 2)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
|  |  | T1 | T2 |
| cdma2000 1X RF Channel Number |  | 1 | |
|  | dB | -7 | |
|  | dB | -16 | |
| (4.8 kbps) | dB | -12 | |
|  | dB | 0 | 0 |
|  | dBm/ 1.2288 MHz | -55 | |
| CDMA2000 1xRTT Pilot Strength | dB | -10 | -10 |
| Propagation Condition |  | AWGN | |
| SnonServingCell,x |  | -20 | |
| Treselection | s | 0 | |
| oneXRTT-CellReselectionPriority | - | 0 | |
| Threshx, low |  | -28 | |

#### A.4.6.1.1.2 Test Requirements

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2 and starts to send access probe preambles on the Access Channel on cell 2.

The cell re-selection delay to the lower priority cell 2 shall be less than 21 s.

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

NOTE: The cell re-selection delay to lower priority cell can be expressed as: Tevaluatecdma2000 1X + TSI-cdma2000 1X

Where:

Tevaluatcdma2000 1X See Table 4.2.2.5.5-1

TSI-cdma2000 1X Maximum repetition period of relevant system information blocks that need to be received by the UE to camp on cell 2; 1280 ms is assumed in this test case.

This gives a total of 20.48 s for the lower priority cell reselection, allow 21 s in the test case.

### A.4.6.2 E-UTRAN TDD – cdma2000 1X

#### A.4.6.2.1 E-UTRAN TDD –cdma2000 1X Cell Reselection: cdma2000 1X is of Lower Priority

##### A.4.6.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN TDD- cdma2000 1X inter-RAT cell reselection requirements specified in clause 4.2.2.5.5 when the cdma2000 1X cell is of lower priority.

The test scenario comprises of one cdma2000 1X and one E-UTRAN TDD cells as given in tables A.4.6.2.1.1-1, A.4.6.2.1.1-2 and A.4.6.2.1.1-3.

The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both E-UTRAN TDD cell 1 and cdma2000 1X cell 2 are already identified by the UE prior to the start of the test. At T1 the UE is camped on to cell 1. Cell 2 is of lower priority than cell 1. Cell 1 and cell 2 shall belong to different tracking areas.

Table A.4.6.2.1.1-1: General Test Parameters for E-UTRAN TDD - lower priority cdma2000 1X Cell Re-selection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active cell |  | Cell 1 | E-UTRAN TDD cell |
| Neighbour cell |  | Cell 2 | cdma2000 1X cell |
| Final condition | Active cell |  | Cell 2 | cdma2000 1X cell is selecting during T2 |
| DRX cycle length | | s | 1.28 |  |
| E-UTRA TDD RF Channel Number | |  | 1 | Only one TDD carrier frequency is used. |
| E-UTRA TDD Channel Bandwidth (BW**channel)** | | MHz | 10 |  |
| cdma2000 1X RF Channel Number | |  | 1 | Only one cdma2000 1X carrier frequency is used. |
| E-UTRA TDD PRACH configuration | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Uplink-downlink configuration of cell 1 | |  | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | |  | 6 | As specified in table 4.2.1 in TS 36.211 |
| E\_UTRA TDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T1 | | s | 30 |  |
| T2 | | s | 30 |  |

Table A.4.6.2.1.1-2: Cell Specific Test Parameters for E-UTRAN TDD (Cell # 1)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in A.3.2.2.2 (OP.2 TDD) |  | OP.2 TDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Note 2 | dBm/15 kHz | -98 | |
| RSRP Note 3 | dBm/15 KHz | -89 | -102 |
|  | dB | 9 | -4 |
|  | dB | 9 | -4 |
| TreselectionEUTRAN | S | 0 | |
| Snonintrasearch | dB | Not sent | |
| cellReselectionPriority | - | 1 | |
| Qrxlevmin | dBm | -140 | |
| Qrxlevminoffset | dB | 0 | |
| Pcompensation | dB | 0 | |
| **SServingCell** | dB | 51 | 38 |
| Threshserving, low | dB | 44 | |
| Propagation Condition |  | AWGN | |
| Note 1: CNG 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: Iterference 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: SRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

Table A.4.6.2.1.1-3: Cell Specific Test Parameters for cdma2000 1X (cell # 2)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
|  |  | T1 | T2 |
| cdma2000 1X RF Channel Number |  | 1 | |
|  | dB | -7 | |
|  | dB | -16 | |
| (4.8 kbps) | dB | -12 | |
|  | dB | 0 | 0 |
|  | dBm/ 1.2288 MHz | -55 | |
| CDMA2000 1xRTT Pilot Strength | dB | -10 | -10 |
| Propagation Condition |  | AWGN | |
| SnonServingCell,x |  | -20 | |
| Treselection | s | 0 | |
| oneXRTT-CellReselectionPriority | - | 0 | |
| Threshx, low |  | -28 | |

##### A.4.6.2.1.2 Test Requirements

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2 and starts to send access probe preambles on the Access Channel on cell 2.

The cell re-selection delay to the lower priority cell 2 shall be less than 21 s.

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

NOTE: The cell re-selection delay to lower priority cell can be expressed as: Tevaluatecdma2000 1X + TSI-cdma2000 1X

Where:

Tevaluatcdma2000 1X See Table 4.2.2.5.5-1

TSI-cdma2000 1X Maximum repetition period of relevant system information blocks that need to be received by the UE to camp on cell 2; 1280 ms is assumed in this test case.

This gives a total of 20.48 s for the lower priority cell reselection, allow 21 s in the test case.

## A.4.7 Idle State Positioning Measurement for UE category NB1

### A.4.7.1 HD – FDD Intra frequency case for UE Category NB1 standalone mode in enhanced coverage

#### A.4.7.1.1 Test Purpose and Environment

The purpose of the test is to verify that the intra frequency RSTD measurement period for HD-FDD category NB1 UE meets the delay requirements specified in Clause 4.8.2.

In the test there are three synchronous cells: nCell 1, nCell 2 and nCell 3. nCell 1 is the reference cell. nCell 2 and nCell 3 are the neighbour cells. All cells are on the same RF channel.

The test consists of six consecutive time intervals, with duration of T1, T2, T3, T4, T5, and T6. nCell 1 is active throughout T1, T2, T3, T4, T5, and T6, whilst nCell 2 and nCell 3 are activated only in the beginning of T2. nCell 2 is active until the end of T5, and nCell 3 is active until the end of T4. nCell 1 transmits NPRS in T2 and T4, while nCell 2 transmits NPRS in T3 and T5, and nCell 3 transmits NPRS only in T2 and T4. Note: The information on when NPRS is muted is conveyed to the UE using PRS muting information.

Prior to the start of the time duration T1, the UE shall be fully synchronized to nCell1.

At the start of the time duration T1, the OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355 [24], shall be provided to the UE. The duration of T1 is sufficiently long to deliver the OTDOA assistance data and *OTDOA-RequestLocationInformation* to the UE and is independent of the delay requirements specified in Clause 4.8.2.

After OTDOA assistance data and *OTDOA-RequestLocationInformation* have been successfully received, the UE is provided with a RRC connection release command. The RRC connection release command shall be received by the UE in the last TTI of interval T1. The UE shall enter RRC\_IDLE state within ΔT seconds after the receipt of the RRC connection release, where ΔT = 10s is the maximum delay for NB-IOT UE to perform RRC connection release as define in TS36.331 [2].

The test parameters are given in Tables A.4.7.1.1-1 A.4.7.1.1-2 and A.4.7.1.1-3.

Table A.4.7.1.1-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NB-IoT operational mode |  | **Standalone** |  |
| Reference cell |  | nCell 1 | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells |  | nCell 2 and nCell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| nprsID |  | (nprsID of Cell 1 – nprsID of Cell 2)mod6=1  and  (nprsID of Cell 1 – nprsID of Cell 3)mod6=2 | As defined in TS36.366 [24] |
| nprs-period | ms | 1280 | As defined in TS36.355 [24] |
| nprs-startSF |  | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS36.355 [24] |
| Number of consecutive downlink positioning subframes  nprs-NumSF |  | 320 | As defined in TS36.355 [24] |
| NPRS muting info |  | nCell 1: ‘11110000’  nCell 2: ‘00001111’  nCell 3: ‘11110000’ | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration |  | N/A | NPRS is configured based on PartB but not PartA. |
| CP length |  | Normal |  |
| NPRACH Configuration |  | NPRACH.R-1 | Refer to A.3.18 |
| DRX cycle length |  | 1.28 | The value shall be used for all cells in the test. |
| Radio frame receive time offset between the cells at the UE antenna connector | μs | nCell 2 to nCell 1: 1  nCell 3 to nCell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | μs | nCell 2: 3  nCell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | μs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data |  | 16 | Including the reference cell |
| T2 | s | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 5.12 | The length of the time interval that follows immediately after time interval T2 |
| T4 | s | 5.12 | The length of the time interval that follows immediately after time interval T3 |
| T5 | s | 5.12 | The length of the time interval that follows immediately after time interval T4 |
| T6 | s | ≥ 57 | The length of the time interval that follows immediately after time interval T5 |

Table A.4.7.1.1-2: Cell-specific test parameters during T1 and T6

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | nCell 1 | | nCell 2 | | nCell 3 |
| NB-IoT RF Channel Number |  | 1 | | 1 | | 1 |
| NB-IoT Channel Bandwidth (BWchannel) | kHz | 200 | | 200 | | 200 |
| OCNG Pattern Note 1 |  | NOP.3 FDD | | N/A | | N/A |
| NPDSCH parameters Note 2 |  | R.18 HD-FDD | | N/A | | N/A |
| NPDCCH parameters Note 2 |  | R.30 HD-FDD | | N/A | | N/A |
| NPBCH\_RA | dB | 0 | | N/A | | N/A |
| NPBCH\_RB |
| NPSS\_RA |
| NSSS\_RA |
| NPDCCH\_RA |
| NPDCCH\_RB |
| NPDSCH\_RA |
| NPDSCH\_RB |
| OCNG\_RA Note 1 |
| OCNG\_RB Note 1 |
| Note 3 | dBm/  15 kHz | -98 | | | | |
| NPRS | dB | -Infinity | | -Infinity | | -Infinity |
|  | dB | -2 | | -Infinity | | -Infinity |
| Propagation Condition |  | AWGN | | | | |
| Antenna Configuration |  | 1x1 | | | | |
| Timing offset to nCell 1 | μs | N/A | 1 | | -1 | |
| 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 NPDSCH and NPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | | |

Table A.4.7.1.1-3: Cell-specific test parameters from T2 to T5

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | nCell 1 | | nCell 2 | | | | nCell 3 | |
| T2 and T4 | T3 and T5 | T2 and T4 | | T3 and T5 | | T2 and T4 | T3 and T5 |
| BWchannel | kHz | 200 | | 200 | | | | 200 | |
| NB-IoT RF Channel Number |  | 1 | | 1 | | | | 1 | |
| OCNG patterns |  | NOP.3 FDD | | N/A | NOP.3 FDD | | | NOP.3 FDD | N/A |
| NPBCH\_RA | dB | 0 | | 0 | | | | 0 | N/A |
| NPBCH\_RB |
| NPSS\_RA |
| NSSS\_RA |
| NPDCCH\_RA |
| NPDCCH\_RB |
| NPDSCH\_RA |
| NPDSCH\_RB |
| OCNG\_RA Note 1 |
| OCNG\_RB Note 1 |
|  |
| NPRS\_RA | dB | -3 | N/A | N/A | | 0 | | 0 | N/A |
| Note 3 | dBm/  15 kHz | -98 | -95 | -98 | | -95 | | -98 | -95 |
| NPRS | dB | -15 | -Infinity | -Infinity | | -15 | | -15 | -Infinity |
| NPRS  Note 4 | dB | -15 | -Infinity | -Infinity | | -15 | | -15 | -Infinity |
| Io Note 4 | dBm/  180kHz | -87.14 | -87.12 | -87.14 | | -87.12 | | -87.14 | -87.12 |
| NPRP Note 4 | dBm/  15 kHz | -113 | -Infinity | -Infinity | | -110 | | -113 | -Infinity |
| NRSRP Note 4 | dBm/ 15 kHz | -110 | -107 | -113 | | -110 | | -113 | -Infinity |
| Note 4 | dB | -12 | -12 | -15 | | -15 | | -15 | -Infinity |
| Propagation Condition |  | AWGN | | | | | | | |
| Antenna Configuration |  | 1x1 | | | | | | | |
| Timing offset to nCell 1 | μs | N/A | | 1 | | | -1 | | |
| Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: If NPRS\_RA is not “N/A”, , NPRS , Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS\_RA is “N/A”, Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes. | | | | | | | | | |

#### A.4.7.1.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 4.8.2.

The UE shall perform and report the RSTD measurements for nCell 2 and nCell 3 with respect to the reference cell in the OTDOA assistance data, nCell 1, within TRSTD \_intra\_NB-IoT-EC +TRandomAccess\_NB-IoT-EC = 67.16 s starting from the beginning of time interval T4, to the moment when the UE starts to send preambles on the PRACH for sending the positioning measurement report message to nCell1.

The RSTD measurement time TRSTD \_intra\_NB-IoT-EC in the test is derived according to section 4.8.2. This gives the total RSTD measurement time of 11.52s for Cell 2 and Cell 3 with respect to the reference Cell 1

The random access to an already detected cell TRandomAccess\_NB-IoT-EC can be expressed as: Tevaluate, NB\_intra\_NB-IoT-EC + TSI + TPRACH\_NB-IoT,

Where:

Tevaluate, NB\_intra\_NB-IoT-EC See Table 4.6.2.4-1 in clause 4.6.2.4

TSI = 41560 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target NB-IoT FDD cell.

TPRACH\_NB-IoT = 1280 ms; it is the additional delay caused by the random access procedure.

This gives TRandomAccess\_NB-IoT-EC = 55.64 s for the random access delay to an already detected cell in the test case.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3 , i.e., between RSTD\_0000 and RSTD\_12711.

### A.4.7.2 HD – FDD Inter frequency case for UE Category NB1 standalone mode in enhanced coverage

#### A.4.7.2.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement period for HD-FDD category NB1 UE meets the delay requirements specified in Clause 4.8.4.

In the test there are three synchronous cells: nCell 1, nCell 2 and nCell 3. nCell 1 is the reference cell. nCell 2 and nCell 3 are the neighbour cells.

The test consists of six consecutive time intervals, with duration of T1, T2, T3, T4, T5, and T6. nCell 1 is active throughout T1, T2, T3, T4, T5, and T6, whilst nCell 2 and nCell 3 are activated only in the beginning of T2. nCell 2 is active until the end of T5, and nCell 3 is active until the end of T4. nCell 1 transmits NPRS in T2 and T4, while nCell 2 transmits NPRS in T3 and T5, and nCell 3 transmits NPRS only in T2 and T4. Note: The information on when NPRS is muted is conveyed to the UE using PRS muting information.

Prior to the start of the time duration T1, the UE shall be fully synchronized to nCell1

At the start of the time duration T1, the OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355 [24], shall be provided to the UE. The duration of T1 is sufficiently long to deliver the OTDOA assistance data and *OTDOA-RequestLocationInformation* to the UE and is independent of the delay requirements specified in Clause 4.8.2.

After OTDOA assistance data and *OTDOA-RequestLocationInformation* have been successfully received, the UE is provided with a RRC connection release command. The RRC connection release command shall be received by the UE in the last TTI of interval T1. The UE shall enter RRC\_IDLE state within ΔT seconds after the receipt of the RRC connection release, where ΔT = 10s is the maximum delay for NB-IOT UE to perform RRC connection release as define in TS36.331 [2].

The test parameters are given in Tables A.4.7.2.1-1 A.4.7.2.1-2 and A.4.7.2.1-3.

Table A.4.7.2.1-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NB-IoT operational mode |  | **Standalone** |  |
| Reference cell |  | nCell 1 | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells |  | nCell 2 and nCell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| nprsID |  | (nprsID of Cell 1 – nprsID of Cell 2)mod6=1  and  (nprsID of Cell 1 – nprsID of Cell 3)mod6=2 | As defined in TS36.366 [24] |
| nprs-period | ms | 640 | As defined in TS36.355 [24] |
| nprs-startSF |  | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS36.355 [24] |
| Number of consecutive downlink positioning subframes  nprs-NumSF |  | 320 | As defined in TS36.355 [24] |
| nprs-SubframeOffset |  | 0 | As defined in TS36.355 [24] |
| NPRS muting info |  | Cell 1: ‘1111111100000000’  Cell 2: ‘0000000011111111’  Cell 3: ‘1111111100000000’ | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration |  | N/A | NPRS is configured based on PartB but not PartA. |
| CP length |  | Normal |  |
| NPRACH Configuration |  | NPRACH.R-1 | Refer to A.3.18 |
| DRX |  | 1.28 | DRX parameters are further specified in Table A.8.12.1.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | μs | nCell 2 to nCell 1: 1  nCell 3 to nCell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | μs | Cell 2: -2  Cell 3: 2  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | μs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data |  | 16 | Including the reference cell |
| T2 | s | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 5.12 | The length of the time interval that follows immediately after time interval T2 |
| T4 | s | 5.12 | The length of the time interval that follows immediately after time interval T3 |
| T5 | s | 5.12 | The length of the time interval that follows immediately after time interval T4 |
| T6 | s | ≥ 57 | The length of the time interval that follows immediately after time interval T5 |

Table A.4.7.2.1-2: Cell-specific test parameters during T1 and T6

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | nCell 1 | | nCell 2 | | nCell 3 |
| NB-IoT RF Channel Number |  | 1 | | 2 | | 2 |
| NB-IoT Channel Bandwidth (BWchannel) | KHz | 200 | | 200 | | 200 |
| OCNG Pattern Note 1 |  | NOP.3 FDD | | N/A | | N/A |
| NPDSCH parametersNote 2 |  | R.18 HD-FDD | | N/A | | N/A |
| NPDCCH parameters Note 2 |  | R.30 HD-FDD | | N/A | | N/A |
| NPBCH\_RA | dB | 0 | | N/A | | N/A |
| NPBCH\_RB |
| NPSS\_RA |
| NSSS\_RA |
| NPDCCH\_RA |
| NPDCCH\_RB |
| NPDSCH\_RA |
| NPDSCH\_RB |
| OCNG\_RA Note 1 |
| OCNG\_RB Note 1 |
| Note 3 | dBm/  15 kHz | -98 | | | | |
| NPRS | dB | -Infinity | | -Infinity | | -Infinity |
|  | dB | -2 | | -Infinity | | -Infinity |
| Propagation Condition |  | AWGN | | | | |
| Antenna Configuration |  | 1x1 | | | | |
| Timing offset to nCell 1 | μs | N/A | 1 | | -1 | |
| 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 NPDSCH and NPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | | |

Table A.4.7.2.1-3: Cell-specific test parameters from T2 to T5

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | nCell 1 | | nCell 2 | | | | nCell 3 | |
| T2 and T4 | T3 and T5 | T2 and T4 | | T3 and T5 | | T2 and T4 | T3 and T5 |
| BWchannel | kHz | 200 | | 200 | | | | 200 | |
| NB-IoT RF Channel Number |  | 1 | | 2 | | | | 2 | |
| NPDSCH parameters Note 2 |  | R.18 HD-FDD | | N/A | | | | N/A | |
| NPDCCH parameters Note 2 |  | R.30 HD-FDD | | N/A | | | | N/A | |
| OCNG patterns |  | NOP.3 FDD | | N/A | NOP.3 FDD | | | NOP.3 FDD | N/A |
| NPBCH\_RA | dB | 0 | | 0 | | | | 0 | N/A |
| NPBCH\_RB |
| NPSS\_RA |
| NSSS\_RA |
| NPDCCH\_RA |
| NPDCCH\_RB |
| NPDSCH\_RA |
| NPDSCH\_RB |
| OCNG\_RA Note 1 |
| OCNG\_RB Note 1 |
| NPRS\_RA | dB | -3 | N/A | N/A | | 0 | | 0 | N/A |
| Note 3 | dBm/  15 kHz | -98 | -98 | -98 | | -95 | | -98 | -95 |
| NPRS | dB | -15 | -Infinity | -Infinity | | -15 | | -15 | -Infinity |
| NPRS  Note 4 | dB | -15 | -Infinity | -Infinity | | -15 | | -15 | -Infinity |
| Io Note 4 | dBm/  180kHz | -87.17 | -87.20 | -87.17 | | -87.15 | | -87.17 | -87.15 |
| NPRP Note 4 | dBm/  15 kHz | -113 | -Infinity | -Infinity | | -110 | | -113 | -Infinity |
| NRSRP Note 4 | dBm/ 15 kHz | -110 | -110 | -113 | | -110 | | -113 | -Infinity |
| Note 4 | dB | -12 | -12 | -15 | | -15 | | -15 | -Infinity |
| Propagation Condition |  | AWGN | | | | | | | |
| Antenna Configuration |  | 1x1 | | | | | | | |
| Timing offset to nCell 1 | μs | N/A | | 1 | | | -1 | | |
| Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: If NPRS\_RA is not “N/A”, , NPRS , Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS\_RA is “N/A”, Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes. | | | | | | | | | |

#### A.4.7.4.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 4.8.4.

The UE shall perform and report the RSTD measurements for nCell 2 and nCell 3 with respect to the reference cell in the OTDOA assistance data, nCell 1, within TRSTD \_inter\_NB-IoT-EC +TRandomAccess\_NB-IoT-EC  = 67.16 s starting from the beginning of time interval T4, to the moment when the UE starts to send preambles on the PRACH for sending the positioning measurement report message to nCell1.

The RSTD measurement time TRSTD \_inter\_NB-IoT-EC in the test is derived according to section 4.8.4. This gives the total RSTD measurement time of 11.52 s for Cell 2 and Cell 3 with respect to the reference Cell 1.

The random access to an already detected cell TRandomAccess\_NB-IoT-EC  can be expressed as: Tevaluate, NB\_inter\_NB-IoT-EC + TSI + TPRACH\_NB-IoT,

Where:

Tevaluate, NB\_inter\_NB-IoT-EC See Table 4.6.2.4-1 in clause 4.6.2.4

TSI = 41560 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target NB-IoT FDD cell.

TPRACH\_NB-IoT = 1280 ms; it is the additional delay caused by the random access procedure.

This gives TRandomAccess\_NB-IoT =55.64 s for the random access delay to an already detected cell in the test case.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD\_0000 and RSTD\_12711.

### A.4.7.3 TDD Intra frequency case for UE Category NB1 standalone mode in enhanced coverage

#### A.4.7.3.1 Test Purpose and Environment

The purpose of the test is to verify that the intra frequency RSTD measurement period for TDD category NB1 UE meets the delay requirements specified in Clause 4.8.2.In the test there are three synchronous cells: nCell 1, nCell 2 and nCell 3. nCell 1 is the reference cell. nCell 2 and nCell 3 are the neighbour cells. All cells are on the same RF channel.

The test consists of six consecutive time intervals, with duration of T1, T2, T3, T4, T5, and T6. nCell 1 is active throughout T1, T2, T3, T4, T5, and T6, whilst nCell 2 and nCell 3 are activated only in the beginning of T2. nCell 2 is active until the end of T5, and nCell 3 is active until the end of T4. nCell 1 transmits NPRS in T2 and T4, while nCell 2 transmits NPRS in T3 and T5, and nCell 3 transmits NPRS only in T2 and T4. Note: The information on when NPRS is muted is conveyed to the UE using PRS muting information.

Prior to the start of the time duration T1, the UE shall be fully synchronized to nCell1.

At the start of the time duration T1, the OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355 [24], shall be provided to the UE. The duration of T1 is sufficiently long to deliver the OTDOA assistance data and *OTDOA-RequestLocationInformation* to the UE and is independent of the delay requirements specified in Clause 4.8.2.

After OTDOA assistance data and *OTDOA-RequestLocationInformation* have been successfully received, the UE is provided with an RRC connection release command. The RRC connection release command shall be received by the UE in the last TTI of interval T1. The UE shall enter RRC\_IDLE state within ΔT seconds after the receipt of the RRC connection release, where ΔT = 10s is the maximum delay for NB-IOT UE to perform RRC connection release as define in TS 36.331 [2].

The test parameters are given in Tables A.4.7.3.1-1 A.4.7.3.1-2 and A.4.7.3.1-3.

Table A.4.7.3.1-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NB-IoT operational mode |  | **Standalone** |  |
| Reference cell |  | nCell 1 | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells |  | nCell 2 and nCell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| nprsID |  | (nprsID of Cell 1 – nprsID of Cell 2)mod6=1  and  (nprsID of Cell 1 – nprsID of Cell 3)mod6=2 | As defined in TS 36.355 [24] |
| nprs-period | ms | 1280 | As defined in TS 36.355 [24] |
| nprs-startSF |  | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS 36.355 [24] |
| Number of consecutive downlink positioning subframes  nprs-NumSF |  | 640 | As defined in TS 36.355 [24] |
| NPRS muting info |  | nCell 1: ‘11110000’  nCell 2: ‘00001111’  nCell 3: ‘11110000’ | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration |  | N/A | NPRS is configured based on PartB but not PartA. |
| CP length |  | Normal |  |
| NPRACH Configuration |  | NPRACH.R-2 | Specified in A.3.18 |
| DRX cycle length |  | 1.28 | The value shall be used for all cells in the test. |
| Radio frame receive time offset between the cells at the UE antenna connector | μs | nCell 2 to nCell 1: 1  nCell 3 to nCell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | μs | nCell 2: 3  nCell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | μs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data |  | 16 | Including the reference cell |
| Special subframe configuration |  | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration |  | 2 | As specified in table 4.2-2 in TS 36.211 [16] |
| T2 | s | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 5.12 | The length of the time interval that follows immediately after time interval T2 |
| T4 | s | 5.12 | The length of the time interval that follows immediately after time interval T3 |
| T5 | s | [5.12] | The length of the time interval that follows immediately after time interval T4 |
| T6 | s | ≥ 58.2 | The length of the time interval that follows immediately after time interval T5 |

Table A.4.7.3.1-2: Cell-specific test parameters during T1 and T6

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | nCell 1 | | nCell 2 | | nCell 3 |
| NB-IoT RF Channel Number |  | 1 | | 1 | | 1 |
| NB-IoT Channel Bandwidth (BWchannel) | kHz | 200 | | 200 | | 200 |
| OCNG Pattern Note 1 |  | NOP.3 TDD | | N/A | | N/A |
| NPDSCH parameters Note 2 |  | R.18 NB-TDD | | N/A | | N/A |
| NPDCCH parameters Note 2 |  | R.30 NB-TDD | | N/A | | N/A |
| NPBCH\_RA | dB | 0 | | N/A | | N/A |
| NPBCH\_RB |
| NPSS\_RA |
| NSSS\_RA |
| NPDCCH\_RA |
| NPDCCH\_RB |
| NPDSCH\_RA |
| NPDSCH\_RB |
| OCNG\_RA Note 1 |
| OCNG\_RB Note 1 |
| Note 3 | dBm/  15 kHz | -98 | | | | |
| NPRS | dB | -Infinity | | -Infinity | | -Infinity |
|  | dB | -2 | | -Infinity | | -Infinity |
| Propagation Condition |  | AWGN | | | | |
| Antenna Configuration |  | 1x1 | | | | |
| Timing offset to nCell 1 | μs | N/A | 1 | | -1 | |
| 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 NPDSCH and NPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | | |

Table A.4.7.3.1-3: Cell-specific test parameters from T2 to T5

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | nCell 1 | | nCell 2 | | | | nCell 3 | |
| T2 and T4 | T3 and T5 | T2 and T4 | | T3 and T5 | | T2 and T4 | T3 and T5 |
| BWchannel | kHz | 200 | | 200 | | | | 200 | |
| NB-IoT RF Channel Number |  | 1 | | 1 | | | | 1 | |
| OCNG patterns |  | NOP.3 TDD | | N/A | NOP.3 TDD | | | NOP.3 TDD | N/A |
| NPBCH\_RA | dB | 0 | | 0 | | | | 0 | N/A |
| NPBCH\_RB |
| NPSS\_RA |
| NSSS\_RA |
| NPDCCH\_RA |
| NPDCCH\_RB |
| NPDSCH\_RA |
| NPDSCH\_RB |
| OCNG\_RA Note 1 |
| OCNG\_RB Note 1 |
| NPRS\_RA | dB | -3 | N/A | N/A | | 0 | | 0 | N/A |
| Note 3 | dBm/  15 kHz | -98 | -95 | -98 | | -95 | | -98 | -95 |
| NPRS | dB | -15 | -Infinity | -Infinity | | -15 | | -15 | -Infinity |
| NPRS  Note 4 | dB | -15 | -Infinity | -Infinity | | -15 | | -15 | -Infinity |
| Io Note 4 | dBm/  180kHz | -87.14 | -87.12 | -87.14 | | -87.12 | | -87.14 | -87.12 |
| NPRP Note 4 | dBm/  15 kHz | -113 | -Infinity | -Infinity | | -110 | | -113 | -Infinity |
| NRSRP Note 4 | dBm/ 15 kHz | -110 | -107 | -113 | | -110 | | -113 | -Infinity |
| Note 4 | dB | -12 | -12 | -15 | | -15 | | -15 | -Infinity |
| Propagation Condition |  | AWGN | | | | | | | |
| Antenna Configuration |  | 1x1 | | | | | | | |
| Timing offset to nCell 1 | μs | N/A | | 1 | | | -1 | | |
| Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: If NPRS\_RA is not “N/A”, , NPRS , Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS\_RA is “N/A”, Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes. | | | | | | | | | |

#### A.4.7.3.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 4.8.2.

The UE shall perform and report the RSTD measurements for nCell 2 and nCell 3 with respect to the reference cell in the OTDOA assistance data, nCell 1, within TRSTD \_intra\_NB-IoT-EC +TRandomAccess\_NB-IoT-EC = 68.44 s starting from the beginning of time interval T4, to the moment when the UE starts to send preambles on the PRACH for sending the positioning measurement report message to nCell 1.

The RSTD measurement time TRSTD \_intra\_NB-IoT-EC in the test is derived according to section 4.8.2. This gives the total RSTD measurement time of 11.52 s for nCell 2 and nCell 3 with respect to the reference nCell 1.

The random access to an already detected cell TRandomAccess\_NB-IoT-EC can be expressed as: Tevaluate, NB\_intra\_NB-IoT-EC + TSI + TPRACH\_NB-IoT,

Where:

Tevaluate, NB\_intra\_NB-IoT-EC See Table 4.6.2.4-1 in clause 4.6.2.4

TSI = 41560 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target NB-IoT TDD cell.

TPRACH\_NB-IoT = 2560 ms; it is the additional delay caused by the random access procedure.

This gives TRandomAccess\_NB-IoT-EC = 56.92 s for the random access delay to an already detected cell in the test case.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD\_0000 and RSTD\_12711.

### A.4.7.4 TDD Inter frequency case for UE Category NB1 standalone mode in enhanced coverage

#### A.4.7.4.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement period for TDD category NB1 UE meets the delay requirements specified in Clause 4.8.4. In the test there are three synchronous cells: nCell 1, nCell 2 and nCell 3. nCell 1 is the reference cell. nCell 2 and nCell 3 are the neighbour cells.

The test consists of six consecutive time intervals, with durations of T1, T2, T3, T4, T5, and T6. nCell 1 is active throughout T1, T2, T3, T4, T5, and T6, whilst nCell 2 and nCell 3 are activated only in the beginning of T2. nCell 2 is active until the end of T5, and nCell 3 is active until the end of T4. nCell 1 transmits NPRS in T2 and T4, while nCell 2 transmits NPRS in T3 and T5, and nCell 3 transmits NPRS only in T2 and T4. Note: The information on when NPRS is muted is conveyed to the UE using PRS muting information.

Prior to the start of the time duration T1, the UE shall be fully synchronized to nCell 1.

At the start of the time duration T1, the OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355 [24], shall be provided to the UE. The duration of T1 is sufficiently long to deliver the OTDOA assistance data and *OTDOA-RequestLocationInformation* to the UE and is independent of the delay requirements specified in Clause 4.8.2.

After OTDOA assistance data and *OTDOA-RequestLocationInformation* have been successfully received, the UE is provided with a RRC connection release command. The RRC connection release command shall be received by the UE in the last TTI of interval T1. The UE shall enter RRC\_IDLE state within ΔT seconds after the receipt of the RRC connection release, where ΔT = 10s is the maximum delay for NB-IOT UE to perform RRC connection release as define in TS 36.331 [2].

The test parameters are given in Tables A.4.7.4.1-1 A.4.7.4.1-2 and A.4.7.4.1-3.

Table A.4.7.4.1-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NB-IoT operational mode |  | **Standalone** |  |
| Reference cell |  | nCell 1 | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells |  | nCell 2 and nCell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| nprsID |  | (nprsID of Cell 1 – nprsID of Cell 2)mod6=1  and  (nprsID of Cell 1 – nprsID of Cell 3)mod6=2 | As defined in TS 36.355 [24] |
| nprs-period | ms | 1280 | As defined in TS 36.355 [24] |
| nprs-startSF |  | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS 36.355 [24] |
| Number of consecutive downlink positioning subframes  nprs-NumSF |  | 640 | As defined in TS 36.355 [24] |
| nprs-SubframeOffset |  | 0 | As defined in TS 36.355 [24] |
| NPRS muting info |  | Cell 1: ‘1111111100000000’  Cell 2: ‘0000000011111111’  Cell 3: ‘1111111100000000’ | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration |  | N/A | NPRS is configured based on PartB but not PartA. |
| CP length |  | Normal |  |
| NPRACH Configuration |  | NPRACH.R-2 | Refer to A.3.18 |
| DRX |  | 1.28 | DRX parameters are further specified in Table A.8.12.1.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | μs | nCell 2 to nCell 1: 1  nCell 3 to nCell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | μs | Cell 2: -2  Cell 3: 2  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | μs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data |  | 16 | Including the reference cell |
| Special subframe configuration |  | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration |  | 2 | As specified in table 4.2-2 in TS 36.211 [16] |
| T2 | s | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 5.12 | The length of the time interval that follows immediately after time interval T2 |
| T4 | s | 10.24 | The length of the time interval that follows immediately after time interval T3 |
| T5 | s | 10.24 | The length of the time interval that follows immediately after time interval T4 |
| T6 | s | ≥ 58.2 | The length of the time interval that follows immediately after time interval T5 |

Table A.4.7.4.1-2: Cell-specific test parameters during T1 and T6

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | nCell 1 | | nCell 2 | | nCell 3 |
| NB-IoT RF Channel Number |  | 1 | | 2 | | 2 |
| NB-IoT Channel Bandwidth (BWchannel) | KHz | 200 | | 200 | | 200 |
| OCNG Pattern Note 1 |  | NOP.3 TDD | | N/A | | N/A |
| NPDSCH parametersNote 2 |  | R.18 NB-TDD | | N/A | | N/A |
| NPDCCH parameters Note 2 |  | R.30 NB-TDD | | N/A | | N/A |
| NPBCH\_RA | dB | 0 | | N/A | | N/A |
| NPBCH\_RB |
| NPSS\_RA |
| NSSS\_RA |
| NPDCCH\_RA |
| NPDCCH\_RB |
| NPDSCH\_RA |
| NPDSCH\_RB |
| OCNG\_RA Note 1 |
| OCNG\_RB Note 1 |
| Note 3 | dBm/  15 kHz | -98 | | | | |
| NPRS | dB | -Infinity | | -Infinity | | -Infinity |
|  | dB | -2 | | -Infinity | | -Infinity |
| Propagation Condition |  | AWGN | | | | |
| Antenna Configuration |  | 1x1 | | | | |
| Timing offset to nCell 1 | μs | N/A | 1 | | -1 | |
| 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 NPDSCH and NPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | | |

Table A.4.7.4.1-3: Cell-specific test parameters from T2 to T5

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | nCell 1 | | nCell 2 | | | | nCell 3 | |
| T2 and T4 | T3 and T5 | T2 and T4 | | T3 and T5 | | T2 and T4 | T3 and T5 |
| BWchannel | kHz | 200 | | 200 | | | | 200 | |
| NB-IoT RF Channel Number |  | 1 | | 2 | | | | 2 | |
| NPDSCH parameters Note 2 |  | R.18 NB-TDD | | N/A | | | | N/A | |
| NPDCCH parameters Note 2 |  | R.30 NB-TDD | | N/A | | | | N/A | |
| OCNG patterns |  | NOP.3 TDD | | N/A | NOP.3 TDD | | | NOP.3 TDD | N/A |
| NPBCH\_RA | dB | 0 | | 0 | | | | 0 | N/A |
| NPBCH\_RB |
| NPSS\_RA |
| NSSS\_RA |
| NPDCCH\_RA |
| NPDCCH\_RB |
| NPDSCH\_RA |
| NPDSCH\_RB |
| OCNG\_RA Note 1 |
| OCNG\_RB Note 1 |
| NPRS\_RA | dB | -3 | N/A | N/A | | 0 | | 0 | N/A |
| Note 3 | dBm/  15 kHz | -98 | -98 | -98 | | -95 | | -98 | -95 |
| NPRS | dB | -15 | -Infinity | -Infinity | | -15 | | -15 | -Infinity |
| NPRS  Note 4 | dB | -15 | -Infinity | -Infinity | | -15 | | -15 | -Infinity |
| Io Note 4 | dBm/  180kHz | -87.17 | -87.20 | -87.17 | | -87.15 | | -87.17 | -87.15 |
| NPRP Note 4 | dBm/  15 kHz | -113 | -Infinity | -Infinity | | -110 | | -113 | -Infinity |
| NRSRP Note 4 | dBm/ 15 kHz | -110 | -110 | -113 | | -110 | | -113 | -Infinity |
| Note 4 | dB | -12 | -12 | -15 | | -15 | | -15 | -Infinity |
| Propagation Condition |  | AWGN | | | | | | | |
| Antenna Configuration |  | 1x1 | | | | | | | |
| Timing offset to nCell 1 | μs | N/A | | 1 | | | -1 | | |
| Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: If NPRS\_RA is not “N/A”, , NPRS , Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS\_RA is “N/A”, Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes. | | | | | | | | | |

#### A.4.7.4.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 4.8.4.

The UE shall perform and report the RSTD measurements for nCell 2 and nCell 3 with respect to the reference cell in the OTDOA assistance data, nCell 1, within TRSTD \_inter\_NB-IoT-EC +TRandomAccess\_NB-IoT-EC  = 78.68 s starting from the beginning of time interval T4, to the moment when the UE starts to send preambles on the PRACH for sending the positioning measurement report message to nCell 1.

The RSTD measurement time TRSTD \_inter\_NB-IoT-EC in the test is derived according to section 4.8.4. This gives the total RSTD measurement time of 21.76 s for nCell 2 and nCell 3 with respect to the reference nCell 1.

The random access to an already detected cell TRandomAccess\_NB-IoT-EC  can be expressed as: Tevaluate, NB\_inter\_NB-IoT-EC + TSI + TPRACH\_NB-IoT,

Where:

Tevaluate, NB\_inter\_NB-IoT-EC See Table 4.6.2.4-1 in clause 4.6.2.4

TSI = 41560 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target NB-IoT TDD cell.

TPRACH\_NB-IoT = 2560 ms; it is the additional delay caused by the random access procedure.

This gives TRandomAccess\_NB-IoT =56.92 s for the random access delay to an already detected cell in the test case.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD\_0000 and RSTD\_12711.

# A.5 E-UTRAN RRC CONNECTED Mode Mobility

## A.5.1 E-UTRAN Handover

### A.5.1.1 E-UTRAN FDD - FDD Intra frequency handover

#### A.5.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover requirements specified in clause 5.1.2.1.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.1.1-1 and A.5.1.1.1-2. 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. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.5.1.1.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| 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 | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.1.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | | T2 | | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | | | OP.1 FDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 8 | -3.3 | -3.3 | -Infinity | | 2.36 | | | 2.36 | |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 8 | 8 | 8 | - Infinity | | | 11 | | | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | | -87 | | | -87 | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.5.1.1.2 Test Requirements

The UE shall start to transmit 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 5.1.2.1.2.1.

This gives a total of 50 ms.

### A.5.1.2 E-UTRAN TDD - TDD Intra frequency handover

#### A.5.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency handover requirements specified in clause 5.2.2.4.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.2.1-1 and A.5.1.2.1-2. 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. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.5.1.2.1-1: General test parameters for E-UTRAN TDD-TDD Intra frequency handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCHPHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| 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. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.2.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Intra frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | | | T2 | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | | | OP.1 TDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 8 | -3.3 | -3.3 | -Infinity | | | 2.36 | | 2.36 | |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 8 | 8 | 8 | -Infinity | | 11 | | | | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | | | -87 | | -87 | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.5.1.2.2 Test Requirements

The UE shall start to transmit 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 5.2.2.4.2.1.

This gives a total of 50 ms.

### A.5.1.3 E-UTRAN FDD – FDD Inter frequency handover

#### A.5.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter-frequency handover requirements specified in clause 5.1.2.1.

The test scenario comprises of two E-UTRA FDD carriers and one cell on each carrier as given in tables A.5.1.3.1-1 and A.5.1.3.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. 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 does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.5.1.3.1-1: General test parameters for E-UTRAN FDD-FDD Inter frequency handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbouring cell |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF channel number | |  | 1, 2 | Two FDD carriers are used |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| A3-Offset | | dB | -4 |  |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | DRX\_L | As specified in clause A.3.3 |
| PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | |  | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.3.1-2: Cell specific test parameters for E-UTRAN FDD-FDD Inter frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | | | |
| T1 | | T2 | | T3 | T1 | | | T2 | | | T3 |
| E-UTRA RF Channel number |  | 1 | | | | | 2 | | | | | | |
| BWchannel | MHz | 10 | | | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.1 FDD | | OP.2 FDD | | OP.2 FDD | OP.2 FDD | | | OP.1 FDD | | |
| PBCH\_RA | dB | 0 | | | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | | 4 | | 4 | -Infinity | | | 7 | | | 7 |
| Note 2 | dBm/15 kHz | -98 | | | | | | | | | | | |
|  | dB | 4 | | 4 | | 4 | -Infinity | | 7 | | | 7 | |
| RSRP Note 3 | dBm/15 KHz | -94 | | -94 | | -94 | -Infinity | | | -91 | | | -91 |
| Propagation Condition |  | AWGN | | | | | | | | | | | |
| 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.5.1.3.2 Test Requirements

The UE shall start to transmit 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 5.1.2.1.2.1.

This gives a total of 50 ms.

### A.5.1.4 E-UTRAN TDD – TDD Inter frequency handover

#### A.5.1.4.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter frequency handover requirements specified in clause 5.2.2.4.

The test scenario comprises of two E-UTRA TDD carriers and one cell on each carrier as given in tables Table A.5.1.4.1-1 and Table A.5.1.4.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. 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.

Table A.5.1.4.1-1: General test parameters for E-UTRAN TDD-TDD Inter frequency handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | |  | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbour cell |  | Cell 2 |  |
| Final conditions | Active cell |  | Cell 2 |  |
| E-UTRA RF channel number | |  | 1, 2 | Two TDD carriers are used |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| A3-Offset | | dB | -4 |  |
| Hysteresis | | dB | 0 |  |
| Time to Trigger | | ms | 0 |  |
| Filter coefficient | |  | 0 |  |
| DRX | |  | DRX\_L | As specified in clause A.3.3 |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.4.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Inter frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | | | | | Cell 2 | | | | | | | |
| T1 | | | | T2 | | | T3 | T1 | | | T2 | | | T3 | |
| E-UTRA RF Channel number |  | 1 | | | | | | | | 2 | | | | | | | |
| BWchannel | MHz | 10 | | | | | | | | 10 | | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.1 FDD | | | | OP.2 FDD | | | OP.2 FDD | OP.2 FDD | | | OP.1 FDD | | |
| PBCH\_RA | dB | 0 | | | | | | | | 0 | | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | | | | 4 | | | 4 | -Infinity | | | 7 | | | 7 | |
| Note 2 | dBm/15 kHz | -98 | | | | | | | | | | | | | | | |
|  | dB | 4 | | 4 | | | | | 4 | -Infinity | | 7 | | | 7 | |
| RSRP Note 3 | dBm/15 KHz | -94 | | | -94 | | | -94 | | -infinity | | | -91 | | | -91 | |
| Propagation Condition |  | AWGN | | | | | | | | | | | | | | | |
| 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.5.1.4.2 Test Requirements

The UE shall start to transmit 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 5.2.2.4.2.1.

This gives a total of 50 ms.

### A.5.1.5 E-UTRAN FDD – FDD Inter frequency handover: unknown target cell

#### A.5.1.5.1 Test Purpose and Environment

This test is to verify the FDD-FDD inter-frequency handover requirements for the case when the target cell is unknown as specified in clause 5.1.2.1.

The test scenario comprises of two E-UTRA FDD carriers and one cell on each carrier as given in tables A.5.1.5.1-1 and A.5.1.5.1-2. No gap patterns are configured in the test case. 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 does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and start to transmit the PRACH to Cell 2.

A RRC message implying handover shall be sent to the UE during period T1. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.5.1.5.1-1: General test parameters for the E-UTRAN FDD-FDD Inter frequency handover test case when the target cell is unknown

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbouring cell |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF channel number | |  | 1, 2 | Two FDD carriers are used |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| DRX | |  | OFF | Non-DRX test |
| PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| T1 | | s | ≤5 |  |
| T2 | | s | 1 |  |

Table A.5.1.5.1-2: Cell specific test parameters for the E-UTRAN FDD-FDD Inter frequency handover test case when the target cell is unknown

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | Cell 2 | | |
| T1 | T2 | T1 | | T2 |
| E-UTRA RF Channel number |  | 1 | | 2 | | |
| BWchannel | MHz | 10 | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.2 FDD | OP.2 FDD | | OP.1 FDD |
| PBCH\_RA | dB | 0 | | 0 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | 4 | -Infinity | 7 | |
| Note 2 | dBm/15 kHz | -98 | | | | |
|  | dB | 4 | 4 | -Infinity | 7 | |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -91 | |
| Propagation Condition |  | AWGN | | | | |
| 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.5.1.5.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 130 ms from the beginning of time period T2.

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, which is specified in clause 11.2 in TS 36.331 [2].

*Tinterrupt* = 115 ms in the test. See clause 5.1.2.1.2.1.

This gives a total of 130 ms.

### A.5.1.6 E-UTRAN TDD – TDD Inter frequency handover; unknown Target Cell

#### A.5.1.6.1 Test Purpose and Environment

This test is to verify the TDD-TDD inter-frequency handover requirements for the case when the target cell is unknown as specified in clause 5.2.2.4.

The test scenario comprises of two E-UTRA TDD carriers and one cell on each carrier as given in tables A.5.1.6.1-1 and A.5.1.6.1-2. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.5.1.6.1-1: General test parameters for the E-UTRAN TDD-TDD Inter-Frequency handover test case when the target cell is unknown

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbouring cell |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF channel number | |  | 1, 2 | Two TDD carriers |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| Gap pattern configuration | |  | - | No gap pattern configured |
| T1 | | s | ≤5 |  |
| T2 | | s | 1 |  |

Table A.5.1.6.1-2: Cell specific test parameters for the E-UTRAN TDD-TDD Inter frequency handover test case when the target cell is unknown

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | Cell 2 | | |
| T1 | T2 | T1 | T2 | |
| E-UTRA RF Channel Number |  | 1 | | 2 | | |
| BW**channel** | MHz | 10 | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | OP.2 TDD | OP.2 TDD | | OP.1 TDD |
| PBCH\_RA | dB | 0 | | 0 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Note 3 | dBm/15 kHz | -98 | | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -93 | |
|  | dB | 4 | 4 | -Infinity | 5 | |
| SCH\_RP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -93 | |
|  | dB | 4 | 4 | -Infinity | 5 | |
| Propagation Condition |  | AWGN | | | | |
| 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: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: 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 4: RSRP and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

#### A.5.1.6.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 130 ms from the beginning of time period T2.

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, which is specified in clause 11.2 in TS 36.331 [2].

*Tinterrupt* = 115 ms in the test. See clause 5.2.2.4.2.1.

This gives a total of 130 ms.

### A.5.1.7 E-UTRAN FDD – TDD Inter frequency handover

#### A.5.1.7.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-TDD inter frequency handover requirements specified in clause 5.2.2.2.

The test scenario comprises of one E-UTRA FDD cell and one E-UTRA TDD cell as given in tables Table A.5.1.7.1-1 , Table A.5.1.7.1-2 and Table A.5.1.7.1-3. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. 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 does 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.

Table A.5.1.7.1-1: General test parameters for E-UTRAN FDD-TDD Inter frequency handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Cell 1 PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| Cell 1 PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Cell 2 PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| Cell 2 PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | |  | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbour cell |  | Cell 2 |  |
| Final conditions | Active cell |  | Cell 2 |  |
| Cell 1 E-UTRA RF channel number | |  | 1 | One FDD carrier is used |
| Cell 2 E-UTRA RF channel number | |  | 2 | One TDD carrier is used |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| A3-Offset | | dB | -4 |  |
| Hysteresis | | dB | 0 |  |
| Time to Trigger | | ms | 0 |  |
| Filter coefficient | |  | 0 |  |
| DRX | |  | DRX\_L | As specified in clause A.3.3 |
| CP length | |  | Normal |  |
| E-UTRA TDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211. Applicable to cell 2. |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211. Applicable to cell 2 |
| E-UTRA TDD PRACH configuration | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.7.1-2: Cell specific test parameters for E-UTRAN FDD (cell #1) in E-UTRAN FDD-TDD Inter frequency handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | |
| T1 | T2 | T3 |
| E-UTRA RF Channel number |  | 1 | | |
| BWchannel | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.1 FDD | OP.2 FDD |
| PBCH\_RA | dB | 0 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | 4 | 4 |
| Note 2 | dBm/15 kHz | -98 | | |
|  | dB | 4 | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 |
| Propagation Condition | AWGN | | | |
| 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 parameter themselves. | | | | |

Table A.5.1.7.1-3: Cell specific test parameters for E-UTRAN TDD (cell #2) in E-UTRAN FDD-TDD Inter frequency handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | | |
| T1 | T2 | T3 |
| E-UTRA RF Channel number |  | 2 | | |
| BWchannel | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.2 TDD | OP.2 TDD | OP.1 TDD |
| PBCH\_RA | dB | 0 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | -Infinity | 7 | 7 |
| Note 2 | dBm/15 kHz | -98 | | |
|  | dB | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -Infinity | -91 | -91 |
| Propagation Condition | AWGN | | | |
| 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 parameter themselves. | | | | |

#### A.5.1.7.2 Test Requirements

The UE shall start to transmit 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 5.2.2.4.2.1.

This gives a total of 50 ms.

### A.5.1.8 E-UTRAN TDD – FDD Inter frequency handover

#### A.5.1.8.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-FDD inter-frequency handover requirements specified in clause 5.2.2.3.

The test scenario comprises of one E-UTRA TDD cell and one E-UTRA FDD cell as given in tables Table A.5.1.8.1-1, Table A.5.1.8.1-2 and Table A.5.1.8.1-3. PDCCHs indicating new transmissions should be sent continuously to ensure that the UE would not enter the DRX state. 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 does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.5.1.8.1-1: General test parameters for E-UTRAN TDD-FDD Inter frequency handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Cell 1 PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| Cell 1 PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Cell 2 PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| Cell 2 PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbouring cell |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell |  | Cell 2 |  |
| Cell 1 E-UTRA RF channel number | |  | 1 | One TDD carrier is used |
| Cell 2 E-UTRA RF channel number | |  | 2 | One FDD carrier is used |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| A3-Offset | | dB | -4 |  |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | DRX\_L | As specified in clause A.3.3 |
| E-UTRA FDD PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E-UTRA FDD Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | |  | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.8.1-2: Cell specific test parameters for E-UTRAN TDD (cell #1) in E-UTRAN TDD-FDD Inter frequency handover test case

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | |
| T1 | | T2 | | T3 |
| E-UTRA RF Channel number |  | 1 | | | | |
| BWchannel | MHz | 10 | | | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | OP.1 TDD | | OP.2 TDD | |
| PBCH\_RA | dB | 0 | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | | 4 | | 4 |
| Note 2 | dBm/15 kHz | -98 | | | | |
|  | dB | 4 | | 4 | | 4 |
| RSRP Note 3 | dBm/15 KHz | -94 | | -94 | | -94 |
| Propagation Condition | AWGN | | | | | |
| 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 parameter themselves. | | | | | | |

Table A.5.1.8.1-3: Cell specific test parameters for E-UTRAN FDD (cell #2) in E-UTRAN TDD-FDD Inter frequency handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | | |
| T1 | T2 | T3 |
| E-UTRA RF Channel number |  | 2 | | |
| BWchannel | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH\_RA | dB | 0 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | -Infinity | 7 | 7 |
| Note 2 | dBm/15 kHz | -98 | | |
|  | dB | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -Infinity | -91 | -91 |
| Propagation Condition | AWGN | | | |
| 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 parameter themselves. | | | | |

#### A.5.1.8.2 Test Requirements

The UE shall start to transmit 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 5.1.2.1.2.1.

This gives a total of 50 ms.

### A.5.1.9 E-UTRAN FDD - FDD Intra frequency handover for 5MHz bandwidth

#### A.5.1.9.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.5.1.1. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.5.1.9.1-1 and A.5.1.9.1-2 will replace the values of corresponding parameters in Tables A.5.1.1.1-1 and A.5.1.1.1-2.

Table A.5.1.9.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency handover test case, 5MHz

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters |  | DL Reference Measurement Channel R.5 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters |  | DL Reference Measurement Channel R.11 FDD | As specified in clause A.3.1.2.1 |
| Channel Bandwidth (BWchannel) | MHz | 5 |  |
| Note 1: See Table A.5.1.1.1-1 for other general test parameters.  Note 2: This test is performed according to the principle defined in section A.3.7.2 | | | |

Table A.5.1.9.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover test case, 5MHz

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | |
| T1 | T2 | T3 | T1 | | T2 | | T3 |
| BWchannel | MHz | 5 | | | 5 | | | | |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and in A.3.2.1.16 (OP.16 FDD) |  | OP.15 FDD | OP.15 FDD | OP.16 FDD | OP.16 FDD | OP.16 FDD | | OP.15 FDD | |
| Note 1: See Table A.5.1.1.1-2 for other cell-specific test parameters. | | | | | | | | | |

#### A.5.1.9.2 Test Requirements

The requirements defined in section A.5.1.1.2 shall apply to this test case.

### A.5.1.10 E-UTRAN FDD - FDD Intra frequency handover for UE category 0

#### A.5.1.10.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover requirements specified in clause 5.1.2.1.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.10.1-1 and A.5.1.10.1-2. 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. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.5.1.10.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.13 FDD | As specified in clause A.3.1.1.3 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| 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 | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.10.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | | T2 | | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | | | OP.1 FDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 8 | -3.3 | -3.3 | -Infinity | | 2.36 | | | 2.36 | |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 8 | 8 | 8 | - Infinity | | | 11 | | | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | | -87 | | | -87 | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.5.1.10.2 Test Requirements

The UE shall start to transmit 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 5.1.2.1.2.1.

This gives a total of 50 ms.

### A.5.1.11 E-UTRAN HD - FDD Intra frequency handover for UE category 0

#### A.5.1.11.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency handover requirements specified in clause 5.2.2.5.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.11.1-1 and A.5.1.11.1-2. 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. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.5.1.11.1-1: General test parameters for E-UTRAN HD-FDD intra frequency handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.1 HD-FDD | As specified in clause A.3.1.1.4 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.3 HD-FDD | As specified in clause A.3.1.2.3 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| 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 | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.11.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | | T2 | | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | | | OP.1 FDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 8 | -3.3 | -3.3 | -Infinity | | 2.36 | | | 2.36 | |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 8 | 8 | 8 | - Infinity | | | 11 | | | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | | -87 | | | -87 | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.5.1.11.2 Test Requirements

The UE shall start to transmit 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 5.2.2.5.2.1.

This gives a total of 50 ms.

### A.5.1.12 E-UTRAN TDD - TDD Intra frequency handover for UE category 0

#### A.5.1.12.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency handover requirements specified in clause 5.2.2.4.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.12.1-1 and A.5.1.12.1-2. 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. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.5.1.12.1-1: General test parameters for E-UTRAN TDD-TDD Intra frequency handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.12 TDD | As specified in clause A.3.1.1.5 |
| PCFICH/PDCCHPHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| 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. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.12.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Intra frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | | | T2 | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | | | OP.1 TDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 8 | -3.3 | -3.3 | -Infinity | | | 2.36 | | 2.36 | |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 8 | 8 | 8 | -Infinity | | 11 | | | | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | | | -87 | | -87 | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.5.1.12.2 Test Requirements

The UE shall start to transmit 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 5.2.2.4.2.1.

This gives a total of 50 ms.

### A.5.1.13 E-UTRAN FDD-FDD Intra frequency handover for Cat-M1 UEs in CEModeA

#### A.5.1.13.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover requirements specified in clause 5.5.2.1.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.5.1.13.1-1 and A.5.1.13.1-2. 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. 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.5.1.13.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency 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 |  |
| 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.5.1.13.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover for Cat-M1 UEs in CEModeA test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | | T2 | | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | | | | | | | |
| BWchannel | MHz | 10 | | | | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.1 |  | R.21 FDD | R.21 FDD | - | - | - | | | R.21 FDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.1 |  | R.17 FDD | | | R.17 FDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 |  | R.7 FDD | | | R.7 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 |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | |
| Io Note 3 | dBm/9MHz | -61.58 | - 56.57 | - 56.57 | Specified in columns for Cell 1 | | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| Timing offset to Cell 1  Asynchronous cells | ms | - | | | 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 level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.5.1.13.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 170 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 = 120 + 35 ms in the test; Tinterrupt is defined in clause 5.5.2.1.2.

This gives a total of 170 ms.

### A.5.1.14 E-UTRAN HD-FDD Intra frequency handover for Cat-M1 UEs in CEModeA

#### A.5.1.14.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency handover requirements specified in clause 5.5.2.2.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.14.1-1 and A.5.1.14.1-2. 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. 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.5.1.14.1-1: General test parameters for E-UTRAN HD-FDD intra frequency 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 |  |
| 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.5.1.14.1-2: 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 | T3 | T1 | | T2 | | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | | | | | | | |
| BWchannel | MHz | 10 | | | | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.2 |  | R.11 HD-FDD | R.11 HD-FDD | - | - | - | | | R.11 HD-FDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.2 |  | R.7 HD-FDD | | | R.7 HD-FDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.3 |  | R.4 HD-FDD | | | R.4 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 |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | |
| Io Note 3 | dBm/9MHz | -61.58 | - 56.57 | - 56.57 | Specified in columns for Cell 1 | | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| Timing offset to Cell 1  Asynchronous cells | ms | - | | | 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 level has been derived from other parameters for information purpose. They are not settable parameters themselves | | | | | | | | | | | |

#### A.5.1.14.2 Test Requirements

The UE shall finish the transmission of all the repetitions of the PRACH to Cell 2 less than 170 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 = 120 + 35 ms in the test; Tinterrupt is defined in clause 5.5.2.1.2.

This gives a total of 170 ms.

### A.5.1.15 E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeA

#### A.5.1.15.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency handover requirements specified in clause 5.5.2.3.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.15.1-1 and A.5.1.15.1-2. 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. 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.5.1.15.1-1: General test parameters for E-UTRAN TDD Intra frequency 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 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD 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. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 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.5.1.15.1-2: Cell specific test parameters for E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeA test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | | | T2 | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | | | | | | | |
| BWchannel | MHz | 10 | | | | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.3 |  | R.17 TDD | R.17 TDD | - | - | - | | | R.17 TDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.3 |  | R.15 TDD | | | R.15 TDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.2 |  | R.7 TDD | | | R.7 TDD | | | | | | |
| OCNG Patterns in clause A.3.2.2 |  | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | | | OP.11 TDD | | |
| PBCH\_RA | dB | -3 | | | -3 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 |
| Io Note 3 | dBm/9MHz | -61.58 | -56.57 | -56.57 | Specified in columns for Cell 1 | | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| Timing offset to Cell 1  Synchronous cells | μs | - | | | 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 level has been derived from other parameters for information purpose. They are not settable parameters themselves | | | | | | | | | | | |

#### A.5.1.15.2 Test Requirements

The UE shall finish the transmission of all the repetitions of the PRACH to Cell 2 less than 170 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 = 120 + 35 ms in the test; Tinterrupt is defined in clause 5.5.2.3.2.

This gives a total of 170 ms.

### A.5.1.16 E-UTRAN FDD-FDD Intra frequency handover for Cat-M1 UEs in CEModeB

#### A.5.1.16.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover requirements specified in clause 5.6.2.1.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.5.1.16.1-1 and A.5.1.16.1-2. 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.

During period T2, the UE should report Event A3, and afterwards E-UTRAN shall send a RRC message to the UE implying handover to Cell 2. T3 is defined as the end of the last TTI containing the RRC message from UE implying handover.

During the test, the 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.5.1.16.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency handover for Cat-M1 UEs in CEModeB test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| 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 handover message |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 5 |  |
| Gap pattern ID | |  | 1 |  |

Table A.5.1.16.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover for Cat-M1 UEs in CEModeB test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | | T2 | | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | | | | | | | |
| BWchannel | MHz | 10 | | | | | | | | | |
| PDSCH Reference Channel in A.3.1.4.4 |  | R.23 FDD | R.23 FDD | - | - | - | | | R.23 FDD | | |
| MPDCCH Reference Channel in A.3.1.3.4 |  | R.19 FDD | | | R.19 FDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 |  | R.7 FDD | | | R.7 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 |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | -12 | -12 | -12 | -Infinity | | | -7 | | | -7 |
| Note 3 | dB | -12 | -12.79 | -12.79 | -Infinity | | -7.27 | | | -7.27 | |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | | -105 | | | -105 | |
| Io Note 3 | dBm/9MHz | -69.95 | -69.21 | -69.21 | Specified in columns for Cell 1 | | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| Timing offset to Cell 1  Asynchronous cells | ms | - | | | 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 level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.5.1.16.2 Test Requirements

The UE shall finish transmission of all repetitions of the PRACH to Cell 2 less than 2610ms 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 = 2560ms + 35ms = 2595ms is defined in clause 5.6.2.1.2.

This gives a total of 2610ms.

### A.5.1.17 E-UTRAN HD-FDD Intra frequency handover for Cat-M1 UEs in CEModeB

#### A.5.1.17.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency handover requirements specified in clause 5.6.2.2.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.5.1.17.1-1 and A.5.1.17.1-2. 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.

During period T2, the UE should report Event A3, and afterwards E-UTRAN shall send a RRC message to the UE implying handover to Cell 2. During T3 is defined as the end of the last TTI containing the RRC message from UE 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.5.1.17.1-1: General test parameters for E-UTRAN HD-FDD intra frequency handover for Cat-M1 UEs in CEModeB test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| 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 clause  A.3.16 |
| PRACH initial CE level | |  | 0 | Specified in handover message |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 5 |  |
| Gap pattern ID | |  | 1 |  |

Table A.5.1.17.1-2: 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 | T3 | T1 | | T2 | | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | | | | | | | |
| BWchannel | MHz | 10 | | | | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.5 |  | R.13 HD-FDD | R.13 HD-FDD | - | - | - | | | R.13 HD-FDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.5 |  | R.9 HD-FDD | | | R.9 HD-FDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.3 |  | R.4 HD-FDD | | | R.4 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 |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | -12 | -12 | -12 | -Infinity | | -7 | | | -7 | |
|  | dB | -12 | -12.79 | -12.79 | -Infinity | | | -7.27 | | | -7.27 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | | -105 | | | -105 | |
| Io Note 3 | dBm/9MHz | -69.95 | -69.21 | -69.21 | Specified in columns for Cell 1 | | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| Timing offset to Cell 1  Asynchronous cells | ms | - | | | 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 level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.5.1.17.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 2610 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 = 2560ms + 35ms = 2595ms is defined in clause 5.6.2.1.2.

This gives a total of 2610ms.

### A.5.1.18 E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeB

#### A.5.1.18.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency handover requirements specified in clause 5.6.2.3.

The test scenario comprises of one E-UTRA TDD carrier and two cells as given in tables A.5.1.18.1-1 and A.5.1.18.1-2. 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.

During period T2, the UE should report Event A3, and afterwards E-UTRAN shall send a RRC message to the UE implying handover to Cell 2. During T3 is defined as the end of the last TTI containing the RRC message from UE implying handover.

During the test, the 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.5.1.18.1-1: General test parameters for E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeB test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| 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. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration | |  | PRACH\_4CE | As specified in clause  A.3.16 |
| PRACH initial CE level | |  | 0 | Specified in handover message |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 5 |  |
| Gap pattern ID | |  | 1 |  |

Table A.5.1.18.1-2: Cell specific test parameters for E-UTRAN TDD Intra frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | | | T2 | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.6 |  | R.19 TDD | R.19 TDD | - | - | - | | | R.19 TDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.6 |  | R.17 TDD | | | R.17 TDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.2 |  | R.7 TDD | | | R.7 TDD | | | | | | |
| OCNG Patterns in clause A.3.2.2 |  | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | | | OP.11 TDD | | |
| PBCH\_RA | dB | -3 | | | -3 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | -12 | -12 | -12 | -Infinity | | -7 | | | | -7 |
| Note 3 | dB | -12 | -12.79 | -12.79 | -Infinity | | | -7.27 | | | -7.27 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | | | -105 | | | -105 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.21 | -69.21 | Specified in columns for Cell 1 | | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| Timing offset to Cell 1  Synchronous cells | μs | - | | | 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 level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.5.1.18.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 2610 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 = 2560ms + 35ms = 2595ms is defined in clause 5.6.2.1.2.

This gives a total of 2610 ms.

### A.5.1.19 E-UTRAN FDD - FDD Intra frequency handover for UE Category 1bis

#### A.5.1.19.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover requirements for UE category 1bis specified in clause 5.1.2.1.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.19.1-1 and A.5.1.19.1-2. 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. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.5.1.19.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| 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 | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.19.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | | T2 | | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH Reference Measurement Channel in clause A.3.1.1.1 |  | R.0 FDD | R.0 FDD | - | - | - | | | R.0 FDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 |  | R.6 FDD | | | R.6 FDD | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 and in A.3.2.1.2 |  | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | | | OP.1 FDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_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 |
|  | dB | 8 | -4.27 | -4.27 | -Infinity | | | 3.36 | | | 3.36 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | | -86 | | | -86 | |
| Io Note 3 | dBm/9MHz | -61.58 | - 56.57 | - 56.57 | Specified in columns for Cell 1 | | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 1x1 | | | 1x1 | | | | | | |
| Timing offset to Cell 1  Asynchronous cells | ms | - | | | 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. | | | | | | | | | | | |

### A.5.1.19.2 Test Requirements

The UE shall start to transmit 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 5.1.2.1.2.

This gives a total of 50 ms.

### A.5.1.20 E-UTRAN TDD - TDD Intra frequency handover for UE Category 1bis

#### A.5.1.20.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency handover requirements for UE category 1bis specified in clause 5.2.2.4.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.20.1-1 and A.5.1.20.1-2. 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. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.5.1.20.1-1: General test parameters for E-UTRAN TDD-TDD Intra frequency handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD 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. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.20.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Intra frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | | | T2 | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH Reference Measurement Channel in clause A.3.1.1.2 |  | R.0 TDD | R.0 TDD | - | - | - | | | R.0 TDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.2 |  | R.6 TDD | | | R.6 TDD | | | | | | |
| OCNG Patterns defined in A.3.2.2.1 and in A.3.2.2.2 |  | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | | | OP.1 TDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_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 |
|  | dB | 8 | -4.27 | -4.27 | -Infinity | | 3.36 | | | | 3.36 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | | | -86 | | -86 | |
| Io Note 3 | dBm/9MHz | -61.58 | - 56.57 | - 56.57 | Specified in columns for Cell 1 | | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 1x1 | | | 1x1 | | | | | | |
| Timing offset to Cell 1  Asynchronous cells | μs | - | | | 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. | | | | | | | | | | | |

#### A.5.1.20.2 Test Requirements

The UE shall start to transmit 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 5.2.2.4.2.

This gives a total of 50 ms.

### A.5.1.21 E-UTRAN FDD - FDD Intra frequency RACH-less handover

#### A.5.1.21.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency RACH-less handover requirements specified in clause 5.1.2.1.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.21.1-1 and A.5.1.21.1-2. 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 RACH-less 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, and the PUSCH transmission in the cell2 is configured in the RRC message from cell1. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.5.1.21.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency RACH-less handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| A3-Offset | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| ul-SchedInterval-r14 | |  | sf10 | As specified in section 6.3.4 in TS 36.331 |
| ul-StartSubframe-r14 | |  | 0 | As specified in section 6.3.4 in TS 36.331 |
| DRX | |  |  | OFF |
| CP length | |  | Normal |  |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.21.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency RACH-less handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | | T2 | | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | | | OP.1 FDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 8 | -3.3 | -3.3 | -Infinity | | 2.36 | | | 2.36 | |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 8 | 8 | 8 | - Infinity | | | 11 | | | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | | -87 | | | -87 | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.5.1.21.2 Test Requirements

The UE shall start to transmit the PUSCH to Cell 2 less than 45 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 = 30 ms in the test; Tinterrupt is defined in clause 5.1.2.1.2.2.

This gives a total of 45 ms.

### A.5.1.22 E-UTRAN TDD - TDD Intra frequency RACH-less handover

#### A.5.1.22.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency RACH-less handover requirements specified in clause 5.2.2.4.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.22.1-1 and A.5.1.22.1-2. 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 RACH-less 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, and the PUSCH transmission in the cell2 is configured in the RRC message from cell1. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.5.1.22.1-1: General test parameters for E-UTRAN TDD-TDD Intra frequency RACH-less handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCHPHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| A3-Offset | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| ul-SchedInterval-r14 | |  | sf10 | As specified in section 6.3.4 in TS 36.331 |
| ul-StartSubframe-r14 | |  | 2 | As specified in section 6.3.4 in TS 36.331 |
| DRX | |  |  | OFF |
| CP length | |  | Normal |  |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.22.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Intra frequency RACH-less handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | | | T2 | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | | | OP.1 TDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 8 | -3.3 | -3.3 | -Infinity | | | 2.36 | | 2.36 | |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 8 | 8 | 8 | -Infinity | | 11 | | | | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | | | -87 | | -87 | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.5.1.22.2 Test Requirements

The UE shall start to transmit the PUSCH to Cell 2 less than 45 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 = 30 ms in the test; Tinterrupt is defined in clause 5.2.2.4.2.

This gives a total of 45 ms.

### A.5.1.23 E-UTRAN FDD – FDD Inter frequency RACH-less handover

#### A.5.1.23.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter-frequency RACH-less handover requirements specified in clause 5.1.2.1.

The test scenario comprises of two E-UTRA FDD carriers and one cell on each carrier as given in tables A.5.1.23.1-1 and A.5.1.23.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. 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 does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying RACH-less handover shall be sent to the UE during period T2, after the UE has reported Event A3, and the PUSCH transmission in the cell2 is configured in the RRC message from cell1. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.5.1.23.1-1: General test parameters for E-UTRAN FDD-FDD Inter frequency RACH-less handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbouring cell |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF channel number | |  | 1, 2 | Two FDD carriers are used |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| A3-Offset | | dB | -4 |  |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| ul-SchedInterval-r14 | |  | sf10 | As specified in section 6.3.4 in TS 36.331 |
| ul-StartSubframe-r14 | |  | 0 | As specified in section 6.3.4 in TS 36.331 |
| DRX | |  | DRX\_L | As specified in clause A.3.3 |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | |  | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.23.1-2: Cell specific test parameters for E-UTRAN FDD-FDD Inter frequency RACH-less handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | | | |
| T1 | | T2 | | T3 | T1 | | | T2 | | | T3 |
| E-UTRA RF Channel number |  | 1 | | | | | 2 | | | | | | |
| BWchannel | MHz | 10 | | | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.1 FDD | | OP.2 FDD | | OP.2 FDD | OP.2 FDD | | | OP.1 FDD | | |
| PBCH\_RA | dB | 0 | | | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | | 4 | | 4 | -Infinity | | | 7 | | | 7 |
| Note 2 | dBm/15 kHz | -98 | | | | | | | | | | | |
|  | dB | 4 | | 4 | | 4 | -Infinity | | 7 | | | 7 | |
| RSRP Note 3 | dBm/15 KHz | -94 | | -94 | | -94 | -Infinity | | | -91 | | | -91 |
| Propagation Condition |  | AWGN | | | | | | | | | | | |
| 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.5.1.23.2 Test Requirements

The UE shall start to transmit the PUSCH to Cell 2 less than 45 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 = 30 ms in the test; Tinterrupt is defined in clause 5.1.2.1.2.

This gives a total of 45 ms.

### A.5.1.24 E-UTRAN TDD – TDD Inter frequency RACH-less handover

#### A.5.1.24.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter frequency RACH-less handover requirements specified in clause 5.2.2.4.

The test scenario comprises of two E-UTRA TDD carriers and one cell on each carrier as given in tables Table A.5.1.24.1-1 and Table A.5.1.24.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. 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 RACH-less 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, and the PUSCH transmission in the cell2 is configured in the RRC message from cell1.

Table A.5.1.24.1-1: General test parameters for E-UTRAN TDD-TDD Inter frequency RACH-less handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | |  | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbour cell |  | Cell 2 |  |
| Final conditions | Active cell |  | Cell 2 |  |
| E-UTRA RF channel number | |  | 1, 2 | Two TDD carriers are used |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| A3-Offset | | dB | -4 |  |
| Hysteresis | | dB | 0 |  |
| Time to Trigger | | ms | 0 |  |
| Filter coefficient | |  | 0 |  |
| ul-SchedInterval-r14 | |  | sf10 | As specified in section 6.3.4 in TS 36.331 |
| ul-StartSubframe-r14 | |  | 2 | As specified in section 6.3.4 in TS 36.331 |
| DRX | |  | DRX\_L | As specified in clause A.3.3 |
| CP length | |  | Normal |  |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.24.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Inter frequency RACH-less handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | | | | | Cell 2 | | | | | | | |
| T1 | | | | T2 | | | T3 | T1 | | | T2 | | | T3 | |
| E-UTRA RF Channel number |  | 1 | | | | | | | | 2 | | | | | | | |
| BWchannel | MHz | 10 | | | | | | | | 10 | | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.1 FDD | | | | OP.2 FDD | | | OP.2 FDD | OP.2 FDD | | | OP.1 FDD | | |
| PBCH\_RA | dB | 0 | | | | | | | | 0 | | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | | | | 4 | | | 4 | -Infinity | | | 7 | | | 7 | |
| Note 2 | dBm/15 kHz | -98 | | | | | | | | | | | | | | | |
|  | dB | 4 | | 4 | | | | | 4 | -Infinity | | 7 | | | 7 | |
| RSRP Note 3 | dBm/15 KHz | -94 | | | -94 | | | -94 | | -infinity | | | -91 | | | -91 | |
| Propagation Condition |  | AWGN | | | | | | | | | | | | | | | |
| 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.5.1.24.2 Test Requirements

The UE shall start to transmit the PUSCH to Cell 2 less than 45 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 = 30 ms in the test; Tinterrupt is defined in clause 5.2.2.4.2.

This gives a total of 45 ms.

### A.5.1.25 E-UTRAN FDD - FDD Intra frequency make-before-break handover

#### A.5.1.25.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency make-before-break handover requirements specified in clause 5.1.2.1.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.25.1-1 and A.5.1.25.1-2. 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 make-before-break handover to cell 2. The RRC message implying make-before-break handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying make-before-break handover.

Table A.5.1.25.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency make-before-break handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| 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 | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.25.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency make-before-break handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | | T2 | | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | | | OP.1 FDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 8 | -3.3 | -3.3 | -Infinity | | 2.36 | | | 2.36 | |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 8 | 8 | 8 | - Infinity | | | 11 | | | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | | -87 | | | -87 | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.5.1.25.2 Test Requirements

The UE shall start to transmit 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 make-before-break 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 5.1.2.1.2.3.

This gives a total of 50 ms.

The UE shall be scheduled on Cell 1 continuously throughout the test. From the start of T3 until the UE start to transmit the PRACH, at most 5 of all expected ACK/NACKs can be not transmitted by the UE.

Both the rate of correct handovers and the number of not transmitted ACK/NACKs have to be fulfilled simultaneously.

### A.5.1.26 E-UTRAN TDD - TDD Intra frequency make-before-break handover

#### A.5.1.26.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency make-before-break handover requirements specified in clause 5.2.2.4.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.26.1-1 and A.5.1.26.1-2. 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 make-before-break handover to cell 2. The RRC message implying make-before-break handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying make-before-break handover.

Table A.5.1.26.1-1: General test parameters for E-UTRAN TDD-TDD Intra frequency make-before-break handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCHPHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| 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. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.1.26.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Intra frequency make-before-break handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | | | T2 | | T3 | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | | | OP.1 TDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 8 | -3.3 | -3.3 | -Infinity | | | 2.36 | | 2.36 | |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 8 | 8 | 8 | -Infinity | | 11 | | | | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | | | -87 | | -87 | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.5.1.26.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

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

NOTE: The make-before-break 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 5.2.2.4.2.3.

This gives a total of 50 ms.

The UE shall be scheduled on Cell 1 continuously throughout the test. From the start of T3 until the UE start to transmit the PRACH, at most 3 of all expected ACK/NACKs can be not transmitted by the UE.

Both the rate of correct handovers and the number of not transmitted ACK/NACKs have to be fulfilled simultaneously.

### A.5.1.27 E-UTRAN FDD inter frequency handover for Cat-M1 UEs in CEModeA

#### A.5.1.27.1 Test Purpose and Environment

This test is to verify the requirement for the FDD inter frequency handover requirements specified in clause 5.5.2.1.

The test scenario comprises of two E-UTRA FDD carriers and one cell in each carrier as given in tables A.5.1.27.1-1 and A.5.1.27.1-2. 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.

Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. The RRC message implying handover to Cell 2 shall be sent to the UE during period T2, after the UE has reported Event A3. The *field sameSFN-Indication* is not included in the handover command. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

During the test, UE is configured with measurement gap to enable inter-frequency monitoring.

Table A.5.1.27.1-1: General test parameters for E-UTRAN FDD inter frequency handover for Cat-M1 UEs in CEModeA test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbouring cell |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1, 2 | Two FDD carriers are 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.5.1.27.1-2: Cell specific test parameters for E-UTRAN FDD inter frequency handover for Cat-M1 UEs in CEModeA test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | **Cell 2** | | | | | | |
| **T1** | **T2** | **T3** | **T1** | | **T2** | | | **T3** | |
| E-UTRA RF Channel Number |  | 1 | | | 2 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.1 |  | R.21 FDD | R.21 FDD | - | - | - | | | R.21 FDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.1 |  | R.17 FDD | | | R.17 FDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 |  | R.7 FDD | | | R.7 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 |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | | | -98 | | | | | | |
|  | dB | -3 | -3 | -3 | -Infinity | | | 4 | | | 4 |
| Note 3 | dB | -3 | -3 | -3 | -Infinity | | 4 | | | 4 | |
| RSRP Note 3 | dBm/15 KHz | -101 | -101 | -101 | -Infinity | | -94 | | | -94 | |
| Io Note 3 | dBm/9MHz | -68.45 | -68.45 | -68.45 | -Infinity | | -64.76 | | | -64.76 | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| Timing offset to Cell 1  Asynchronous cells | ms | - | | | 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 level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.5.1.27.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 170 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 = 120 + 35 ms in the test; Tinterrupt is defined in clause 5.5.2.1.2.

This gives a total of 170 ms.

### A.5.1.28 E-UTRAN HD-FDD inter frequency handover for Cat-M1 UEs in CEModeA

#### A.5.1.28.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD inter frequency handover requirements specified in clause 5.5.2.2.

The test scenario comprises of two E-UTRA FDD carriers and one cell in each carrier as given in tables A.5.1.28.1-1 and A.5.1.28.1-2. 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.

Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. The RRC message implying handover to Cell 2 shall be sent to the UE during period T2, after the UE has reported Event A3. The *field sameSFN-Indication* is not included in the handover command. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

During the test, UE is configured with measurement gap to enable inter-frequency monitoring.

Table A.5.1.28.1-1: General test parameters for E-UTRAN HD-FDD inter frequency handover for Cat-M1 UEs in CEModeA test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbouring cell |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1, 2 | Two FDD carriers are 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.5.1.28.1-2: Cell specific test parameters for E-UTRAN HD-FDD inter frequency handover for Cat-M1 UEs in CEModeA test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | **Cell 2** | | | | | | |
| **T1** | **T2** | **T3** | **T1** | | **T2** | | | **T3** | |
| E-UTRA RF Channel Number |  | 1 | | | 2 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.1 |  | R.11 HD-FDD | R.11 HD-FDD | - | - | - | | | R.11 HD-FDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.1 |  | R.7 HD-FDD | | | R.7 HD-FDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 |  | R.4 HD-FDD | | | R.4 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 |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | | | -98 | | | | | | |
|  | dB | -3 | -3 | -3 | -Infinity | | | 4 | | | 4 |
| Note 3 | dB | -3 | -3 | -3 | -Infinity | | 4 | | | 4 | |
| RSRP Note 3 | dBm/15 KHz | -101 | -101 | -101 | -Infinity | | -94 | | | -94 | |
| Io Note 3 | dBm/9MHz | -68.45 | -68.45 | -68.45 | -Infinity | | -64.76 | | | -64.76 | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| Timing offset to Cell 1  Asynchronous cells | ms | - | | | 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 level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.5.1.28.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 170 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 = 120 + 35 ms in the test; Tinterrupt is defined in clause 5.5.2.1.2.

This gives a total of 170 ms.

### A.5.1.29 E-UTRAN TDD inter frequency handover for Cat-M1 UEs in CEModeA

#### A.5.1.29.1 Test Purpose and Environment

This test is to verify the requirement for the TDD inter frequency handover requirements specified in clause 5.5.2.3.

The test scenario comprises of two E-UTRA TDD carriers and one cell in each carrier as given in tables A.5.1.29.1-1 and A.5.1.29.1-2. 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.

Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. The RRC message implying handover to Cell 2 shall be sent to the UE during period T2, after the UE has reported Event A3. The *field sameSFN-Indication* is not included in the handover command. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

During the test, UE is configured with measurement gap to enable inter-frequency monitoring.

Table A.5.1.29.1-1: General test parameters for E-UTRAN TDD inter frequency handover for Cat-M1 UEs in CEModeA test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbouring cell |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1, 2 | Two TDD carriers are 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. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| 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.5.1.29.1-2: Cell specific test parameters for E-UTRAN TDD inter frequency handover for Cat-M1 UEs in CEModeA test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | **Cell 2** | | | | | | |
| **T1** | **T2** | **T3** | **T1** | | **T2** | | | **T3** | |
| E-UTRA RF Channel Number |  | 1 | | | 2 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.1 |  | R.17 TDD | R.17 TDD | - | - | - | | | R.17 TDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.1 |  | R.15 TDD | | | R.15 TDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 |  | R.7 TDD | | | R.7 TDD | | | | | | |
| OCNG Patterns in clause A.3.2.1 |  | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | | | OP.11 TDD | | |
| PBCH\_RA | dB | -3 | | | -3 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | | | -98 | | | | | | |
|  | dB | -3 | -3 | -3 | -Infinity | | | 4 | | | 4 |
| Note 3 | dB | -3 | -3 | -3 | -Infinity | | 4 | | | 4 | |
| RSRP Note 3 | dBm/15 KHz | -101 | -101 | -101 | -Infinity | | -94 | | | -94 | |
| Io Note 3 | dBm/9MHz | -68.45 | -68.45 | -68.45 | -Infinity | | -64.76 | | | -64.76 | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| 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, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.5.1.29.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 170 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 = 120 + 35 ms in the test; Tinterrupt is defined in clause 5.5.2.1.2.

This gives a total of 170 ms.

### A.5.1.30 E-UTRAN FDD inter frequency handover for Cat-M1 UEs in CEModeB

#### A.5.1.30.1 Test Purpose and Environment

This test is to verify the requirement for the FDD inter frequency handover requirements specified in clause 5.5.3.1.

The test scenario comprises of two E-UTRA FDD carriers and one cell in each carrier as given in tables A.5.1.30.1-1 and A.5.1.30.1-2. 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.

Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. The RRC message implying handover to Cell 2 shall be sent to the UE during period T2, after the UE has reported Event A3. The *field sameSFN-Indication* is not included in the handover command. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

During the test, UE is configured with measurement gap to enable inter-frequency monitoring.

Table A.5.1.30.1-1: General test parameters for E-UTRAN FDD inter frequency handover for Cat-M1 UEs in CEModeB test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbouring cell |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1, 2 | Two FDD carriers are 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.5.1.30.1-2: Cell specific test parameters for E-UTRAN FDD inter frequency handover for Cat-M1 UEs in CEModeB test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | **Cell 2** | | | | | | |
| **T1** | **T2** | **T3** | **T1** | | **T2** | | | **T3** | |
| E-UTRA RF Channel Number |  | 1 | | | 2 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4 |  | R.23 FDD | R.23 FDD | - | - | - | | | R.21 FDD | | |
| MPDCCH Reference Channel in clause A.3.1.3 |  | R.19 FDD | | | R.17 FDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 |  | R.7 FDD | | | R.7 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 |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | | | -98 | | | | | | |
|  | dB | -12 | -12 | -12 | -Infinity | | | -4 | | | -4 |
| Note 3 | dB | -12 | -12 | -12 | -Infinity | | -4 | | | -4 | |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | | -102 | | | -102 | |
| Io Note 3 | dBm/9MHz | -69.95 | -69.95 | -69.95 | -Infinity | | -68.76 | | | -68.76 | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| Timing offset to Cell 1  Asynchronous cells | ms | - | | | 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 level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.5.1.30.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 2610 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 = 2560 + 35 ms in the test; Tinterrupt is defined in clause 5.5.2.1.2.

This gives a total of 2610 ms.

### A.5.1.31 E-UTRAN HD-FDD inter frequency handover for Cat-M1 UEs in CEModeB

#### A.5.1.31.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD inter frequency handover requirements specified in clause 5.5.3.2.

The test scenario comprises of two E-UTRA FDD carriers and one cell in each carrier as given in tables A.5.1.31.1-1 and A.5.1.31.1-2. 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.

Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. The RRC message implying handover to Cell 2 shall be sent to the UE during period T2, after the UE has reported Event A3. The *field sameSFN-Indication* is not included in the handover command. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

During the test, UE is configured with measurement gap to enable inter-frequency monitoring.

Table A.5.1.31.1-1: General test parameters for E-UTRAN HD-FDD inter frequency handover for Cat-M1 UEs in CEModeB test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbouring cell |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1, 2 | Two FDD carriers are 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.5.1.31.1-2: Cell specific test parameters for E-UTRAN HD-FDD inter frequency handover for Cat-M1 UEs in CEModeB test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | **Cell 2** | | | | | | |
| **T1** | **T2** | **T3** | **T1** | | **T2** | | | **T3** | |
| E-UTRA RF Channel Number |  | 1 | | | 2 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4 |  | R.13 HD-FDD | R.13 HD-FDD | - | - | - | | | R.11 HD-FDD | | |
| MPDCCH Reference Channel in clause A.3.1.3 |  | R.9 HD-FDD | | | R.7 HD-FDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 |  | R.4 HD-FDD | | | R.4 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 |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | | | -98 | | | | | | |
|  | dB | -12 | -12 | -12 | -Infinity | | | -4 | | | -4 |
| Note 3 | dB | -12 | -12 | -12 | -Infinity | | -4 | | | -4 | |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | | -102 | | | -102 | |
| Io Note 3 | dBm/9MHz | -69.95 | -69.95 | -69.95 | -Infinity | | -68.76 | | | -68.76 | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| Timing offset to Cell 1  Asynchronous cells | ms | - | | | 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 level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.5.1.31.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 2610 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 = 2560 + 35 ms in the test; Tinterrupt is defined in clause 5.5.2.1.2.

This gives a total of 2610 ms.

### A.5.1.32 E-UTRAN TDD inter frequency handover for Cat-M1 UEs in CEModeB

#### A.5.1.32.1 Test Purpose and Environment

This test is to verify the requirement for the TDD inter frequency handover requirements specified in clause 5.5.3.3.

The test scenario comprises of two E-UTRA TDD carriers and one cell in each carrier as given in tables A.5.1.32.1-1 and A.5.1.32.1-2. 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.

Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. The RRC message implying handover to Cell 2 shall be sent to the UE during period T2, after the UE has reported Event A3. The *field sameSFN-Indication* is not included in the handover command. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

During the test, UE is configured with measurement gap to enable inter-frequency monitoring.

Table A.5.1.32.1-1: General test parameters for E-UTRAN TDD inter frequency handover for Cat-M1 UEs in CEModeB test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbouring cell |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1, 2 | Two TDD carriers are 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. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| 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.5.1.32.1-2: Cell specific test parameters for E-UTRAN TDD inter frequency handover for Cat-M1 UEs in CEModeB test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | **Cell 2** | | | | | | |
| **T1** | **T2** | **T3** | **T1** | | **T2** | | | **T3** | |
| E-UTRA RF Channel Number |  | 1 | | | 2 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.1 |  | R.19 TDD | R.19 TDD | - | - | - | | | R.17 TDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.1 |  | R.17 TDD | | | R.15 TDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 |  | R.7 TDD | | | R.7 TDD | | | | | | |
| OCNG Patterns in clause A.3.2.1 |  | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | | | OP.11 TDD | | |
| PBCH\_RA | dB | -3 | | | -3 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | | | -98 | | | | | | |
|  | dB | -12 | -12 | -12 | -Infinity | | | -4 | | | -4 |
| Note 3 | dB | -12 | -12 | -12 | -Infinity | | -4 | | | -4 | |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | | -102 | | | -102 | |
| Io Note 3 | dBm/9MHz | -69.95 | -69.95 | -69.95 | -Infinity | | -68.76 | | | -68.76 | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| 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, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.5.1.32.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 2610 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 = 2560 + 35 ms in the test; Tinterrupt is defined in clause 5.5.2.1.2.

This gives a total of 2610 ms.

### A.5.1.33 E-UTRAN FDD-FDD Intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition

#### A.5.1.33.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover requirements without SFN acquisition specified in clause 5.5.2.1.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.5.1.33.1-1 and A.5.1.33.1-2. 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.5.1.33.1-1: 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 |  |
| 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.5.1.33.1-2: 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 | 10 | | | | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.1 |  | R.21 FDD | R.21 FDD | - | - | - | | | R.21 FDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.1 |  | R.17 FDD | | | R.17 FDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 |  | R.7 FDD | | | R.7 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 |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | |
| Io Note 3 | dBm/9MHz | -61.58 | - 56.57 | - 56.57 | Specified in columns for Cell 1 | | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| 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, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.5.1.13.2 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 5.5.2.1.2.

This gives a total of 50 ms.

### A.5.1.34 E-UTRAN HD-FDD Intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition

#### A.5.1.34.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency handover requirements without SFN acquisition specified in clause 5.5.2.2.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.34.1-1 and A.5.1.34.1-2. 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.5.1.34.1-1: 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 |  |
| 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.5.1.34.1-2: 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 | 10 | | | | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.2 |  | R.11 HD-FDD | R.11 HD-FDD | - | - | - | | | R.11 HD-FDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.2 |  | R.7 HD-FDD | | | R.7 HD-FDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.3 |  | R.4 HD-FDD | | | R.4 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 |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | |
| Io Note 3 | dBm/9MHz | -61.58 | - 56.57 | - 56.57 | Specified in columns for Cell 1 | | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| 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, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves | | | | | | | | | | | |

#### A.5.1.34.2 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 5.5.2.1.2.

This gives a total of 50 ms.

### A.5.1.35 E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition

#### A.5.1.35.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency handover requirements without SFN acquisition specified in clause 5.5.2.3.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.35.1-1 and A.5.1.35.1-2. 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.5.1.35.1-1: General test parameters for E-UTRAN TDD 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 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD 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. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 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.5.1.35.1-2: Cell specific test parameters for E-UTRAN TDD 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 | 10 | | | | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.3 |  | R.17 TDD | R.17 TDD | - | - | - | | | R.17 TDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.3 |  | R.15 TDD | | | R.15 TDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.2 |  | R.7 TDD | | | R.7 TDD | | | | | | |
| OCNG Patterns in clause A.3.2.2 |  | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | | | OP.11 TDD | | |
| PBCH\_RA | dB | -3 | | | -3 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 |
| Io Note 3 | dBm/9MHz | -61.58 | -56.57 | -56.57 | Specified in columns for Cell 1 | | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| Timing offset to Cell 1  Synchronous cells | μs | - | | | 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 level has been derived from other parameters for information purpose. They are not settable parameters themselves | | | | | | | | | | | |

#### A.5.1.35.2 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 5.5.2.1.2.

This gives a total of 50 ms.

### A.5.1.36 E-UTRAN FDD-FDD Intra frequency handover for Cat-M1 UEs in CEModeB without SFN acquisition

#### A.5.1.36.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover requirements without SFN acquisition specified in clause 5.5.3.1.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.5.1.36.1-1 and A.5.1.36.1-2. 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.

During period T2, the UE should report Event A3, and afterwards E-UTRAN shall send a RRC message to the UE implying handover to Cell 2. 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 from UE implying handover.

During the test, the 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.5.1.36.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency handover for Cat-M1 UEs in CEModeB 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 |  |
| 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 handover message |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 5 |  |
| Gap pattern ID | |  | 1 |  |

Table A.5.1.36.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover for Cat-M1 UEs in CEModeB 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 | 10 | | | | | | | | | |
| PDSCH Reference Channel in A.3.1.4.4 |  | R.23 FDD | R.23 FDD | - | - | - | | | R.23 FDD | | |
| MPDCCH Reference Channel in A.3.1.3.4 |  | R.19 FDD | | | R.19 FDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 |  | R.7 FDD | | | R.7 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 |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | -12 | -12 | -12 | -Infinity | | | -7 | | | -7 |
| Note 3 | dB | -12 | -12.79 | -12.79 | -Infinity | | -7.27 | | | -7.27 | |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | | -105 | | | -105 | |
| Io Note 3 | dBm/9MHz | -69.95 | -69.21 | -69.21 | Specified in columns for Cell 1 | | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| 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, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.5.1.36.2 Test Requirements

The UE shall finish transmission of all repetitions of the PRACH to Cell 2 less than 50ms 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 = 35ms is defined in clause 5.6.2.1.2.

This gives a total of 50ms.

### A.5.1.37 E-UTRAN HD-FDD Intra frequency handover for Cat-M1 UEs in CEModeB without SFN acquisition

#### A.5.1.37.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency handover requirements without SFN acquisition specified in clause 5.5.3.2.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.5.1.37.1-1 and A.5.1.37.1-2. 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.

During period T2, the UE should report Event A3, and afterwards E-UTRAN shall send a RRC message to the UE implying handover to Cell 2. The field sameSFN-Indication and mib-RepetitionStatus are included in the handover command. During T3 is defined as the end of the last TTI containing the RRC message from UE 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.5.1.37.1-1: General test parameters for E-UTRAN HD-FDD intra frequency handover for Cat-M1 UEs in CEModeB 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 |  |
| 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 clause  A.3.16 |
| PRACH initial CE level | |  | 0 | Specified in handover message |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 5 |  |
| Gap pattern ID | |  | 1 |  |

Table A.5.1.37.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra frequency handover for Cat-M1 UEs in CEModeB 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 | 10 | | | | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.5 |  | R.13 HD-FDD | R.13 HD-FDD | - | - | - | | | R.13 HD-FDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.5 |  | R.9 HD-FDD | | | R.9 HD-FDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.3 |  | R.4 HD-FDD | | | R.4 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 |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | -12 | -12 | -12 | -Infinity | | -7 | | | -7 | |
|  | dB | -12 | -12.79 | -12.79 | -Infinity | | | -7.27 | | | -7.27 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | | -105 | | | -105 | |
| Io Note 3 | dBm/9MHz | -69.95 | -69.21 | -69.21 | Specified in columns for Cell 1 | | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| 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, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.5.1.37.2 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 = 35ms is defined in clause 5.6.2.1.2.

This gives a total of 50ms.

### A.5.1.38 E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeB without SFN acquisition

#### A.5.1.38.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency handover requirements without SFN acquisition specified in clause 5.5.3.3.

The test scenario comprises of one E-UTRA TDD carrier and two cells as given in tables A.5.1.38.1-1 and A.5.1.38.1-2. 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.

During period T2, the UE should report Event A3, and afterwards E-UTRAN shall send a RRC message to the UE implying handover to Cell 2. The field sameSFN-Indication and mib-RepetitionStatus are included in the handover command. During T3 is defined as the end of the last TTI containing the RRC message from UE implying handover.

During the test, the 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.5.1.38.1-1: General test parameters for E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeB 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 |  |
| 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. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration | |  | PRACH\_4CE | As specified in clause  A.3.16 |
| PRACH initial CE level | |  | 0 | Specified in handover message |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 5 |  |
| Gap pattern ID | |  | 1 |  |

Table A.5.1.38.1-2: Cell specific test parameters for E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeB without SFN acquisition test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | **Cell 2** | | | | | | |
| **T1** | **T2** | **T3** | **T1** | | | **T2** | | **T3** | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.6 |  | R.19 TDD | R.19 TDD | - | - | - | | | R.19 TDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.6 |  | R.17 TDD | | | R.17 TDD | | | | | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.2 |  | R.7 TDD | | | R.7 TDD | | | | | | |
| OCNG Patterns in clause A.3.2.2 |  | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | | | OP.11 TDD | | |
| PBCH\_RA | dB | -3 | | | -3 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | 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 | -12 | -12 | -12 | -Infinity | | -7 | | | | -7 |
| Note 3 | dB | -12 | -12.79 | -12.79 | -Infinity | | | -7.27 | | | -7.27 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | | | -105 | | | -105 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.21 | -69.21 | Specified in columns for Cell 1 | | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| Timing offset to Cell 1  Synchronous cells | μs | - | | | 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 level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.5.1.38.2 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 = 35ms is defined in clause 5.6.2.1.2.

This gives a total of 50 ms.

### A.5.1.39 E-UTRAN FDD - FDD Intra frequency handover with direct SCell activation

#### A.5.1.39.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover with direct SCell activation requirements specified in subclause 7.7.19.

The test scenario comprises of two E-UTRA FDD carriers and 2 cells as given in tables A.5.1.39.1-1 and A.5.1.39.1-2. 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 is in connected mode with PCell and SCell1 (cell 2) is in activated state and UE is reporting CQI for both PCell and SCell1.

Time period T2 starts when UE receives a handover command that also activates SCell1 (Cell2). This is done using an *RRCConnectionReconfiguration* message with parameter *sCellState* set to *activated* for the SCell1 (Cell 2). The message is sent from the test equipment to the UE and is received in a subframe # denoted m at the UE antenna connector. The UE shall accomplish the activation of the SCell no later than subframe (m + *Ndirect*).

Time period T3 starts at (m + *Ndirect*), at which point UE shall be reporting a valid CQI for both PCell and SCell1.

Table A.5.1.39.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency handover with direct SCell activation test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | PCell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| SCell1 |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | PCell |  | Cell 1 | Cell 1 is on RF channel number 1 |
|  | SCell1 |  | Cell 2 | Cell 2 is on RF channel number 2 |
| E-UTRA RF channel number | |  | 1, 2 | Two FDD carriers are used |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| CP length | |  | Normal |  |
| DRX | |  | - | OFF |
| PRACH configuration | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 [16] |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | - | Intra-cell handover, no offset |
| T1 | | s | 1 |  |
| T2 | | ms | *Ndirect* |  |
| T3 | | s | 1 |  |

**Table A.5.1.39.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover with direct SCell activation test case**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | **Cell 2** | | | | | | |
| **T1** | **T2** | **T3** | **T1** | | **T2** | | | **T3** | |
| E-UTRA RF Channel Number |  | 1 | | | 2 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) |  | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | | | OP.2 FDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 8 | 8 | 8 | 8 | | 8 | | | 8 | |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 8 | 8 | 8 | 8 | | | 8 | | | 8 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -90 | | -90 | | | -90 | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.5.1.39.2 Test Requirements

The UE shall be capable to transmit valid CSI report for the directly activated SCell1 no later than in subframe m+*Ndirect*.

The rate of correct observed SCell1 direct activation delay during repeated tests shall be at least 90%.

NOTE: The SCell activation delay, Ndirect, can be expressed as: Ndirect = TRRC\_process + Tinterrupt + TIU + T2 + T3 + Tinterupt\_window + Ttime\_direct, where:

TRRC\_Process is the RRC procedure delay = 20 ms which is the RRC procedure delay defined for SCell addition in clause 11.2 of TS 36.331 [2],

*Tinterrupt* is the interruption time as defined in subclause 5.1.2.1.2,

*T2* is the delay for obtaining a valid TA command for the target PCell from the target PCell and the scheduling grant for sending valid CSI report in the target PCell. T2 is up to [13] subframes,

*T3* is the delay for applying the received TA for uplink transmission in the target PCell, and greater than or equal to 6 subframes,

*Tinterupt\_window* is the interruption window which is 5ms for FDD and

*Ttime\_direct* is the direct SCell activation delay. If the SCell is known, then *Ttime\_direct* is 20 ms. If the SCell is unknown, then *Ttime\_direct* is 30 ms provided the SCell can be successfully detected on the first attempt.

This gives a total of *Ndirect* = 65 *+ TIU + T2 + T3* ms = 65 + 10 + 13 + 6 = 94 ms.

During T3 the UE shall send valid CSI reports for PCell and SCell1 with non-zero CQI index and continue to send CSI reports for PCell and SCell1 (Cell 2) with non-zero CQI index until the end of T3.

All of the above test requirements shall be fulfilled in order for the observed SCell1 direct activation delay to be counted as correct.

### A.5.1.40 E-UTRAN TDD - TDD Intra frequency handover with direct SCell activation

#### A.5.1.40.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency handover with direct SCell activation requirements specified in subclause 7.7.19.

The test scenario comprises of two E-UTRA TDD carriers and 2 cells as given in tables A.5.1.40.1-1 and A.5.1.40.1-2. 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 is in connected mode with PCell and SCell1 (cell 2) is in activated state and UE is reporting CQI for both PCell and SCell1.

Time period T2 starts when UE receives a handover command that also activates SCell1 (Cell2). This is done using an *RRCConnectionReconfiguration* message with parameter *sCellState* set to *activated* for the SCell1 (Cell 2). The message is sent from the test equipment to the UE and is received in a subframe # denoted m at the UE antenna connector. The UE shall accomplish the activation of the SCell no later than subframe (m+ *Ndirect*).

Time period T3 starts at (m+ *Ndirect*), at which point UE shall be reporting a valid CQI for both PCell and SCell1.

**Table A.5.1.40.1-1: General test parameters for E-UTRAN TDD-TDD Intra frequency handover test case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCHPHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | PCell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| SCell1 |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | PCell |  | Cell 1 | Cell 1 is on RF channel number 1 |
|  | SCell1 |  | Cell 2 | Cell 2 is on RF channel number 2 |
| E-UTRA RF Channel Number | |  | 1,2 | Two TDD carriers are used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| DRX | |  | - | OFF |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 [16] |
| Time offset between cells | |  | - | Intra-cell handover, no offset |
| T1 | | s | 1 |  |
| T2 | | s | *Ndirect* |  |
| T3 | | s | 1 |  |

**Table A.5.1.40.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Intra frequency handover test case**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | **Cell 2** | | | | | | |
| **T1** | **T2** | **T3** | **T1** | | | **T2** | | **T3** | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | | | OP.2 TDD | | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 8 | 8 | 8 | 8 | | | 8 | | 8 | |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 8 | 8 | 8 | 8 | | 8 | | | | 8 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -90 | | | -90 | | -90 | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.5.1.40.2 Test Requirements

The UE shall be capable to transmit valid CSI report for the directly activated SCell1 no later than in subframe m+*Ndirect*.

The rate of correct observed SCell1 direct activation delay during repeated tests shall be at least 90%.

NOTE: The SCell activation delay, *Ndirect*, can be expressed as: *Ndirect* = *TRRC\_process + Tinterrupt + TIU + T2 + T3 + Tinterupt\_window + Ttime\_direct*, where:

TRRC\_Process is the RRC procedure delay = 20 ms which is the RRC procedure delay defined for SCell addition in clause 11.2 of TS 36.331 [2],

*Tinterrupt* is the interruption time as defined in subclause 5.1.2.1.2,

*T2* is the delay for obtaining a valid TA command for the target PCell from the target PCell and the scheduling grant for sending valid CSI report in the target PCell. T2 is up to [13] subframes,

*T3* is the delay for applying the received TA for uplink transmission in the target PCell, and greater than or equal to 6 subframes,

*Tinterupt\_window* is the interruption window which is 7 ms for TDD and

*Ttime\_direct* is the direct SCell activation delay. If the SCell is known, then *Ttime\_direct* is 20 ms. If the SCell is unknown, then *Ttime\_direct* is 30 ms provided the SCell can be successfully detected on the first attempt.

This gives a total of *Ndirect* = 67 + TIU*+ T2 + T3* ms = 67 + 10 + 13 + 6 = 96 ms.

During T3 the UE shall send valid CSI reports for PCell and SCell1 with non-zero CQI index and continue to send CSI reports for PCell and SCell1 (Cell 2) with non-zero CQI index until the end of T3.

All of the above test requirements shall be fulfilled in order for the observed SCell1 direct activation delay to be counted as correct.

## A.5.2 E-UTRAN Handover to other RATs

### A.5.2.1 E-UTRAN FDD – UTRAN FDD Handover

#### A.5.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to UTRAN FDD handover requirements specified in clause 5.3.1.

The test parameters are given in Tables A.5.2.1.1-1, A.5.2.1.1-2 and A.5.2.1.1-3. 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 does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

Table A.5.2.1.1-1: General test parameters for E-UTRAN FDD to UTRAN FDD handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 | E-UTRAN cell |
| Neighbouring cell |  | Cell 2 | UTRAN cell |
| Final condition | Active cell |  | Cell 2 | UTRAN cell |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| Gap Pattern Id | |  | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| E-UTRAN FDD measurement quantity | |  | RSRP |  |
| Inter-RAT (UTRAN FDD) measurement quantity | |  | CPICH Ec/N0 |  |
| b2-Threshold1 | | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2-UTRA | | dB | -18 | Absolute UTRAN CPICH Ec/Io threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | |  | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| UTRA RF Channel Number | |  | 1 | One UTRA FDD carrier frequency is used. |
| Monitored UTRA FDD cell list size | |  | 12 | UTRA cells on UTRA RF channel 1 provided in the cell before T2. |
| Post-verification period | |  | False |  |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.2.1.1-2: Cell specific test parameters for E-UTRAN FDD to UTRAN FDD handover test case (cell 1)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 (E-UTRA) | | | | | | |
| T1 | T2 | | | T3 | | |
| E-UTRA RF Channel number |  | 1 | | | | | | |
| BWchannel | MHz | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | | OP.1 FDD | | | OP.2  FDD | |
| PBCH\_RA | dB | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 0 | | | 0 | | | 0 |
|  | dBm/15 kHz | -98 | | | | | | |
|  | dB | 0 | | | 0 | | | 0 |
| RSRP Note 2 | dBm/15 KHz | -98 | | | -98 | | | -98 |
| Io Note 2 | dBm/9 MHz | -67.21 | | | -67.21 | | | -67.21 |
| Propagation Condition |  | AWGN | | | | | | |
| 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | |

Table A.5.2.1.1-3: Cell specific test parameters for E-UTRAN FDD to UTRAN FDD handover test case (cell 2)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | | Cell 2 (UTRA) | | | | | |
|  | T1 | | T2 | | T3 | | |
| CPICH\_Ec/Ior | dB | -10 | | | | | |
| PCCPCH\_Ec/Ior | dB | -12 | | | | | |
| SCH\_Ec/Ior | dB | -12 | | | | | |
| PICH\_Ec/Ior | dB | -15 | | | | | |
| DCH\_Ec/Ior | dB | N/A | | N/A | | Note 1 | |
| OCNS\_Ec/Ior | dB | -0.941 | | 0.941 | | Note 2 | |
|  | dB | ‑infinity | | -1.8 | | -1.8 | |
|  | dBm/3,84 MHz | ‑70 | | -70 | | -70 | |
| CPICH\_Ec/Io | dB | ‑infinity | | -14 | | -14 | |
| Propagation Condition |  | AWGN | | | | | |
| Note 1: The DPCH level is controlled by the power control loop  Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior . | | | | | | | |

#### A.5.2.1.2 Test Requirements

The UE shall start to transmit the UL DPCCH to Cell 2 less than 190 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 = 50 ms, which is specified in clause 5.3.1.1.1.

Tinterrupt = 140 ms in the test; Tinterrupt is defined in clause 5.3.1.1.2.

This gives a total of 190 ms.

### A.5.2.2 E-UTRAN TDD - UTRAN FDD Handover

#### A.5.2.2.1 Test Purpose and Environment

This test is to verify the E-UTRAN TDD – UTRAN FDD handover requirements specified in clause 5.3.1.

The test scenario comprises of one E-UTRAN TDD cell and one UTRAN FDD cell as given in the tables A.5.2.2.1-1, A5.2.2.1-2 and A.5.2.2.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. At start of time duration T1, the UE does not have any timing information of cell 2. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before the start of T2 to enable the monitoring of UTRAN FDD. A neighbouring cell list, including the UTRAN cell (cell2), shall be sent to the UE before T2 starts. During the time T2 cell 2 becomes detectable and the UE is expected to detect and send the measurement report. A RRC message implying handover shall be sent to the UE during T2, after the UE has reported event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

Table A.5.2.2.1-1: General test parameters for E-UTRAN TDD-UTRAN FDD handover

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters (E-UTRAN TDD) | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| Final conditions | Active cell |  | Cell 2 |  |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211. Applicable to cell 1. |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211. Applicable to cell 1 |
| E-UTRAN TDD measurement quantity | |  | RSRP |  |
| Inter-RAT (UTRA FDD) measurement quantity | |  | CPICH Ec/Io |  |
| b2-Threshold1 | | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2-UTRA | | dB | -18 | UTRAN FDD CPICH Ec/Io threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| DRX | |  | OFF | No DRX configured. |
| Time to Trigger | | ms | 0 |  |
| Filter coefficient | |  | 0 |  |
| CP length | |  | Normal | Applicable to cell 1 |
| Gap pattern configuration Id | |  | 0 | As specified in Table 8.1.2.1-1; to start before T2 starts |
| E-UTRA RF Channel Number | |  | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| UTRA RF Channel Number | |  | 1 | One UTRA FDD carrier frequency is used. |
| Monitored UTRA FDD cell list size | |  | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list before T2. |
| Post-verification period | |  | False | Post verification is not used. |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.2.2.1-2: Cell specific test parameters for E-UTRAN TDD (cell 1) for handover to UTRAN FDD (cell # 2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 (E-UTRAN) | | |
| T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | |
| BWchannel | MHz | 10 | | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | | OP.2 TDD |
| PBCH\_RA | dB | 0 | | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote 1 |
| OCNG\_RBNote 1 |
| RSRP | dBm/15 kHz | -98 | -98 | -98 |
|  | dB | 0 | 0 | 0 |
|  | dB | 0 | 0 | 0 |
|  | dBm/15 kHz | -98 | | |
| Io Note 2 | dBm/9 MHz | -67.21 | -67.21 | -67.21 |
| 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.  Note 2: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

Table A.5.2.2.1-3: Cell specific test parameters for UTRAN FDD (cell # 2) for handover from E-UTRAN TDD cell (cell #1)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | | Cell 1 (UTRA) | | | | | |
|  | | T1 | | T2 | | T3 | |
| CPICH\_Ec/Ior | dB | | -10 | | | | | |
| PCCPCH\_Ec/Ior | dB | | -12 | | | | | |
| SCH\_Ec/Ior | dB | | -12 | | | | | |
| PICH\_Ec/Ior | dB | | -15 | | | | | |
| DPCH\_Ec/Ior | dB | | N/A | | N/A | | Note 1 | |
| OCNS | dB | | -0.941 | | -0.941 | | Note 2 | |
|  | dB | | -infinity | | -1.8 | | -1.8 | |
|  | dBm/3.84 MHz | | ‑70 | | | | | |
| CPICH\_Ec/Io | dB | | -infinity | | -14 | | -14 | |
| Propagation Condition |  | | AWGN | | | | | |
| Note 1: The DPCH level is controlled by the power control loop  Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior . | | | | | | | | |

#### A.5.2.2.2 Test Requirements

The UE shall start to transmit the UL DPCCH to Cell 2 less than 190 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 = 50 ms, which is specified in clause 5.1.1.1.1.

Tinterrupt = 140 ms in the test; Tinterrupt is defined in clause 5.3.1.1.2.

This gives a total of 190 ms.

### A.5.2.3 E-UTRAN FDD- GSM Handover

##### A.5.2.3.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN to GSM cell handover delay specified in clause 5.3.3.

The test parameters are given in Table A.5.2.3.1 -1, A.5.2.3.1 -2 and A.5.2.3.1 -3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 shall be used. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

The RRC message implying handover to cell 2 shall be sent to the UE during period T2, after the UE has reported Event B1. The start of T3 is defined as the end of last E-UTRAN TTI containing the RRC message implying handover.

The requirements are also applicable for a UE not requiring measurement gap, in which case no measurement gap pattern should be sent for the parameters specified in Table A.5.2.3.1-1.

Table A.5.2.3.1 -1: General test parameters for E-UTRAN FDD-GSM handover

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Gap Pattern Id | |  | 1 | As specified in TS 36.133 section8.1.2.1. |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbour cell |  | Cell 2 |  |
| Final conditions | Active cell |  | Cell 2 |  |
| Inter-RAT measurement quantity | |  | GSM Carrier RSSI |  |
| Threshold other system | | dBm | -80 | Absolute GSM carrier RSSI threshold for event B1. |
| Hysteresis | | dB | 0 |  |
| Time to Trigger | | ms | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  |  | OFF |
| T1 | | s | 20 |  |
| T2 | | s | 7 |  |
| T3 | | s | 1 |  |

Table A. A.5.2.3.1 - 2: Cell Specific Parameters for Handover from E- UTRAN FDD to GSM cell case (cell 1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | | Cell 1 | |
| T1, T2 | T3 |
| BWchannel | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | | OP.2 FDD |
| PBCH\_RA | dB | 0 | | |
| PBCH\_ RB | dB |
| PSS\_ RA | dB |
| SSS\_ RA | dB |
| PCFICH\_ RB | dB |
| PHICH\_ RA | dB |
| PHICH\_ RB | dB |
| PDCCH\_ RA | dB |
| PDCCH\_ RB | dB |
| PDSCH\_ RA | dB |
| PDSCH\_ RB | dB |
| OCNG\_ RA Note1 | dB |
| OCNG\_ RB Note1 | dB |
|  | dB | 4 | | |
| Note 2 | dBm/15 kHz | -98 (AWGN) | | |
|  | dB | 4 | | |
| RSRP Note 3 | dBm/15kHz | -94 | | |
| Propagation Condition |  | AWGN | | |
| Note 1: OCNG shall be used such that cell 1 is 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. | | | | |

Table A.5.2.3.1 - 3: Cell Specific Parameters for Handover from E-UTRAN FDD to GSM cell case (cell 2)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (GSM) | |
| T1 | T2, T3 |
| Absolute RF Channel Number |  | ARFCN 1 | |
| RXLEV | dBm | -85 | -75 |

##### A.5.2.3.2 Test Requirements

The UE shall begin to send access bursts on the new DCCH of the target cell less than 100 ms from the beginning of time period T3.

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

NOTE: The test requirement in this test case is expressed as:

THandover delay = 90 ms (Table 5.3.3.2.1-1) + Toffset + TUL

Toffset : Equal to 4.65 ms, GSM timing uncertainty between the time from when the UE is ready to transmit until the start of the next timeslot in GSM 26 multiframe structure

TUL: Equal to 4.65 ms, the time the UE has to wait in case the next timeslot is an idle frame or a SACCH frame.

This gives a total of 99.3 ms, allow 100 ms in the test case.

### A.5.2.4 E-UTRAN TDD - UTRAN TDD Handover

#### A.5.2.4.1 Test Purpose and Environment

##### A.5.2.4.1.1 Void

##### A.5.2.4.1.2 1.28 Mcps TDD option

This test is to verify the requirement for E-UTRAN TDD to UTRAN TDD handover requirements specified in clause 5.3.2.

The test scenario comprises of 1 E-UTRA TDD cell and 1 UTRA TDD cell as given in tables Table A.5.2.4.1.2-1, Table A.5.2.4.1.2-2, and Table A.5.2.4.1.2-3. Gap pattern configuration #0 as defined in table 8.1.2.1-1 is provided.

The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively.

E-UTRAN shall send a RRC message implying handover to UE. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event B2. The end of the last TTI containing handover message is begin of T3 duration.

Table A.5.2.4.1.2-1: General test parameters for E-UTRA TDD to UTRA(1.28 Mcps TDD OPTION) handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 | E-UTRA TDD cell |
| Neighbour cell |  | Cell 2 | UTRA 1.28Mcps TDD Cell |
| Final conditions | Active cell |  | Cell 2 |  |
| Gap Pattern Id | |  | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Uplink-downlink configuration of cell 1 | |  | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | |  | 6 | As specified in table 4.2.1 in TS 36.211 |
| CP length of cell 1 | |  | Normal |  |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Access Barring Information | |  | Not Sent | No additional delays in random access procedure. |
| Assigned Sub-Channel Number | |  | 1 | No additional delays in random access procedure due to ASC. |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF |  |
| Ofn | | dB | 0 |  |
| Thresh1 | | dBm | -93 | E-UTRA event B2 threshold |
| Thresh2 | | dBm | -80 | UTRA event B2 threshold |
| T1 | | s | 5 |  |
| T2 | | s | ≤10 |  |
| T3 | | s | 1 |  |

Table A.5.2.4.1.2-2: Cell specific test parameters for E-UTRA TDD to UTRA TDD handover test case (cell 1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | |
| T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | |
| BWchannel | MHz | 10 | | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.1.2 (OP.2 TDD) |  | OP.1 TDD | | OP.2 TDD |
| PBCH\_RA | dB | 0 | 0 | 0 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 13 | -3 | -3 |
|  | dB | 13 | -3 | -3 |
|  | dBm/15kHz | -98 | | |
| RSRP Note 2 | dBm/15kHz | -85 | -101 | -101 |
| SCH\_RP Note 2 | dBm/15 kHz | -85 | -101 | -101 |
| Io Note 2 | dBm/9MHz | -57.01 | -68.45 | -68.45 |
| Propagation Condition |  | AWGN | | |
| Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves | | | | |

Table A.5.2.4.1.2-3: Cell specific test parameters for cell search E-UTRA to UTRA case (cell 2)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 (UTRA) | | | | | |
| Timeslot Number | |  | 0 | | | DwPTS | | |
|  |  | | T1 | T2 | T3 | T1 | T2 | T3 |
| UTRA RF Channel Number Note 21 |  | | Channel 2 | | | | | |
| PCCPCH\_Ec/Ior | dB | | -3 | | |  | | |
| DwPCH\_Ec/Ior | dB | |  | | | 0 | | |
| OCNS\_Ec/Ior | dB | | -3 | | |  | | |
|  | dB | | -3 | 11 | 11 | -3 | 11 | 11 |
|  | dBm/1.28 MHz | | -80 | | | | | |
| PCCPCH RSCP Note 2 | dBm | | -86 | -72 | -72 | n.a. | | |
| Io Note 2 | dBm/1.28 MHz | | -78.24 | -68.67 | -68.67 |  | | |
| Propagation Condition |  | | AWGN | | | | | |
| Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency’s channel number.  Note 2: PCCPCH\_RSCP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | |

##### A.5.2.4.1.3 Void

#### A.5.2.4.2 Test Requirements

##### A.5.2.4.2.1 Void

##### A.5.2.4.2.2 1.28 Mcps TDD option

The UE shall start to transmit the SYNCH-UL sequence in the UpPTS to Cell 2 less than 120 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 = 50 ms, which is specified in clause 5.3.2.2.1.

Tinterrupt is defined in clause 5.3.2.2.2. Tinterrupt = 70 ms in the test as following:

Tinterrupt1= Toffset+TUL+30\*FSFN+20 ms

Toffset = 10 ms; TUL = 10 ms; and FSFN = 1 for UE decoding SFN.

This gives a total of 120 ms.

##### A.5.2.4.2.3 Void

### A.5.2.5 E-UTRAN FDD – UTRAN TDD Handover

#### A.5.2.5.1 Test Purpose and Environment

A.5.2.5.1.1 Void

A.5.2.5.1.2 1.28 Mcps TDD option

This test is to verify the requirement for the E-UTRAN FDD to UTRAN TDD handover requirements specified in clause 5.3.2.

The test scenario comprises of two cells, E-UTRA TDD cell1 and UTRA TDD cell2. 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 does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #1 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring. The test parameters are given in Tables A.5.2.5.1-1, A.5.2.5.1-2 and A.5.2.5.1-3.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

Table A.5.2.5.1.2-1: General test parameters for E-UTRA FDD to UTRA (1.28 Mcps TDD option) handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 | E-UTRA FDD cell |
| Neighbour cell |  | Cell 2 | UTRA 1.28Mcps TDD Cell |
| Final conditions | Active cell |  | Cell 2 |  |
| Gap Pattern Id | |  | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| E-UTRAN FDD measurement quantity | |  | RSRP |  |
| UTRAN TDD measurement quantity | |  | RSCP |  |
| CP length of cell 1 | |  | Normal |  |
| Access Barring Information | |  | Not Sent | No additional delays in random access procedure. |
| Assigned Sub-Channel Number | |  | 1 | No additional delays in random access procedure due to ASC. |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF |  |
| Ofn | | dB | 0 |  |
| Thresh1 | | dBm | -93 | Absolute E-UTRAN RSRP threshold for event B2 |
| Thresh2 | | dBm | -80S | Absolute UTRAN RSCP threshold for event B2 |
| T1 | | s | 5 |  |
| T2 | | s | ≤ 10 |  |
| T3 | | s | 1 |  |

Table A.5.2.5.1.2-2: Cell specific test parameters for E-UTRAN FDD to UTRAN (1.28 Mcps TDD option) handover test case (cell 1)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 (E-UTRA) | | | | | | |
| T1 | T2 | | | T3 | | |
| E-UTRA RF Channel number |  | 1 | | | | | | |
| BWchannel | MHz | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | | OP.1 FDD | | | OP.2  FDD | |
| PBCH\_RA | dB | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 13 | | | -3 | | | -3 |
|  | dBm/15 kHz | -98 | | | | | | |
|  | dB | 13 | | | -3 | | | -3 |
| RSRP Note 2 | dBm/15 KHz | -85 | | | -101 | | | -101 |
| Io Note 2 | dBm/9MHz | -57.01 | | | -68.45 | | | -68.45 |
| Propagation Condition |  | AWGN | | | | | | |
| 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves | | | | | | | | |

Table A.5.2.5.1.2-3: Cell specific test parameters for E-UTRAN FDD to UTRAN (1.28 Mcps TDD option) handover test case (cell 2)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (UTRA) | | | | | |
| Timeslot Number |  | 0 | | | DwPTS | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| UTRA RF Channel Number Note 21 |  | Channel 2 | | | | | |
| PCCPCH\_Ec/Ior | dB | -3 | | |  | | |
| DwPCH\_Ec/Ior | dB |  | | | 0 | | |
| OCNS\_Ec/Ior | dB | -3 | | |  | | |
|  | dB | -3 | 11 | 11 | -3 | 11 | 11 |
|  | dBm/1.28 MHz | -80 | | | | | |
| PCCPCH RSCP Note 2 | dBm | -86 | -72 | -72 | n.a. | | |
| Io Note 2 | dBm/1.28 MHz | -78.24 | -68.67 | -68.67 |  | | |
| Propagation Condition |  | AWGN | | | | | |
| Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency’s channel number.  Note 2: PCCPCH\_RSCP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

##### A.5.2.5.1.3 Void

#### A.5.2.5.2 Test Requirements

##### A.5.2.5.2.1 Void

##### A.5.2.5.2.2 1.28 Mcps TDD option

The UE shall start to transmit the SYNCH-UL sequence in the UpPTS to Cell 2 less than 120 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 = 50 ms, which is specified in clause 5.3.2.2.1.

Tinterrupt is defined in clause 5.3.2.2.2. Tinterrupt = 70 ms in the test as following:

Tinterrupt1= Toffset+TUL+30\*FSFN+20 ms

Toffset = 10 ms; TUL = 10 ms; and FSFN = 1 for UE decoding SFN.

This gives a total of 120 ms.

##### A.5.2.5.2.3 Void

#### A.5.2.6 E-UTRAN TDD - GSM Handover

##### A.5.2.6.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN to GSM cell handover delay specified in clause 5.3.3.

The test parameters are given in Table A.5.2.6.1-1, A.5.2.6.1-2 and A.5.2.6.1-3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 shall be used. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

The RRC message implying handover to cell 2 shall be sent to the UE during period T2, after the UE has reported Event B1. The start of T3 is defined as the end of last E-UTRAN TTI containing the RRC message implying handover.

The requirements are also applicable for a UE not requiring measurement gap, in which case no measurement gap pattern should be sent for the parameters specified in Table A.5.2.6.1-1.

Table A.5.2.6.1-1: General test parameters for E-UTRAN TDD toGSM neighbours handover test case in AWGN propagation condition

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | |  | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbour cell |  | Cell 2 |  |
| Final conditions | Active cell |  | Cell 2 |  |
| Uplink-downlink configuration of cell 1 | |  | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | |  | 6 | As specified in table 4.2.1 in TS 36.211 |
| CP length of cell 1 | |  | Normal |  |
| Inter-RAT measurement quantity | |  | GSM Carrier RSSI |  |
| E-UTRA RF Channel Number | |  | 1 | E-UTRA RF Channel Number |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 | E-UTRA Channel Bandwidth (BWchannel) |
| Threshold other system | | dBm | -80 | Absolute GSM carrier RSSI threshold for event B1. |
| Hysteresis | | dB | 0 |  |
| Time to Trigger | | ms | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF |  |
| T1 | | s | 20 |  |
| T2 | | s | 7 |  |
| T3 | | s | 1 |  |

Table A.5.2.6.1-2: Cell Specific Parameters for Handover E- UTRAN TDD to GSM handover test case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
|  | T1, T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | OP.2 TDD |
| PBCH\_RA | dB | 0 | |
| PBCH\_ RB | dB |
| PSS\_ RA | dB |
| SSS\_ RA | dB |
| PCFICH\_ RB | dB |
| PHICH\_ RA | dB |
| PHICH\_ RB | dB |
| PDCCH\_ RA | dB |
| PDCCH\_ RB | dB |
| PDSCH\_ RA | dB |
| PDSCH\_ RB | dB |
| OCNG\_ RA Note1 | dB |
| OCNG\_ RB Note1 | dB |
|  | dB | 4 | |
| Note 2 | dBm/15 kHz | -98 (AWGN) | |
|  | dB | 4 | |
| RSRP Note 3 | dBm/15kHz | -94 | |
| Propagation Condition |  | AWGN | |
| NOTE 1: OCNG shall be used such that cell 1 is 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. | | | |

Table A.5.2.6.1-3: Cell Specific Parameters for Handover E-UTRAN to GSM cell case (cell 2)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (GSM) | |
| T1 | T2, T3 |
| Absolute RF Channel Number |  | ARFCN 1 | |
| RXLEV | dBm | -85 | -75 |

##### A.5.2.6.2 Test Requirements

The UE shall begin to send access bursts on the new DCCH of the target cell less than 100 ms from the beginning of time period T3.

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

NOTE: The test requirement in this test case is expressed as:

THandover delay = 90 ms (Table 5.3.3.2.1-1) + Toffset + TUL

Toffset: Equal to 4.65 ms, GSM timing uncertainty between the time from when the UE is ready to transmit until the start of the next timeslot in GSM 26 multiframe structure

TUL: Equal to 4.65 ms, the time the UE has to wait in case the next timeslot is an idle frame or a SACCH frame.

This gives a total of 99.3 ms, allow 100 ms in the test case.

### A.5.2.7 E-UTRAN FDD – UTRAN FDD Handover; Unknown Target Cell

#### A.5.2.7.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to UTRAN FDD handover requirements for the case when the target cell is unknown as specified in clause 5.3.1.

The test parameters are given in Tables A.5.2.7.1-1, A.5.2.7.1-2 and A.5.2.7.1-3. The test consists of two successive time periods, with time durations of T1, T2. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. No Gap pattern configuration shall be used.

Table A.5.2.7.1-1: General test parameters for E-UTRAN FDD to UTRAN FDD handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 | E-UTRAN cell |
| Neighbouring cell |  | Cell 2 | UTRAN cell |
| Final condition | Active cell |  | Cell 2 | UTRAN cell |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| E-UTRAN FDD measurement quantity | |  | RSRP |  |
| Inter-RAT (UTRAN FDD) measurement quantity | |  | CPICH Ec/N0 |  |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | |  | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| UTRA RF Channel Number | |  | 1 | One UTRA FDD carrier frequency is used. |
| Monitored UTRA FDD cell list size | |  | 12 | UTRA cells on UTRA RF channel 1 provided in the cell before T2. |
| Post-verification period | |  | False |  |
| T1 | | s | ≤5 |  |
| T2 | | s | 1 |  |

Table A.5.2.7.1-2: Cell specific test parameters for E-UTRAN FDD to UTRAN FDD handover test case (cell 1)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 (E-UTRA) | |
| T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.2 FDD |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 0 | 0 |
| Note 2 | dBm/15 kHz | -98 | |
|  | dB | 0 | 0 |
| RSRP Note 3 | dBm/15 KHz | -98 | -98 |
| Propagation Condition |  | AWGN | |
| 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. | | | |

Table A.5.2.7.1-3: Cell specific test parameters for E-UTRAN FDD to UTRAN FDD handover test case (cell 2)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | | Cell 2 (UTRA) | | |
| T1 | | T2 |
| CPICH\_Ec/Ior | dB | -10 | | | |
| PCCPCH\_Ec/Ior | dB | -12 | | | |
| SCH\_Ec/Ior | dB | -12 | | | |
| PICH\_Ec/Ior | dB | -15 | | | |
| DCH\_Ec/Ior | dB | Note 1 | | | |
| OCNS\_Ec/Ior | dB | Note 2 | | | |
|  | dB | ‑infinity | | -1.8 | |
|  | dBm/3,84 MHz | ‑70 | | -70 | |
| CPICH\_Ec/Io | dB | ‑infinity | | -14 | |
| Propagation Condition | AWGN | | | | |
| Note 1: The DPCH level is controlled by the power control loop  Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior . | | | | | |

#### A.5.2.7.2 Test Requirements

The UE shall start to transmit the UL DPCCH to Cell 2 less than 290 ms from the beginning of time period T2.

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 is 50ms. See clause 5.3.1.1.1.

*Tinterrupt* is 240ms. See clause 5.3.1.1.2.

This gives a total of 290ms in the test case.

### A.5.2.8 E-UTRAN FDD - GSM Handover; Unknown Target Cell

#### A.5.2.8.1 Test Purpose and Environment

This test is to verify the E-UTRAN FDD to GSM handover requirements for the case when the target GSM cell is unknown as specified in clause 5.3.3.

The test parameters are given in Table A.5.2.8.1-1, A.5.2.8.1-2 and A.5.2.8.1-3 below. The test consists of two successive time periods, with time duration of T1, T2 respectively. At the start of time duration T1, the UE will not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. No Gap pattern configuration shall be used.

Table A.5.2.8.1-1: General test parameters for E-UTRAN FDD to GSM handover test case; unknown target cell

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Gap Pattern Id | |  | None | No measurement gaps shall be provided. |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbour cell |  | Cell 2 |  |
| Final conditions | Active cell |  | Cell 2 |  |
| DRX | |  | OFF | No DRX configured |
| T1 | | s | 7 |  |
| T2 | | s | 1 |  |

Table A.5.2.8.1 - 2: Cell specific parameters for cell # 1 in E-UTRAN FDD to GSM handover test case; unknown target cell

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| BW**channel** | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.2 FDD |
| PBCH\_RA | dB | 0 | |
| PBCH\_ RB | dB |
| PSS\_ RA | dB |
| SSS\_ RA | dB |
| PCFICH\_ RB | dB |
| PHICH\_ RA | dB |
| PHICH\_ RB | dB |
| PDCCH\_ RA | dB |
| PDCCH\_ RB | dB |
| PDSCH\_ RA | dB |
| PDSCH\_ RB | dB |
| OCNG\_ RA Note1 | dB |
| OCNG\_ RB Note1 | dB |
|  | dB | 4 | |
| Note 2 | dBm/15 kHz | -98 | |
|  | dB | 4 | |
| RSRP Note 3 | dBm/15 kHz | -94 | |
| Propagation Condition |  | AWGN | |
| Note 1: OCNG shall be used such that cell 1 is 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. | | | |

Table A.5.2.8.1-3: Cell specific parameters for cell # 2 in E-UTRAN FDD to GSM handover test case; unknown target cell

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (GSM) | |
| T1 | T2 |
| Absolute RF Channel Number |  | ARFCN 1 | |
| RXLEV | dBm | -Infinity | -75 |

#### A.5.2.8.2 Test Requirements

The UE shall begin to send access bursts on the new DCCH of the target cell less than 200 ms from the beginning of time period T2.

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

NOTE: The test requirement in this test case is expressed as:

THandover delay = 190 ms (Table 5.3.3.2.1-1) + Toffset + TUL

Toffset: Equal to 4.65 ms is the GSM timing uncertainty from the time when the UE is ready to transmit until the start of the next timeslot in GSM 26 multiframe structure

TUL: Equal to 4.65 ms is the time the UE has to wait in case the next timeslot is an idle frame or a SACCH frame.

This gives a total of 199.3 ms, allow 200 ms in the test case.

### A.5.2.9 E-UTRAN TDD - GSM Handover; Unknown Target Cell

#### A.5.2.9.1 Test Purpose and Environment

This test is to verify the E-UTRAN TDD to GSM handover requirements for the case when the target GSM cell is unknown as specified in clause 5.3.3.

The test parameters are given in Table A.5.2.9.1 -1, A.5.2.9.1 -2 and A.5.2.9.1 -3 below. The test consists of two successive time periods, with time duration of T1, T2 respectively. At the start of time duration T1, the UE will not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. No Gap pattern configuration shall be used.

Table A.5.2.9.1-1: General test parameters for E-UTRAN TDD to GSM handover test case; unknown target cell

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | |  | None | No measurement gaps shall be provided. |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbour cell |  | Cell 2 |  |
| Final conditions | Active cell |  | Cell 2 |  |
| DRX | |  | OFF | No DRX configured |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| T1 | | s | 7 |  |
| T2 | | s | 1 |  |

Table A.5.2.9.1 - 2: Cell specific parameters for cell # 1 in E-UTRAN TDD to GSM handover test case; unknown target cell

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| BW**channel** | MHz | 10 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | OP.2 TDD |
| PBCH\_RA | dB | 0 | |
| PBCH\_ RB | dB |
| PSS\_ RA | dB |
| SSS\_ RA | dB |
| PCFICH\_ RB | dB |
| PHICH\_ RA | dB |
| PHICH\_ RB | dB |
| PDCCH\_ RA | dB |
| PDCCH\_ RB | dB |
| PDSCH\_ RA | dB |
| PDSCH\_ RB | dB |
| OCNG\_ RA Note1 | dB |
| OCNG\_ RB Note1 | dB |
|  | dB | 4 | |
| Note 2 | dBm/15 kHz | -98 | |
|  | dB | 4 | |
| RSRP Note 3 | dBm/15 kHz | -94 | |
| Propagation Condition |  | AWGN | |
| Note 1: OCNG shall be used such that cell 1 is 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. | | | |

Table A.5.2.9.1 - 3: Cell specific parameters for cell # 2 in E-UTRAN TDD to GSM handover test case; unknown target cell

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (GSM) | |
| T1 | T2 |
| Absolute RF Channel Number |  | ARFCN 1 | |
| RXLEV | dBm | -Infinity | -75 |

#### A.5.2.9.2 Test Requirements

The UE shall begin to send access bursts on the new DCCH of the target cell less than 200 ms from the beginning of time period T2.

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

NOTE: The test requirement in this test case is expressed as:

THandover delay = 190 ms (Table 5.3.3.2.1-1) + Toffset + TUL

Toffset: Equal to 4.65 ms is the GSM timing uncertainty from the time when the UE is ready to transmit until the start of the next timeslot in GSM 26 multiframe structure

TUL: Equal to 4.65 ms is the time the UE has to wait in case the next timeslot is an idle frame or a SACCH frame.

This gives a total of 199.3 ms, allow 200 ms in the test case.

### A.5.2.10 E-UTRAN TDD to UTRAN TDD handover: unknown target cell

#### A.5.2.10.1 Test Purpose and Environment

This test is to verify the requirement for E-UTRAN TDD to UTRAN TDD handover requirements specified in clause 5.3.2 when the target UTRAN TDD cell is unknown.

The test scenario comprises of 1 E-UTRAN TDD cell and 1 UTRAN TDD cell as given in tables A.5.2.10.1-1, A.5.2.10.1-2, and A.5.2.10.1-3. No gap pattern is configured in the test case.

The test consists of two successive time periods, with time durations of T1 and T2 respectively. During time duration T1, a RRC message implying handover to UTRA 1.28Mcps TDD cell shall be sent to the UE. The end of the last TTI containing handover message is the beginning of T2 duration.

Table A.5.2.10.1-1: General test parameters for E-UTRAN TDD to unknown UTRAN TDD cell handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 | E-UTRAN TDD cell |
| Neighbour cell |  | Cell 2 | UTRA 1.28Mcps TDD cell |
| Final conditions | Active cell |  | Cell 2 | UTRA 1.28Mcps TDD cell |
| CP length of cell 1 | |  | Normal |  |
| Uplink-downlink configuration of cell 1 | |  | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | |  | 6 | As specified in table 4.2.1 in TS 36.211 |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Access Barring Information | |  | Not Sent | No additional delays in random access procedure. |
| Assigned Sub-Channel Number | |  | 1 | No additional delays in random access procedure due to ASC. |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF |  |
| T1 | | s | 5 | During T1, cell 2 shall be powered off, and during the off time the physical layer cell identity shall be changed. |
| T2 | | s | 1 |  |

Table A.5.2.10.1-2: Cell specific test parameters for E-UTRAN TDD to unknown UTRAN TDD cell handover test case (cell 1)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in TS36.133 A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | OP.2 TDD |
| PBCH\_RA | dB | 0 | 0 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 3 | 3 |
|  | dB | 3 | 3 |
|  | dBm/15kHz | -98 | |
| RSRP | dBm/15kHz | -95 | -95 |
| SCH\_RP | dBm/15 kHz | -95 | -95 |
| Propagation Condition |  | AWGN | |
| Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: RSRP and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

Table A.5.2.10.1-3: Cell specific test parameters for E-UTRAN TDD to unknown UTRAN TDD cell test case (cell 2)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (UTRA) | | | |
| Timeslot Number |  | 0 | | DwPTS | |
|  |  | T1 | T2 | T1 | T2 |
| UTRA RF Channel NumberNote1 |  | Channel 2 | | | |
| PCCPCH\_Ec/Ior | dB | -3 | |  | |
| DwPCH\_Ec/Ior | dB |  | | 0 | |
| OCNS\_Ec/Ior | dB | -3 | |  | |
|  | dB | -infinity | 13 | -infinity | 13 |
|  | dBm/1.28 MHz | -80 | | | |
| PCCPCH RSCP | dBm | -infinity | -70 | n.a. | |
| Propagation Condition |  | AWGN | | | |
| Note1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency’s channel number.  Note2: P-CCPCH RSCP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

#### A.5.2.10.2 Test Requirements

The UE shall start to transmit the SYNCH-UL sequence in the UpPTS to Cell 2 less than 280 ms from the beginning of time period T2.

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 = 50 ms, which is specified in clause 5.3.2.2.1.

Tinterrupt is defined in clause 5.3.2.2.2. Tinterrupt = 230 ms in the test as following:

Tinterrupt1= Toffset+TUL+30\*FSFN+180 ms

Toffset = 10 ms; TUL = 10 ms; and FSFN = 1 for UE decoding SFN.

This gives a total of 280 ms.

### A.5.2.10A E-UTRAN FDD – UTRAN FDD Multicarrier Handover with two target cells

#### A.5.2.10A.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to UTRAN FDD handover requirements specified in clause 5.3.1 in a 2 cell multicarrier configuration. It is applicable to UEs that support DC-HSDPA, DB-DC-HSDPA and which do not support 3C-HSDPA or 4C-HSDPA.

The test parameters are given in Tables A.5.2.10A.1-1, A.5.2.10A.1-2 and A.5.2.10A.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 does not have any timing information of Cell 2. Starting T2, Cell 2 and cell 3 become detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover to cell 2 and cell 3 shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target Primary Serving HS-DSCH cell and cell 3 as the target Secondary Serving HS-DSCH cell.

Table A.5.2.10A.1-1: General test parameters for E-UTRAN FDD to UTRAN FDD handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 | E-UTRAN cell |
| Neighbouring cell |  | Cell 2 | UTRAN cell |
| Final condition | Active cell |  | Cell 2 and cell 3 | UTRAN cell |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| Gap Pattern Id | |  | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| E-UTRAN FDD measurement quantity | |  | RSRP |  |
| Inter-RAT (UTRAN FDD) measurement quantity | |  | CPICH Ec/Io |  |
| b2-Threshold1 | | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2-UTRA | | dB | -18 | Absolute UTRAN CPICH Ec/Io threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | |  | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| UTRA RF Channel Number | |  | 1 | One UTRA FDD carrier frequency is used. |
| Monitored UTRA FDD cell list size | |  | 12 | UTRA cells on UTRA RF channel 1 provided in the cell before T2. |
| Post-verification period | |  | False |  |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.2.10A.1-2: Cell specific test parameters for E-UTRAN FDD to UTRAN FDD handover test case (cell 1)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 (E-UTRA) | | | | | | |
| T1 | T2 | | | T3 | | |
| E-UTRA RF Channel number |  | 1 | | | | | | |
| BWchannel | MHz | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | | OP.1 FDD | | | OP.2  FDD | |
| PBCH\_RA | dB | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 0 | | | 0 | | | 0 |
|  | dBm/15 kHz | -98 | | | | | | |
|  | dB | 0 | | | 0 | | | 0 |
| RSRP Note 2 | dBm/15 KHz | -98 | | | -98 | | | -98 |
| Io Note 2 | dBm/9 MHz | -67.21 | | | -67.21 | | | -67.21 |
| Propagation Condition |  | AWGN | | | | | | |
| 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | |

Table A.5.2.10A.1-3: Cell specific test parameters for E-UTRAN FDD to UTRAN FDD multi carrier handover test case (cell 2 and cell 3)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Cell 2** | | | **Cell 3** | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| UTRA RF Channel Number |  | Channel 1 | | | Channel 2 | | |
| Cell type |  | Primary Serving HS-DSCH Cell | | | Secondary Serving HS-DSCH Cell | | |
| CPICH\_Ec/Ior | dB | -10 | | | -10 | | |
| PCCPCH\_Ec/Ior | dB | -12 | | | -12 | | |
| SCH\_Ec/Ior | dB | -12 | | | -12 | | |
| PICH\_Ec/Ior | dB | -15 | | | -15 | | |
| HS-SCCH\_Ec/Ior | dB | -13 | | | -13 | | |
| HS\_DPDCH\_Ec/Ior | dB | -10 | | | -10 | | |
| DPCH\_Ec/Ior | dB | Note 1 | | | N/A | | |
| OCNS |  | Note 2 | | | -2.02 | | |
|  | dB | -Inf | -1.8 | -1.8 | -Inf | -1.8 | -1.8 |
|  | dBm/3.84 MHz | -70 | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Note 1: The DPCH level is controlled by the power control loop  Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior  Note 3: The UE shall be scheduled continuously with HS-DSCH data during T3 using both cell 2 and cell 3 | | | | | | | |

#### A.5.2.10A.2 Test Requirements

The UE shall start to transmit the UL DPCCH to Cell 2 less than 210 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 = 50 ms, which is specified in clause 5.3.1.1.1.

Tinterrupt = 160 ms in the test; Tinterrupt is defined in clause 5.3.1.1.2.

This gives a total of 210 ms.

### A.5.2.10B E-UTRAN TDD – UTRAN FDD Multicarrier Handover with two target cells

#### A.5.2.10B.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN TDD to UTRAN FDD handover requirements specified in clause 5.3.1 in a 2 cell multicarrier configuration. It is applicable to UEs that support DC-HSDPA, DB-DC-HSDPA and which do not support 3C-HSDPA or 4C-HSDPA.

The test parameters are given in Tables A.5.2.10B.1-1, A.5.2.10B.1-2 and A.5.2.10B.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 does not have any timing information of Cell 2. Starting T2, Cell 2 and cell 3 become detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover to cell 2 and cell 3 shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target Primary Serving HS-DSCH cell and cell 3 as the target Secondary Serving HS-DSCH cell.

Table A.5.2.10B.1-1: General test parameters for E-UTRAN TDD to UTRAN FDD handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters (E-UTRAN TDD) | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| Final conditions | Active cell |  | Cell 2 and cell 3 |  |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211. Applicable to cell 1. |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211. Applicable to cell 1 |
| E-UTRAN TDD measurement quantity | |  | RSRP |  |
| Inter-RAT (UTRA FDD) measurement quantity | |  | CPICH Ec/Io |  |
| b2-Threshold1 | | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2-UTRA | | dB | -18 | UTRAN FDD CPICH Ec/Io threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| DRX | |  | OFF | No DRX configured. |
| Time to Trigger | | ms | 0 |  |
| Filter coefficient | |  | 0 |  |
| CP length | |  | Normal | Applicable to cell 1 |
| Gap pattern configuration Id | |  | 0 | As specified in Table 8.1.2.1-1; to start before T2 starts |
| E-UTRA RF Channel Number | |  | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| UTRA RF Channel Number | |  | 1 | One UTRA FDD carrier frequency is used. |
| Monitored UTRA FDD cell list size | |  | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list before T2. |
| Post-verification period | |  | False | Post verification is not used. |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.5.2.10B.1-2: Cell specific test parameters for E-UTRAN TDD to UTRAN FDD handover test case (cell 1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 (E-UTRAN) | | |
| T1 | T2 | T3 |
| E-UTRA RF Channel Number |  | 1 | | |
| BWchannel | MHz | 10 | | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | | OP.2 TDD |
| PBCH\_RA | dB | 0 | | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote 1 |
| OCNG\_RBNote 1 |
| RSRP | dBm/15 kHz | -98 | -98 | -98 |
|  | dB | 0 | 0 | 0 |
|  | dB | 0 | 0 | 0 |
|  | dBm/15 kHz | -98 | | |
| Io Note 2 | dBm/9 MHz | -67.21 | -67.21 | -67.21 |
| 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.  Note 2: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

Table A.5.2.10B.1-3: Cell specific test parameters for E-UTRAN TDD to UTRAN FDD multi carrier handover test case (cell 2 and cell 3)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Cell 2** | | | **Cell 3** | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| UTRA RF Channel Number |  | Channel 1 | | | Channel 2 | | |
| Cell type |  | Primary Serving HS-DSCH Cell | | | Secondary Serving HS-DSCH Cell | | |
| CPICH\_Ec/Ior | dB | -10 | | | -10 | | |
| PCCPCH\_Ec/Ior | dB | -12 | | | -12 | | |
| SCH\_Ec/Ior | dB | -12 | | | -12 | | |
| PICH\_Ec/Ior | dB | -15 | | | -15 | | |
| HS-SCCH\_Ec/Ior | dB | -13 | | | -13 | | |
| HS\_DPDCH\_Ec/Ior | dB | -10 | | | -10 | | |
| DPCH\_Ec/Ior | dB | Note 1 | | | N/A | | |
| OCNS |  | Note 2 | | | -2.02 | | |
|  | dB | -Inf | -1.8 | -1.8 | -Inf | -1.8 | -1.8 |
|  | dBm/3.84 MHz | -70 | | | | | |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Note 1: The DPCH level is controlled by the power control loop  Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior  Note 3: The UE shall be scheduled continuously with HS-DSCH data during T3 using both cell 2 and cell 3 | | | | | | | |

#### A.5.2.10B.2 Test Requirements

The UE shall start to transmit the UL DPCCH to Cell 2 less than 210 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 = 50 ms, which is specified in clause 5.3.1.1.1.

Tinterrupt = 160 ms in the test; Tinterrupt is defined in clause 5.3.1.1.2.

This gives a total of 210 ms.

### A.5.2.11 E-UTRAN FDD – UTRAN FDD Handover for 5MHz Bandwidth

#### A.5.2.11.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.5.2.1.1.

The parameters of this test are the same as defined in Subclause A.5.2.1.1 except that the values of the parameters in the Table A.5.2.11.1-1 will replace the values of the corresponding parameters in A.5.2.1.1-1, and the values of the parameters in the Table A.5.2.11.1-2 will replace the values of the corresponding parameters in A.5.2.1.1-2.

Table A.5.2.11.1-1: General test parameters for E-UTRAN FDD to UTRAN FDD handover test case for 5MHz bandwidth

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters |  | DL Reference Measurement Channel R.5 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters |  | DL Reference Measurement Channel R.11 FDD | As specified in clause A.3.1.2.1 |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 5 |  |
| Note 1: See Table A.5.2.1.1-1 for other general test parameters.  Note 2: This test is according to the principle defined in section A.3.7.2. | | | |

Table A.5.2.11.1-2: Cell specific test parameters for E-UTRAN FDD to UTRAN FDD handover test case (cell 1)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 (E-UTRA) | | | | | | |
| T1 | T2 | | | T3 | | |
| BWchannel | MHz | 5 | | | | | | |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and in A.3.2.1.16 (OP.16 FDD) |  | OP.15 FDD | | OP.15 FDD | | | OP.16  FDD | |
| Io Note 2 | dBm/4.5 MHz | -70.22 | | | -70.22 | | | -70.22 |
| 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: See Table A.5.2.1.1-2 for other cell specific test parameters. | | | | | | | | |

#### A.5.2.11.2 Test Requirements

The test requirements defined in section A.5.2.1.2 shall apply to this test case.

#### A.5.3 E-UTRAN Handover to Non-3GPP RATs

#### A.5.3.1 E-UTRAN FDD – HRPD Handover

#### A.5.3.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to HRPD handover requirements specified in clause 5.4.1.

The test parameters are given in Tables A.5.3.1.1-1, A.5.3.1.1-2 and A.5.3.1.1-3. 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 does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

Table A.5.3.1.1-1: General test parameters for E-UTRAN FDD to HRPD handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 | E-UTRAN FDD cell |
| Neighbouring cell |  | Cell 2 | HRPD cell |
| Final condition | Active cell |  | Cell 2 | HRPD cell |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| Gap Pattern Id | |  | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| E-UTRAN FDD measurement quantity | |  | RSRP |  |
| Inter-RAT (HRPD) measurement quantity | |  | CDMA2000 HRPD Pilot Strength |  |
| b2-Threshold1 | | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2-CDMA2000 | | dB | -7 | Absolute ‘CDMA2000 HRPD Pilot Strength’ threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | |  | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| HRPD RF Channel Number | |  | 1 | One HRPD carrier frequency is used. |
| HRPD neighbour cell list size | |  | 8 | HRPD cells on HRPD RF channel 1 provided in the cell list before T2. |
| cdma2000-SearchWindowSize | |  | 8 (60 PN chips) | Search window size as defined in clause 6.3.5 in TS 36.331 |
| T1 | | s | 5 |  |
| T2 | | s | ≤10 |  |
| T3 | | s | 1 |  |

Table A.5.3.1.1-2: Cell specific test parameters for E-UTRAN FDD cell#1 for handover to HRPD cell # 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 (E-UTRA) | | | |
| T1 | T2 | T3 | |
| E-UTRA RF Channel number |  | 1 | | | |
| BWchannel | MHz | 10 | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | | | OP.2 FDD |
| PBCH\_RA | dB | 0 | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Note 2 | dBm/15 kHz | -98 | | | |
| RSRP Note 3 | dBm/15 KHz | -98 | -98 | -98 | |
|  | dB | 0 | 0 | 0 | |
|  | dB | 0 | 0 | 0 | |
| Propagation Condition |  | AWGN | | | |
| 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. | | | | | |

Table A.5.3.1.1-3: Cell specific test parameters for HRPD (cell # 2) for handover from E-UTRAN FDD cell (cell #1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (HRPD) | | |
|  |  | T1 | T2 | T3 |
| (38.4 kbps) | dB | 21 | | |
| (76.8 kbps) | dB | 18 | | |
|  | dB | -infinity | 0 | 0 |
|  | dBm/1.2288 MHz | -55 | | |
| CDMA2000 HRPD Pilot Strength | dB | -infinity | -3 | -3 |
| Propagation Condition |  | AWGN | | |

#### A.5.3.1.2 Test Requirements

The UE shall start transmission of the reverse control channel in HRPD to Cell 2 less than 127 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 = 50 ms, which is specified in clause 5.4.1.1.1.

Tinterrupt = 76.66 ms in the test; Tinterrupt is defined in clause 5.4.1.1.2.

This gives a total of 126.66 ms, allow 127 ms in the test.

#### A.5.3.2 E-UTRAN FDD – cdma2000 1X Handover

#### A.5.3.2.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to cdma2000 1X handover requirements specified in clause 5.4.2.

The test parameters are given in Tables A.5.3.2.1-1, A.5.3.2.1-2 and A.5.3.2.1-3. 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 does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

Table A.5.3.2.1-1: General test parameters for E-UTRAN FDD to cdma2000 1X handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 | E-UTRAN FDD cell |
| Neighbouring cell |  | Cell 2 | cdma2000 1X cell |
| Final condition | Active cell |  | Cell 2 | cdma2000 1X cell |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| Gap Pattern Id | |  | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| E-UTRAN FDD measurement quantity | |  | RSRP |  |
| Inter-RAT (cdma2000 1X) measurement quantity | |  | CDMA2000 1xRTT Pilot Strength |  |
| b2-Threshold1 | | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2-CDMA2000 | | dB | -14 | Absolute ‘CDMA2000 1xRTT Pilot Strength’ threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | |  | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| cdma2000 1X RF Channel Number | |  | 1 | One HRPD carrier frequency is used. |
| cdma2000 1X neighbour cell list size | |  | 8 | cdma2000 1X cells on cdma2000 1X RF channel 1 provided in the cell list before T2. |
| cdma2000-SearchWindowSize | |  | 8 (60 PN chips) | Search window size as defined in clause 6.3.5 in TS 36.331 |
| T1 | | s | 5 |  |
| T2 | | s | ≤10 |  |
| T3 | | s | 1 |  |

Table A.5.3.2.1-2: Cell specific test parameters for E-UTRAN FDD cell#1 for handover to cdma2000 1X cell # 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 (E-UTRA) | | | |
| T1 | T2 | T3 | |
| E-UTRA RF Channel number |  | 1 | | | |
| BWchannel | MHz | 10 | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | | | OP.2 FDD |
| PBCH\_RA | dB | 0 | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Note 2 | dBm/15 kHz | -98 | | | |
| RSRP Note 3 | dBm/15 KHz | -98 | -98 | -98 | |
|  | dB | 0 | 0 | 0 | |
|  | dB | 0 | 0 | 0 | |
| Propagation Condition |  | AWGN | | | |
| 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. | | | | | |

Table A.5.3.2.1-3: Cell specific test parameters for cdma2000 1X (cell # 2) for handover from E-UTRAN FDD cell (cell #1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (cdma2000 1X) | | |
|  |  | T1 | T2 | T3 |
|  | dB | -7 | | |
|  | dB | -16 | | |
| (4.8 kbps) | dB | -12 | | |
|  | dB | -infinity | 0 | 0 |
|  | dBm/1.2288 MHz | -55 | | |
| CDMA2000 1xRTT Pilot Strength | dB | -infinity | -10 | -10 |
| Propagation Condition |  | AWGN | | |

#### A.5.3.2.2 Test Requirements

The UE shall start transmission of the reverse control channel in cdma2000 1X to Cell 2 less than 300 ms from the beginning of time period T3.

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

RRC procedure delay = 130 ms, which is specified in clause 5.4.2.1.1.

Tinterrupt = 170 ms in the test; Tinterrupt is defined in clause 5.4.2.1.2.

This gives a total of 300 ms.

### A.5.3.3 E-UTRAN FDD – HRPD Handover; Unknown Target Cell

#### A.5.3.3.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to HRPD handover requirements for the case when the target HRPD cell is unknown as specified in clause 5.4.1.

The test parameters are given in Tables A.5.3.3.1-1, A.5.3.3.1-2 and A.5.3.3.1-3. 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 does not have any timing information of cell 2. During time period T1, message containing Information Element *systemTimeInfo* as defined in clause 6.3.1 of TS 36.331 [2] shall be sent by the System Simulator (SS). No gap patterns are configured in the test case. No HRPD neighbour cell list shall be provided to the UE.

A RRC message implying handover to the unknown HRPD cell shall be sent to the UE towards the end of the time period T1. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

Table A.5.3.3.1-1: General test parameters for E-UTRAN FDD to HRPD handover test case; unknown target HRPD cell

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 | E-UTRAN FDD cell |
| Neighbouring cell |  | Cell 2 | HRPD cell |
| Final condition | Active cell |  | Cell 2 | HRPD cell |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | |  | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| HRPD RF Channel Number | |  | 1 | One HRPD carrier frequency is used. |
| cdma2000-SearchWindowSize | |  | 8 (60 PN chips) | Search window size as defined in clause 6.3.5 in TS 36.331 |
| T1 | | s | ≤5 |  |
| T2 | | s | 1 |  |

Table A.5.3.3.1-2: Cell specific test parameters for E-UTRAN FDD cell#1 for handover to unknown HRPD cell # 2

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 (E-UTRAN FDD) | |
| T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) |  | OP.1 FDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RA Note 1 | dB |
| OCNG\_RB Note 1 | dB |
| Note 2 | dBm/15 kHz | -98 | |
| RSRP Note 3 | dBm/15 kHz | -98 | -98 |
|  | dB | 0 | 0 |
|  | dB | 0 | 0 |
| Propagation Condition |  | AWGN | |
| 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. | | | |

Table A.5.3.3.1-3: Cell specific test parameters for unknown HRPD (cell # 2) for handover from E-UTRAN FDD cell (cell #1)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (HRPD) | |
|  |  | T1 | T2 |
| (38.4 kbps) | dB | 21 | |
| (76.8 kbps) | dB | 18 | |
|  | dB | -infinity | 0 |
|  | dBm/1.2288 MHz | -55 | |
| CDMA2000 HRPD Pilot Strength | dB | -infinity | -3 |
| Propagation Condition |  | AWGN | |

#### A.5.3.3.2 Test Requirements

The UE shall start transmission of the reverse control channel in HRPD to Cell 2 less than 127 ms from the beginning of time period T2.

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

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

Tinterrupt also includes time to detect HRPD cell; see clause 5.4.1.1.2

This gives a total of 126.66 ms, allow 127 ms in the test case.

### A.5.3.4 E-UTRAN FDD – cdma2000 1X Handover; Unknown Target cell

#### A.5.3.4.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to cdma2000 1X handover requirements for the case when the target cdma2000 1X cell is unknown as specified in clause 5.4.2.

The test parameters are given in Tables A.5.3.4.1-1, A.5.3.4.1-2 and A.5.3.4.1-3. 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 does not have any timing information of cell 2. During time period T1, message containing Information Element *systemTimeInfo* as defined in clause 6.3.1 of TS 36.331 [2] shall be sent by the System Simulator (SS). No gap patterns are configured in the test case. No cdma2000 1X neighbour cell list shall be provided to the UE.

A RRC message implying handover to the unknown cdma2000 1X cell shall be sent to the UE towards the end of the time period T1. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

Table A.5.3.2.1-1: General test parameters for E-UTRAN FDD to cdma2000 1X handover test case; unknown target cdma2000 1X cell

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 | E-UTRAN FDD cell |
| Neighbouring cell |  | Cell 2 | cdma2000 1X cell |
| Final condition | Active cell |  | Cell 2 | cdma2000 1X cell |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | |  | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| cdma2000 1X RF Channel Number | |  | 1 | One HRPD carrier frequency is used. |
| cdma2000-SearchWindowSize | |  | 8 (60 PN chips) | Search window size as defined in clause 6.3.5 in TS 36.331 |
| T1 | | s | ≤5 |  |
| T2 | | s | 1 |  |

Table A.5.3.2.1-2: Cell specific test parameters for E-UTRAN FDD cell#1 for handover to unknown cdma2000 1X cell # 2

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 (E-UTRAN FDD) | |
| T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) |  | OP.1 FDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RA Note 1 | dB |
| OCNG\_RB Note 1 | dB |
| Note 2 | dBm/15 kHz | -98 | |
| RSRP Note 3 | dBm/15 kHz | -98 | -98 |
|  | dB | 0 | 0 |
|  | dB | 0 | 0 |
| Propagation Condition |  | AWGN | |
| 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. | | | |

Table A.5.3.2.1-3: Cell specific test parameters for unknown cdma2000 1X (cell # 2) for handover from E-UTRAN FDD cell (cell #1)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (cdma2000 1X) | |
|  |  | T1 | T1 |
|  | dB | -7 | |
|  | dB | -16 | |
| (4.8 kbps) | dB | -12 | |
|  | dB | -infinity | 0 |
|  | dBm/1.2288 MHz | -55 | |
| CDMA2000 1xRTT Pilot Strength | dB | -infinity | -10 |
| Propagation Condition |  | AWGN | |

#### A.5.3.4.2 Test Requirements

The UE shall start transmission of the reverse control channel in cdma2000 1X to Cell 2 less than 300 ms from the beginning of time period T2.

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

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

Tinterrupt also includes time to detect cdma2000 1X cell; see clause 5.4.2.1.2

This gives a total of 300 ms.

### A.5.3.5 E-UTRAN TDD – HRPD Handover

#### A.5.3.5.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN TDD to HRPD handover requirements specified in clause 5.4.1.

The test parameters are given in Tables A.5.3.5.1-1, A.5.3.5.1-2 and A.5.3.5.1-3. 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 does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

Table A.5.3.5.1-1: General test parameters for E-UTRAN TDD to HRPD handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 | E-UTRAN TDD cell |
| Neighbouring cell |  | Cell 2 | HRPD cell |
| Final condition | Active cell |  | Cell 2 | HRPD cell |
| Channel Bandwidth (BW**channel**) | | MHz | 10 |  |
| Gap Pattern Id | |  | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| E-UTRAN TDD measurement quantity | |  | RSRP |  |
| Inter-RAT (HRPD) measurement quantity | |  | CDMA2000 HRPD Pilot Strength |  |
| b2-Threshold1 | | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2-CDMA2000 | | dB | -7 | Absolute ‘CDMA2000 HRPD Pilot Strength’ threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | |  | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| Uplink-downlink configuration of cell 1 | |  | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | |  | 6 | As specified in table 4.2.1 in TS 36.211 |
| HRPD RF Channel Number | |  | 1 | One HRPD carrier frequency is used. |
| HRPD neighbour cell list size | |  | 8 | HRPD cells on HRPD RF channel 1 provided in the cell list before T2. |
| cdma2000-SearchWindowSize | |  | 8 (60 PN chips) | Search window size as defined in clause 6.3.5 in TS 36.331 |
| T1 | | s | 5 |  |
| T2 | | s | ≤10 |  |
| T3 | | s | 1 |  |

Table A.5.3.5.1-2: Cell specific test parameters for E-UTRAN TDD cell#1 for handover to HRPD cell # 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 (E-UTRA) | | | |
| T1 | T2 | T3 | |
| E-UTRA RF Channel number |  | 1 | | | |
| BW**channel** | MHz | 10 | | | |
| OCNG Patterns defined in TS36.133 A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | | | OP.2 TDD |
| PBCH\_RA | dB | 0 | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Note 2 | dBm/15 kHz | -98 | | | |
| RSRP Note 3 | dBm/15 KHz | -98 | -98 | -98 | |
|  | dB | 0 | 0 | 0 | |
|  | dB | 0 | 0 | 0 | |
| Propagation Condition |  | AWGN | | | |
| 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. | | | | | |

Table A.5.3.5.1-3: Cell specific test parameters for HRPD (cell # 2) for handover from E-UTRAN TDD cell (cell #1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | | Cell 2 (HRPD) | | |
|  |  | | T1 | T2 | T3 |
| (38.4 kbps) | dB | 21 | | | |
| (76.8 kbps) | dB | 18 | | | |
|  | dB | -infinity | | 0 | 0 |
|  | dBm/1.2288 MHz | -55 | | | |
| CDMA2000 HRPD Pilot Strength | dB | -infinity | | -3 | -3 |
| Propagation Condition |  | AWGN | | | |

#### A.5.3.5.2 Test Requirements

The UE shall start transmission of the reverse control channel in HRPD to Cell 2 less than 127 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 = 50 ms, which is specified in clause 5.4.1.1.1.

Tinterrupt = 76.66 ms in the test; Tinterrupt is defined in clause 5.4.1.1.2.

This gives a total of 126.66 ms, allow 127 ms in the test.

### A.5.3.6 E-UTRAN TDD – cdma2000 1X Handover

#### A.5.3.6.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN TDD to cdma2000 1X handover requirements specified in clause 5.4.2.

The test parameters are given in Tables A.5.3.6.1-1, A.5.3.6.1-2 and A.5.3.6.1-3. 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 does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

Table A.5.3.6.1-1: General test parameters for E-UTRAN TDD to cdma2000 1X handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 | E-UTRAN TDD cell |
| Neighbouring cell |  | Cell 2 | cdma2000 1X cell |
| Final condition | Active cell |  | Cell 2 | cdma2000 1X cell |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| Gap Pattern Id | |  | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| E-UTRAN TDD measurement quantity | |  | RSRP |  |
| Inter-RAT (cdma2000 1X) measurement quantity | |  | CDMA2000 1xRTT Pilot Strength |  |
| b2-Threshold1 | | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2-CDMA2000 | | dB | -14 | Absolute ‘CDMA2000 1xRTT Pilot Strength’ threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | S | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | |  | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| cdma2000 1X RF Channel Number | |  | 1 | One cdma2000 1X carrier frequency is used. |
| cdma2000 1X neighbour cell list size | |  | 8 | cdma2000 1X cells on cdma2000 1X RF channel 1 provided in the cell list before T2. |
| cdma2000-SearchWindowSize | |  | 8 (60 PN chips) | Search window size as defined in clause 6.3.5 in TS 36.331 |
| T1 | | S | 5 |  |
| T2 | | S | ≤10 |  |
| T3 | | S | 1 |  |

Table A.5.3.6.1-2: Cell specific test parameters for E-UTRAN TDD cell#1 for handover to cdma2000 1X cell # 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 (E-UTRA) | | | |
| T1 | T2 | T3 | |
| E-UTRA RF Channel number |  | 1 | | | |
| BWchannel | MHz | 10 | | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | | | OP.2 TDD |
| PBCH\_RA | dB | 0 | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Note 2 | dBm/15 kHz | -98 | | | |
| RSRP Note 3 | dBm/15 KHz | -98 | -98 | -98 | |
|  | dB | 0 | 0 | 0 | |
|  | dB | 0 | 0 | 0 | |
| Propagation Condition |  | AWGN | | | |
| 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. | | | | | |

Table A.5.3.6.1-3: Cell specific test parameters for cdma2000 1X (cell # 2) for handover from E-UTRAN TDD cell (cell #1)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | | Cell 2 (cdma2000 1X) | | | | | |
|  | |  | | T1 | | T2 | | | T3 |
|  | | dB | | -7 | | | | |
|  | | dB | | -16 | | | | |
| (4.8 kbps) | | dB | | -12 | | | | |
|  | | dB | | -infinity | | 0 | | 0 |
|  | | dBm/1.2288 MHz | | -55 | | | | |
| CDMA2000 1xRTT Pilot Strength | | dB | | -infinity | | -10 | | -10 |
| Propagation Condition | |  | | AWGN | | | | |

#### A.5.3.6.2 Test Requirements

The UE shall start transmission of the reverse control channel in cdma2000 1X to Cell 2 less than 300 ms from the beginning of time period T3.

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

RRC procedure delay = 130 ms, which is specified in clause 5.4.2.1.1.

Tinterrupt = 170 ms in the test; Tinterrupt is defined in clause 5.4.2.1.2.

This gives a total of 300 ms.

# A.6 RRC Connection Control

## A.6.1 RRC Re-establishment

### A.6.1.1 E-UTRAN FDD Intra-frequency RRC Re-establishment

#### A.6.1.1.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.1.2.

The test parameters are given in table A.6.1.1.1-1 and table A.6.1.1.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.1.1.1-1: General test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | ms | 3 | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | ms | 200 |  |
| T3 | | s | 3 |  |

Table A.6.1.1.1-2: Cell specific test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | T2 | | | T3 | | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | | OP.2 FDD | | | OP.1 FDD | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 1.54 | -Infinity | -Infinity | -3.79 | | | 4 | | | 4 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 7 | -Infinity | -Infinity | 4 | | | 4 | | | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | | | -94 | | | -94 |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.6.1.1.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI + TPRACH

Nfreq = 1

Tsearch = 100 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1445 ms, allow 1.5 s in the test case.

### A.6.1.2 E-UTRAN FDD Inter-frequency RRC Re-establishment

#### A.6.1.2.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.1.2.

The test parameters are given in table A.6.1.1.2-1 and table A.6.1.1.2-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of radio link failure. At the start of time period T3, cell 2, which is the neighbour cell, is activated.

Table A.6.1.2.1-1: General test parameters for E-UTRAN FDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number (cell 1) | |  | 1 |  |
| E-UTRA RF Channel Number (cell 2) | |  | 2 |  |
| E-UTRA FDD inter-frequency carrier list size | |  | 1 | 2 E-UTRA FDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 5000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | ms | 3 | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | ms | 200 |  |
| T3 | | s | 5 |  |

Table A.6.1.2.1-2: Cell specific test parameters for E-UTRAN FDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | T2 | | | T3 | | |
| E-UTRA RF Channel Number |  | 1 | | | 2 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | | OP.2 FDD | | | OP.1 FDD | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | -Infinity | -Infinity | -Infinity | | | -Infinity | | | 7 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 4 | -Infinity | -Infinity | - Infinity | | | - Infinity | | | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -Infinity | -Infinity | - Infinity | | | -Infinity | | | -91 |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.6.1.2.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown E-UTRA FDD inter frequency cell shall be less than 3 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI + TPRACH

Nfreq = 2

Tsearch = 800 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 2945 ms, allow 3 s in the test case.

### A.6.1.3 E-UTRAN TDD Intra-frequency RRC Re-establishment

#### A.6.1.3.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA TDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.1.2.

The test parameters are given in table A.6.1.3.1-1 and table A.6.1.3.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.1.3.1-1: General test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | μs | 3 | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | ms | 200 |  |
| T3 | | s | 3 |  |

Table A.6.1.3.1-2: Cell specific test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | T2 | | | T3 | | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | | OP.2 TDD | | | OP.1 TDD | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 1.54 | -Infinity | -Infinity | -3.79 | | | 4 | | | 4 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 7 | -Infinity | -Infinity | 4 | | | 4 | | | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | | | -94 | | | -94 |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.6.1.3.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA TDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI + TPRACH

Nfreq = 1

Tsearch = 100 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN TDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1445 ms, allow 1.5 s in the test case.

### A.6.1.4 E-UTRAN TDD Inter-frequency RRC Re-establishment

#### A.6.1.4.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA TDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.1.2.

The test parameters are given in table A.6.1.4.1-1 and table A.6.1.4.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of radio link failure. At the start of time period T3, cell 2, which is the neighbour cell, is activated.

Table A.6.1.4.1-1: General test parameters for E-UTRAN TDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number (cell 1) | |  | 1 |  |
| E-UTRA RF Channel Number (cell 2) | |  | 2 |  |
| E-UTRA TDD inter-frequency carrier list size | |  | 1 | 2 E-UTRA TDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 5000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | μs | 3 | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | ms | 200 |  |
| T3 | | s | 5 |  |

Table A.6.1.4.1-2: Cell specific test parameters for E-UTRAN TDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | T2 | | | T3 | | |
| E-UTRA RF Channel Number |  | 1 | | | 2 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | | OP.2 TDD | | | OP.1 TDD | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | -Infinity | -Infinity | -Infinity | | | -Infinity | | | 7 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 4 | -Infinity | -Infinity | - Infinity | | | - Infinity | | | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -Infinity | -Infinity | - Infinity | | | -Infinity | | | -91 |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.6.1.4.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown E-UTRA TDD inter frequency cell shall be less than 3 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI + TPRACH

Nfreq = 2

Tsearch = 800 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN TDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 2945 ms, allow 3 s in the test case.

### A.6.1.5 E-UTRAN FDD Intra-frequency RRC Re-establishment for 5MHz bandwidth

#### A.6.1.5.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.6.1.1.1.

The parameters of this test are the same as defined in Subclause A.6.1.1.1 except that the values of the parameters in the Table A.6.1.5.1-1 will replace the values of the corresponding parameters in A.6.1.1.1-1, and the values of the parameters in the Table A.6.1.5.1-2 will replace the values of the corresponding parameters in A.6.1.1.1-2.

Table A.6.1.5.1-1: General test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case for 5MHz bandwidth

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters |  | DL Reference Measurement Channel R.5 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters |  | DL Reference Measurement Channel R.11 FDD | As specified in clause A.3.1.2.1 |
| Channel Bandwidth (BWchannel) | MHz | 5 |  |
| Note 1: See Table A.6.1.1.1-1 for the other parameters.  Note 2: This test is according to the principle defined in section A.3.7.2. | | | |

Table A.6.1.5.1-2: Cell specific test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case for 5MHz bandwidth

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | |
| T1 | T2 | T3 | T1 | T2 | | T3 | |
| BWchannel | MHz | 5 | | | 5 | | | | |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and A.3.2.1.16 (OP.16 FDD) |  | OP.15 FDD | OP.15 FDD | OP.16 FDD | OP.16 FDD | | OP.16 FDD | | OP.15 FDD |
| 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: See Table A.6.1.5.1-2 for the other parameters. | | | | | | | | | |

#### A.6.1.5.2 Test Requirements

The test requirements defined in section A.6.1.1.2 shall apply to this test case.

### A.6.1.6 E-UTRAN FD-FDD Intra-frequency RRC Re-establishment for UE category 0

#### A.6.1.6.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.1.2.

The test parameters are given in table A.6.1.6.1-1 and table A.6.1.6.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.1.6.1-1: General test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.13 FDD | As specified in clause A.3.1.1.3 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | ms | 3 | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | ms | 200 |  |
| T3 | | s | 3 |  |

Table A.6.1.6.1-2: Cell specific test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | T2 | | | T3 | | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | | OP.2 FDD | | | OP.1 FDD | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 1.54 | -Infinity | -Infinity | -3.79 | | | 4 | | | 4 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 7 | -Infinity | -Infinity | 4 | | | 4 | | | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | | | -94 | | | -94 |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.6.1.6.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI + TPRACH

Nfreq = 1

Tsearch = 100 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1445 ms, allow 1.5 s in the test case.

### A.6.1.7 E-UTRAN HD-FDD Intra-frequency RRC Re-establishment for UE category 0

#### A.6.1.7.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.1.2.

The test parameters are given in table A.6.1.7.1-1 and table A.6.1.7.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.1.7.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.1 HD-FDD | As specified in clause A.3.1.1.4 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.3 HD-FDD | As specified in clause A.3.1.2.3 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | ms | 3 | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | ms | 200 |  |
| T3 | | s | 3 |  |

Table A.6.1.7.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | T2 | | | T3 | | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | | OP.2 FDD | | | OP.1 FDD | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 1.54 | -Infinity | -Infinity | -3.79 | | | 4 | | | 4 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 7 | -Infinity | -Infinity | 4 | | | 4 | | | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | | | -94 | | | -94 |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.6.1.7.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI + TPRACH

Nfreq = 1

Tsearch = 100 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1445 ms, allow 1.5 s in the test case.

### A.6.1.8 E-UTRAN TDD Intra-frequency RRC Re-establishment for UE category 0

#### A.6.1.8.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA TDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.1.2.

The test parameters are given in table A.6.1.8.1-1 and table A.6.1.8.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.1.8.1-1: General test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| PDSCH parameters | |  | DL Reference Measurement Channel R.12 TDD | As specified in clause A.3.1.1.5 |
| PCFICH/PDCCH/PHICH parameters | |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | μs | 3 | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | ms | 200 |  |
| T3 | | s | 3 |  |

Table A.6.1.8.1-2: Cell specific test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | T2 | | | T3 | | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | | OP.2 TDD | | | OP.1 TDD | |
| PBCH\_RA | dB | 0 | | | 0 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 1.54 | -Infinity | -Infinity | -3.79 | | | 4 | | | 4 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 7 | -Infinity | -Infinity | 4 | | | 4 | | | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | | | -94 | | | -94 |
| Propagation Condition |  | AWGN | | | | | | | | | |
| 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.6.1.8.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA TDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI + TPRACH

Nfreq = 1

Tsearch = 100 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN TDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1445 ms, allow 1.5 s in the test case.

### A.6.1.9 E-UTRAN FD-FDD Intra-frequency RRC Re-establishment for Cat-M1 UE in CEModeA

#### A.6.1.9.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.9.1-1 and table A.6.1.9.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.1.9.1-1: General test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| PRACH Configuration | |  | PRACH\_2CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | ms | 3 | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | ms | 400 |  |
| T3 | | s | 3 |  |

Table A.6.1.9.1-2: Cell specific test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | T2 | | | T3 | | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.1 |  | R.21 FDD | R.21 FDD | - | - | | - | | | R.21 FDD | |
| MPDCCH Reference Channel in clause A.3.1.3.1 |  | R.17 FDD | | | R.17 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 |
|  | dB | 1.54 | -Infinity | -Infinity | -3.79 | | | 4 | | | 4 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 7 | -Infinity | -Infinity | 4 | | | 4 | | | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | | | -94 | | | -94 |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.6.1.9.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI-EUTRA-M1-CEModeA + TPRACH

Nfreq = 1

Tsearch = 0 ms

TSI-EUTRA-M1-CEModeA = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1345 ms, allow 1.5 s in the test case.

### A.6.1.10 E-UTRAN HD-FDD Intra-frequency RRC Re-establishment for Cat-M1 UE in CEModeA

#### A.6.1.10.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.10.1-1 and table A.6.1.10.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.1.10.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| PRACH Configuration | |  | PRACH\_2CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | ms | 3 | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | ms | 400 |  |
| T3 | | s | 3 |  |

Table A.6.1.10.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | T2 | | | T3 | | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.2 |  | R.11 HD-FDD | R.11 HD-FDD | - | - | | - | | | R.11 HD-FDD | |
| MPDCCH Reference Channel in clause A.3.1.3.2 |  | R.7 HD-FDD | | | R.7 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 |
|  | dB | 1.54 | -Infinity | -Infinity | -3.79 | | | 4 | | | 4 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 7 | -Infinity | -Infinity | 4 | | | 4 | | | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | | | -94 | | | -94 |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.6.1.10.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI-EUTRA-M1-CEModeA + TPRACH

Nfreq = 1

Tsearch = 0 ms

TSI-EUTRA-M1-CEModeA = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1345 ms, allow 1.5 s in the test case.

### A.6.1.11 E-UTRAN TDD Intra-frequency RRC Re-establishment for Cat-M1 UE in CEModeA

#### A.6.1.11.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA TDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.11.1-1 and table A.6.1.11.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.1.11.1-1: General test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| PRACH Configuration | |  | PRACH\_2CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | μs | 3 | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | ms | 400 |  |
| T3 | | s | 3 |  |

Table A.6.1.11.1-2: Cell specific test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | T2 | | | T3 | | |
| E-UTRA RF Channel Number |  | 1 | | | 1 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.3 |  | R.17 TDD | R.17 TDD | - | - | | - | | | R.17 TDD | |
| MPDCCH Reference Channel in clause A.3.1.3.3 |  | R.15 TDD | | | R.15 TDD | | | | | | |
| OCNG Patterns in cluse A.3.2.2 |  | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | | OP.2 TDD | | | OP.11 TDD | |
| 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 |
|  | dB | 1.54 | -Infinity | -Infinity | -3.79 | | | 4 | | | 4 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 7 | -Infinity | -Infinity | 4 | | | 4 | | | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | | | -94 | | | -94 |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.6.1.11.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA TDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI-EUTRA-M1-CEModeA + TPRACH

Nfreq = 1

Tsearch = 0 ms

TSI-EUTRA-M1-CEModeA = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN TDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1345 ms, allow 1.5 s in the test case.

### A.6.1.12 E-UTRAN FD-FDD Intra-frequency RRC Re-establishment for Cat-M1 UE in CEModeB

#### A.6.1.12.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.12.1-1 and table A.6.1.12.1-2 below. The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively. During T1, both cell 1 and cell 2 are in CEModeB. At the start of time period T3, cell 1, which is the active cell, is deactivated. The time period T4 starts after the occurrence of the radio link failure.

Table A.6.1.12.1-1: General test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| PRACH Configuration | |  | PRACH\_3CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | ms | 3 | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | 5 |  |
| T3 | | ms | 4000 |  |
| T4 | | s | 9 |  |

Table A.6.1.12.1-2: Cell specific test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number |  | 1 | | | | 1 | | | |
| BWchannel | MHz | 10 | | | | 10 | | | |
| PDSCH Reference Channel in clause A.3.1.4.4 |  | R.23 FDD | R.23 FDD | R.23 FDD | - | - | - | - | R.23 FDD |
| MPDCCH Reference Channel in clause A.3.1.3.4 |  | R.19 FDD | | | | R.19 FDD | | | |
| OCNG Patterns in clause A.3.2.1 |  | OP.21 FDD | OP.21 FDD | OP.21 FDD | OP.6 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 |
|  | dB | 1.54 | -15.27 | -Infinity | -Infinity | -3.79 | -12.14 | -12 | -12 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | |
|  | dB | 7 | -15 | -Infinity | -Infinity | 4 | -12 | -12 | -12 |
| RSRP Note 3 | dBm/15 KHz | -91 | -113 | -Infinity | -Infinity | -94 | -110 | -110 | -110 |
| Propagation Condition |  | AWGN | | | | AWGN | | | |
| Antenna Configuration |  | 2x1 | | | | 2x1 | | | |
| 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | |

#### A.6.1.12.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T4, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD intra frequency cell shall be less than 7 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI-EUTRA-M1-CEModeB + TPRACH

Nfreq = 1

Tsearch = 0 ms

TSI-EUTRA-M1-CEModeB = 6400 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 6485 ms, allow 7 s in the test case.

### A.6.1.13 E-UTRAN HD-FDD Intra-frequency RRC Re-establishment for Cat-M1 UE in CEModeB

#### A.6.1.13.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.13.1-1 and table A.6.1.13.1-2 below. The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively. During T1, both cell 1 and cell 2 are in CEModeB. At the start of time period T3, cell 1, which is the active cell, is deactivated. The time period T4 starts after the occurrence of the radio link failure.

Table A.6.1.13.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| PRACH Configuration | |  | PRACH\_3CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | ms | 3 | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | 5 |  |
| T3 | | ms | 4000 |  |
| T4 | | s | 9 |  |

Table A.6.1.13.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | |
| T1 | T2 | T3 | T4 | T1 | | T2 | T3 | T4 |
| E-UTRA RF Channel Number |  | 1 | | | | 1 | | | | |
| BWchannel | MHz | 10 | | | | 10 | | | | |
| PDSCH Reference Channel in clause A.3.1.4.5 |  | R.13 HD-FDD | R.13 HD-FDD | R.13 HD-FDD | - | - | | - | - | R.13 HD-FDD |
| MPDCCH Reference Channel in clause A.3.1.3.5 |  | R.9 HD-FDD | | | | R.9 HD-FDD | | | | |
| OCNG Patterns in clause A.3.2. |  | OP.21 FDD | OP.21 FDD | OP.21 FDD | OP.6 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 |
|  | dB | 1.54 | -15.27 | -Infinity | -Infinity | -3.79 | | -12.14 | -12 | -12 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | |
|  | dB | 7 | -15 | -Infinity | -Infinity | | 4 | -12 | -12 | -12 |
| RSRP Note 3 | dBm/15 KHz | -91 | -113 | -Infinity | -Infinity | | -94 | -110 | -110 | -110 |
| Propagation Condition |  | AWGN | | | | | AWGN | | | |
| Antenna Configuration |  | 2x1 | | | | | 2x1 | | | |
| 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | |

#### A.6.1.13.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T4, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD intra frequency cell shall be less than 7 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI-EUTRA-M1-CEModeB + TPRACH

Nfreq = 1

Tsearch = 0 ms

TSI-EUTRA-M1-CEModeB = 6400 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 6465 ms, allow 7 s in the test case.

### A.6.1.14 E-UTRAN TDD Intra-frequency RRC Re-establishment for Cat-M1 UE in CEModeB

#### A.6.1.14.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA TDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.14.1-1 and table A.6.1.14.1-2 below. The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively. During T1, both cell 1 and cell 2 are in CEModeB. At the start of time period T3, cell 1, which is the active cell, is deactivated. The time period T4 starts after the occurrence of the radio link failure.

Table A.6.1.14.1-1: General test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number | |  | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| PRACH Configuration | |  | PRACH\_3CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | μs | 3 | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | 5 |  |
| T3 | | ms | 4000 |  |
| T4 | | s | 9 |  |

Table A.6.1.14.1-2: Cell specific test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number |  | 1 | | | | 1 | | | |
| BWchannel | MHz | 10 | | | | 10 | | | |
| PDSCH Reference Channel in clause A.3.1.4.6 |  | R.19 TDD | R.19 TDD | R.19 TDD | - | - | - | - | R.19 TDD |
| MPDCCH Reference Channel in clause A.3.1.3.6 |  | R.17 TDD | | | | R.17 TDD | | | |
| OCNG Patterns in clause A.3.2.2 |  | OP.11 TDD | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.2TDD | OP.11 TDD |
| PBCH\_RA | dB | 0 | | | | 0 | | | |
| 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 |
|  | dB | 1.54 | -15.27 | -Infinity | -Infinity | -3.79 | -12.14 | -12 | -12 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | |
|  | dB | 7 | -15 | -Infinity | -Infinity | 4 | -12 | -12 | -12 |
| RSRP Note 3 | dBm/15 KHz | -91 | -113 | -Infinity | -Infinity | -94 | -110 | -110 | -110 |
| Propagation Condition |  | AWGN | | | | AWGN | | | |
| Antenna Configuration |  | 2x1 | | | | 2x1 | | | |
| 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | |

#### A.6.1.14.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA TDD intra frequency cell shall be less than 7 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI-EUTRA-M1-CEModeB + TPRACH

Nfreq = 1

Tsearch = 0 ms

TSI-EUTRA-M1-CEModeB = 6400 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN TDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 6465 ms, allow 7s in the test case.

### A.6.1.15 HD-FDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage

#### A.6.1.15.1 Test Purpose and Environment

The purpose is to verify that the NB-IoT FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements for Cat-NB1 UE in clause 6.5.

The test parameters are given in table A.6.1.15.1-1 and table A.6.1.15.1-2 below. nCell1 and nCell2 are NB-IoT cells with different physical cell ID on the same frequency carrier. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.1.15.1-1: General test parameters for HD-FDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NB-IOT operational mode | |  | In-band |  |
| Initial condition | Active cell |  | nCell1 |  |
| Neighbour cells |  | eCell1, eCell2, nCell2 |  |
| Final condition | Active cell |  | nCell2 |  |
| E-UTRA RF Channel Number | |  | 1 | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| NPRACH Configuration | |  | NPRACH.R-1 | Refer to A.3.18 |
| NPDCCH repetition level | |  | 16 | NPDCCH Rmax |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | Ms | 0 | Radio link failure timer; T310 is disabled |
| T311-v13xy | | Ms | 60000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| T1 | | S | 5 |  |
| T2 | | Ms | 400 |  |
| T3 | | S | 60 |  |

Table A.6.1.15.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | nCell 1 | | | nCell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | kHz | 200 | | | 200 | | |
| PRB location within eCell | - | eCell1 BWchannel 5MHz: 17  eCell1 BWchannel 10MHz: 30 | | | eCell1 BWchannel 5MHz: 17  eCell1 BWchannel 10MHz: 30 | | |
| NPDSCH parameters |  | eCell1 BWchannel 5MHz: R.16 HD-FDD  eCell1 BWchannel 10MHz: R.14 HD-FDD | | | eCell1 BWchannel 5MHz: R.16 HD-FDD  eCell1 BWchannel 10MHz: R.14 HD-FDD | | |
| NPDCCH parameters |  | eCell1 BWchannel 5MHz: R.38 HD-FDD  eCell1 BWchannel 10MHz: R.26 HD-FDD | | | eCell1 BWchannel 5MHz: R.38 HD-FDD  eCell1 BWchannel 10MHz: R.26 HD-FDD | | |
| NPBCH\_RA | dB | 0 | | | 0 | | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote 1 | dB |
| NOCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | Specified in Table A.6.1.15.1-3 | | | | | |
|  | dB | 7 | -Infinity | -Infinity | -Infinity | -12.6 | -12.6 |
| Note2 | dB | 7 | -Infinity | -Infinity | -Infinity | -12.6 | -12.6 |
| NRSRP Note2 | dBm/15 kHz | -91 | -Infinity | -Infinity | -Infinity | -110.6 | -110.6 |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 1x1 | | | 1x1 | | |
| Timing offset to nCell 1 | ms | - | | | 3 | | |
| Note 1: NOCNG 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: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

Table A.6.1.15.1-3: eCell 1 and eCell2 specific test parameters for HD-FDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | MHz | 5 or 10 | | | 5 or 10 | | |
| NOCNG Patterns |  | BWchannel 5MHz: NOP.4 FDD  BWchannel 10MHz: NOP.1 FDD | | | BWchannel 5MHz: NOP.4 FDD  BWchannel 10MHz: NOP.1 FDD | | |
| PBCH\_RA | | dB | 0 | | | 0 | | |
| PBCH\_RB | | dB |
| PSS\_RA | | dB |
| SSS\_RA | | dB |
| PDCCH\_RA | | dB |
| PDCCH\_RB | | dB |
| PCFICH\_RB | | dB |
| OCNG\_RANote 1 | | dB |
| OCNG\_RBNote 1 | | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Note2 | dBm/15 kHz | -98 | | | -98 | | |
|  | dBm | -12.6 | -12.6 | -12.6 | -12.6 | -12.6 | -12.6 |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 1x1 | | | 1x1 | | |
| Timing offset to eCell 1 | ms | - | | | 3 | | |
| Note 1: OCNG shall be used such that the eCell is 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 .  Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

#### A.6.1.15.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send NPRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NB-IoT FDD intra frequency cell shall be less than 58 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE-re-establish\_delay\_NB-IoT.

Where:

- TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The NPRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

- TUE-re-establish\_delay\_NB-IoT = 100 ms + NNB-Iot-freq\*Tsearch\_NB-IoT + TSI\_NB-IoT + TPRACH\_NB-IoT

- NNB-Iot-freq = 1

- Tsearch\_NB-IoT = 14800 ms

- TSI\_NB-IoT = 41560 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target NB-IoT FDD cell.

- TPRACH\_NB-IoT = 1280 ms; it is the additional delay caused by the random access procedure.

### A.6.1.16 HD-FDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage

#### A.6.1.16.1 Test Purpose and Environment

The purpose is to verify that the NB-IoT FDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements for Cat-NB1 UE in clause 6.5.

The test parameters are given in table A.6.1.16.1-1 and table A.6.1.16.1-2 below. nCell1 and nCell2 are NB-IoT cells on different frequency carriers. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be indicated with the carrier frequency of nCell 2 to ensure that the UE has the context of the carrier frequency of nCell 2.

Table A.6.1.16.1-1: General test parameters for HD-FDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NB-IOT operational mode | |  | In-band |  |
| Initial condition | Active cell |  | nCell1 |  |
| Neighbour cells |  | eCell1, nCell2 |  |
| Final condition | Active cell |  | nCell2 |  |
| E-UTRA RF Channel Number | |  | 1 | One carrier frequency is used for eCell. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| NPRACH Configuration | |  | NPRACH.R-1 | Refer to A.3.18 |
| NPDCCH repetition level | |  | 16 | NPDCCH Rmax |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | Ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | Ms | 15000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| T1 | | S | 5 |  |
| T2 | | Ms | 400 |  |
| T3 | | S | 15 |  |

Table A.6.1.16.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | nCell 1 | | | nCell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | kHz | 200 | | | 200 | | |
| PRB location within eCell | - | eCell1 BWchannel 5MHz: 17  eCell1 BWchannel 10MHz: 30 | | | eCell1 BWchannel 5MHz: 22  eCell1 BWchannel 10MHz: 35 | | |
| NPDSCH parameters |  | eCell1 BWchannel 5MHz: R.16 HD-FDD  eCell1 BWchannel 10MHz: R.14 HD-FDD | | | eCell1 BWchannel 5MHz: R.16 HD-FDD  eCell1 BWchannel 10MHz: R.14 HD-FDD | | |
| NPDCCH parameters |  | eCell1 BWchannel 5MHz: R.38 HD-FDD  eCell1 BWchannel 10MHz: R.26 HD-FDD | | | eCell1 BWchannel 5MHz: R.38 HD-FDD  eCell1 BWchannel 10MHz: R.26 HD-FDD | | |
| NPBCH\_RA | dB | 0 | | | 0 | | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote 1 | dB |
| NOCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | Specified in Table A.6.1.16.1-3 | | | | | |
|  | dB | 7 | -Infinity | -Infinity | -Infinity | 4 | 4 |
| Note2 | dB | 7 | -Infinity | -Infinity | -Infinity | 4 | 4 |
| NRSRP Note2 | dBm/15 kHz | -91 | -Infinity | -Infinity | -Infinity | -94 | -94 |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 1x1 | | | 1x1 | | |
| Timing offset to nCell 1 | ms | - | | | 3 | | |
| Note 1: NOCNG 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: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

Table A.6.1.16.1-3: eCell 1 specific test parameters for HD-FDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | eCell 1 | | |
| T1 | T2 | T3 |
| BWchannel | MHz | 5 or 10 | | |
| NOCNG Patterns |  | BWchannel 5MHz: NOP.4 FDD  BWchannel 10MHz: NOP.1 FDD | | |
| PBCH\_RA | dB | 0 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | -98 | | |
|  | dB | 4 | 4 | 4 |
| Note2 | dB | 4 | 4 | 4 |
| RSRP Note2 | dBm/15 kHz | -94 | -94 | -94 |
| Propagation Condition |  | AWGN | | |
| Antenna Configuration |  | 1x1 | | |
| Note 1: OCNG shall be used such that the eCell is 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 .  Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

#### A.6.1.16.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send NPRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NB-IoT FDD inter frequency cell shall be less than 12 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE-re-establish\_delay\_NB-IoT.

Where:

- TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The NPRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

- TUE-re-establish\_delay\_NB-IoT = 100 ms + NNB-Iot-freq\*Tsearch\_NB-IoT + TSI\_NB-IoT + TPRACH\_NB-IoT

- NNB-Iot-freq = 2

- Tsearch\_NB-IoT = 1400 ms

- TSI\_NB-IoT = 8320 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target NB-IoT FDD cell.

- TPRACH\_NB-IoT = 80 ms; it is the additional delay caused by the random access procedure.

### A.6.1.17 E-UTRAN FD-FDD Inter-frequency RRC Re-establishment for Cat-M1 UE in CEModeA

#### A.6.1.17.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.17.1-1 and table A.6.1.17.2-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. During T1, the UE shall be indicated with the carrier frequency of Cell 2 to ensure that the UE has the context of the carrier frequency of Cell 2. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of radio link failure. At the start of time period T3, cell 2, which is the neighbour cell, is activated.

Table A.6.1.17.1-1: General test parameters for E-UTRAN FDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number (cell 1) | |  | 1 | Only one FDD carrier frequency is used. |
| E-UTRA RF Channel Number (cell 2) | |  | 2 |  |
| E-UTRA FDD inter-frequency carrier list size | |  | 1 | 2 E-UTRA FDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| PRACH Configuration | |  | PRACH\_2CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| T1 | | s | 5 |  |
| T2 | | ms | 400 |  |
| T3 | | s | 3 |  |

Table A.6.1.17.1-2: Cell specific test parameters for E-UTRAN FDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | T2 | | | T3 | | |
| E-UTRA RF Channel Number |  | 1 | | | 2 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH parameters (As specified in clause A.3.1.4.1) |  | DL Reference Measurement Channel R.21 FDD | | | DL Reference Measurement Channel R.21 FDD | | | | | | |
| MPDCCH parameters (As specified in clause A.3.1.3.1) |  | DL Reference Measurement Channel R.17 FDD | | | DL Reference Measurement Channel R.17 FDD | | | | | | |
| OCNG Patterns defined in A.3.2.1.21 (OP.21 FDD) and in A.3.2.1.6 (OP.6 FDD) |  | 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 |
|  | dB | 4 | -Infinity | -Infinity | -Infinity | | | -Infinity | | | 7 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 4 | -Infinity | -Infinity | -Infinity | | | -Infinity | | | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -Infinity | -Infinity | -Infinity | | | -Infinity | | | -91 |
| Propagation Condition |  | AWGN | | | | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| Timing offset to Cell 1 (Asynchronous cells) | ms | - | | | 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.6.1.17.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD inter frequency cell shall be less than 3.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI-EUTRA-M1-CEModeA + TPRACH

Nfreq = 2

Tsearch = 1000 ms

TSI-EUTRA-M1-CEModeA = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 3345 ms, allow 3.5 s in the test case.

### A.6.1.18 E-UTRAN HD-FDD Inter-frequency RRC Re-establishment for Cat-M1 UE in CEModeA

#### A.6.1.18.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA HD-FDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.18.1-1 and table A.6.1.18.2-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. During T1, the UE shall be indicated with the carrier frequency of Cell 2 to ensure that the UE has the context of the carrier frequency of Cell 2. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of radio link failure. At the start of time period T3, cell 2, which is the neighbour cell, is activated.

Table A.6.1.18.1-1: General test parameters for E-UTRAN HD-FDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number (cell 1) | |  | 1 | Only one FDD carrier frequency is used. |
| E-UTRA RF Channel Number (cell 2) | |  | 2 |  |
| E-UTRA FDD inter-frequency carrier list size | |  | 1 | 2 E-UTRA FDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| PRACH Configuration | |  | PRACH\_2CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | ms | 3 | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | ms | 400 |  |
| T3 | | s | 3 |  |

Table A.6.1.18.1-2: Cell specific test parameters for E-UTRAN HD-FDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | T2 | | | T3 | | |
| E-UTRA RF Channel Number |  | 1 | | | 2 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH parameters (As specified in clause A.3.1.4.2) |  | DL Reference Measurement Channel R.11 HD-FDD | | | DL Reference Measurement Channel R.11 HD-FDD | | | | | | |
| MPDCCH parameters (As specified in clause A.3.1.3.2) |  | DL Reference Measurement Channel R.11 HD-FDD | | | DL Reference Measurement Channel R.11 HD-FDD | | | | | | |
| OCNG Patterns defined in A.3.2.1.21 (OP.21 FDD) and in A.3.2.1.6 (OP.6 FDD) |  | 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 |
|  | dB | 4 | -Infinity | -Infinity | -Infinity | | | -Infinity | | | 7 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 4 | -Infinity | -Infinity | -Infinity | | | -Infinity | | | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -Infinity | -Infinity | -Infinity | | | -Infinity | | | -91 |
| Propagation Condition |  | AWGN | | | | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| Timing offset to Cell 1 (Asynchronous cells) | Ms | - | | | 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.6.1.18.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD inter frequency cell shall be less than 3.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI-EUTRA-M1-CEModeA + TPRACH

Nfreq = 2

Tsearch = 1000 ms

TSI-EUTRA-M1-CEModeA = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 3345 ms, allow 3.5 s in the test case.

### A.6.1.19 E-UTRAN TDD-TDD Inter-frequency RRC Re-establishment for Cat-M1 UE in CEModeA

#### A.6.1.19.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA TDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.19.1-1 and table A.6.1.19.2-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. During T1, the UE shall be indicated with the carrier frequency of Cell 2 to ensure that the UE has the context of the carrier frequency of Cell 2. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of radio link failure. At the start of time period T3, cell 2, which is the neighbour cell, is activated.

Table A.6.1.19.1-1: General test parameters for E-UTRAN TDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number (cell 1) | |  | 1 | Only one FDD carrier frequency is used. |
| E-UTRA RF Channel Number (cell 2) | |  | 2 |  |
| E-UTRA TDD inter-frequency carrier list size | |  | 1 | 2 E-UTRA TDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| PRACH Configuration | |  | PRACH\_2CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-1 in TS 36.211 |
| PRACH configuration index | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| T1 | | s | 5 |  |
| T2 | | ms | 400 |  |
| T3 | | s | 3 |  |

Table A.6.1.19.1-2: Cell specific test parameters for E-UTRAN TDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T1 | T2 | | | T3 | | |
| E-UTRA RF Channel Number |  | 1 | | | 2 | | | | | | |
| BWchannel | MHz | 10 | | | 10 | | | | | | |
| PDSCH parameters (As specified in clause A.3.1.4.3) |  | DL Reference Measurement Channel R.17 TDD | | | DL Reference Measurement Channel R.17 TDD | | | | | | |
| MPDCCH parameters (As specified in clause A.3.1.3.3) |  | DL Reference Measurement Channel R.15 TDD | | | DL Reference Measurement Channel R.15 TDD | | | | | | |
| OCNG Patterns defined in A.3.2.2.11 (OP.11 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | | OP.2 TDD | | | OP.11 TDD | |
| 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 |
|  | dB | 4 | -Infinity | -Infinity | -Infinity | | | -Infinity | | | 7 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 4 | -Infinity | -Infinity | -Infinity | | | -Infinity | | | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -Infinity | -Infinity | -Infinity | | | -Infinity | | | -91 |
| Propagation Condition |  | AWGN | | | | | | | | | |
| Antenna Configuration |  | 2x1 | | | 2x1 | | | | | | |
| Timing offset to Cell 1 (Synchronous cells) | μs | - | | | 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | |

#### A.6.1.19.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD inter frequency cell shall be less than 3.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI-EUTRA-M1-CEModeA + TPRACH

Nfreq = 2

Tsearch = 1000 ms

TSI-EUTRA-M1-CEModeA = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 3345 ms, allow 3.5 s in the test case.

### A.6.1.20 E-UTRAN FD-FDD Inter-frequency RRC Re-establishment for Cat-M1 UE in CEModeB

#### A.6.1.20.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively. During T1, both cell 1 and cell 2 are in CEModeB, and UE shall be indicated with the carrier frequency of Cell 2 to ensure that the UE has the context of the carrier frequency of Cell 2. At the start of time period T3, cell 1, which is the active cell, is deactivated. The time period T4 starts after the occurrence of the radio link failure.

Table A.6.1.20.1-1: General test parameters for E-UTRAN FDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number (cell 1) | |  | 1 |  |
| E-UTRA RF Channel Number (cell 2) | |  | 2 |  |
| E-UTRA FDD inter-frequency carrier list size | |  | 1 | 2 E-UTRA FDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| PRACH Configuration | |  | PRACH\_3CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| T1 | | s | 5 |  |
| T2 | | s | 5 |  |
| T3 | | s | 4 |  |
| T4 | | s | 9 |  |

Table A.6.1.20.1-2: Cell specific test parameters for E-UTRAN FDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | | **Cell 2** | | | |
| **T1** | **T2** | **T3** | **T4** | **T1** | **T2** | **T3** | **T4** |
| E-UTRA RF Channel Number |  | 1 | | | | 2 | | | |
| BWchannel | MHz | 5  10 | | | | 5  10 | | | |
| PDSCH Reference Channel in clause A.3.1.4.4 |  | 5MHz: R.31 FDD  10MHz: R.23 FDD | | | - | - | | | 5MHz: R.31 FDD  10MHz: R.23 FDD |
| MPDCCH Reference Channel in clause A.3.1.3.4 |  | R.19 FDD | | | | R.19 FDD | | | |
| OCNG Patterns in clause A.3.2.1 |  | 5MHz: OP.22 FDD  10MHz: OP.21 FDD | | | 5MHz: OP.19 FDD  10MHz: OP.6 FDD | 5 MHz: OP.19 FDD  10MHz: OP.6 FDD | | | 5 MHz: OP.22 FDD  10MHz: 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 | | | | -98 | | | |
|  | dB | 7 | -15 | -Infinity | -Infinity | 4 | -12 | -12 | -12 |
|  | dB | 7 | -15 | -Infinity | -Infinity | 4 | -12 | -12 | -12 |
| RSRP Note 3 | dBm/15 KHz | -91 | -113 | -Infinity | -Infinity | -94 | -110 | -110 | -110 |
| Propagation Condition |  | AWGN | | | | AWGN | | | |
| Antenna Configuration |  | 2x1 | | | | 2x1 | | | |
| Timing offset to Cell 1 (Asynchronous cells) | ms | - | | | | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | |

#### A.6.1.20.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T4, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD inter frequency cell shall be less than 7 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI-EUTRA-M1-CEModeB + TPRACH

Nfreq = 2

Tsearch = 100 ms

TSI-EUTRA-M1-CEModeB = 6400 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 6665 ms, allow 7 s in the test case.

### A.6.1.21 E-UTRAN HD-FDD Inter-frequency RRC Re-establishment for Cat-M1 UE in CEModeB

#### A.6.1.21.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA HD-FDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively. During T1, both cell 1 and cell 2 are in CEModeB, and UE shall be indicated with the carrier frequency of Cell 2 to ensure that the UE has the context of the carrier frequency of Cell 2. At the start of time period T3, cell 1, which is the active cell, is deactivated. The time period T4 starts after the occurrence of the radio link failure.

Table A.6.1.21.1-1: General test parameters for E-UTRAN HD-FDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number (cell 1) | |  | 1 | Only one FDD carrier frequency is used. |
| E-UTRA RF Channel Number (cell 2) | |  | 2 |  |
| E-UTRA FDD inter-frequency carrier list size | |  | 1 | 2 E-UTRA FDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| PRACH Configuration | |  | PRACH\_3CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| T1 | | s | 5 |  |
| T2 | | s | 5 |  |
| T3 | | s | 400 |  |
| T4 | | s | 9 |  |

Table A.6.1.21.1-2: Cell specific test parameters for E-UTRAN HD-FDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | | **Cell 2** | | | |
| **T1** | **T2** | **T3** | **T4** | **T1** | **T2** | **T3** | **T4** |
| E-UTRA RF Channel Number |  | 1 | | | | 1 | | | |
| BWchannel | MHz | 10 | | | | 10 | | | |
| PDSCH Reference Channel in clause A.3.1.4.4 |  | R.13 HD-FDD | | | - | - | | | R.13 HD-FDD |
| MPDCCH Reference Channel in clause A.3.1.3.4 |  | R.19 FDD | | | | R.19 FDD | | | |
| OCNG Patterns in clause A.3.2.1 |  | 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 |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 1.54 | -15.27 | -Infinity | -Infinity | -3.79 | -12.14 | -12 | -12 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | |
|  | dB | 7 | -15 | -Infinity | -Infinity | 4 | -12 | -12 | -12 |
| RSRP Note 3 | dBm/15 KHz | -91 | -113 | -Infinity | -Infinity | -94 | -110 | -110 | -110 |
| Propagation Condition |  | AWGN | | | | AWGN | | | |
| Antenna Configuration |  | 2x1 | | | | 2x1 | | | |
| Timing offset to Cell 1 (Asynchronous cells) | ms | - | | | | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | |

#### A.6.1.21.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T4, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD inter frequency cell shall be less than 7 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI-EUTRA-M1-CEModeB + TPRACH

Nfreq = 2

Tsearch = 100 ms

TSI-EUTRA-M1-CEModeB = 6400 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 6665 ms, allow 7 s in the test case.

### A.6.1.22 E-UTRAN TDD Inter-frequency RRC Re-establishment for Cat-M1 UE in CEModeB

#### A.6.1.22.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA TDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively. During T1, both cell 1 and cell 2 are in CEModeB, and UE shall be indicated with the carrier frequency of Cell 2 to ensure that the UE has the context of the carrier frequency of Cell 2. At the start of time period T3, cell 1, which is the active cell, is deactivated. The time period T4 starts after the occurrence of the radio link failure.

Table A.6.1.22.1-1: General test parameters for E-UTRAN TDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF Channel Number (cell 1) | |  | 1 | Only one FDD carrier frequency is used. |
| E-UTRA RF Channel Number (cell 2) | |  | 2 |  |
| E-UTRA FDD inter-frequency carrier list size | |  | 1 | 2 E-UTRA FDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| Channel Bandwidth (BWchannel) | | MHz | 10 |  |
| PRACH Configuration | |  | PRACH\_3CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | |  | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| T1 | | s | 5 |  |
| T2 | | s | 5 |  |
| T3 | | s | 400 |  |
| T4 | | s | 9 |  |

Table A.6.1.22.1-2: Cell specific test parameters for E-UTRAN HD-FDD inter-frequency RRC Re-establishment test case

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | | **Cell 2** | | | |
| **T1** | **T2** | **T3** | **T4** | **T1** | **T2** | **T3** | **T4** |
| E-UTRA RF Channel Number |  | 1 | | | | 1 | | | |
| BWchannel | MHz | 10 | | | | 10 | | | |
| PDSCH Reference Channel in clause A.3.1.4.4 |  | R.19 TDD | | | - | - | | | R.19 TDD |
| MPDCCH Reference Channel in clause A.3.1.3.4 |  | R.17 FDD | | | | R.17 FDD | | | |
| OCNG Patterns in clause A.3.2.1 |  | OP.11 TDD | | | OP.2 TDD | OP.2 FDD | | | OP.11 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 |
|  | dB | 1.54 | -15.27 | -Infinity | -Infinity | -3.79 | -12.14 | -12 | -12 |
| Note 2 | dBm/15 KHz | -98 | | | | | | | |
|  | dB | 7 | -15 | -Infinity | -Infinity | 4 | -12 | -12 | -12 |
| RSRP Note 3 | dBm/15 KHz | -91 | -113 | -Infinity | -Infinity | -94 | -110 | -110 | -110 |
| Propagation Condition |  | AWGN | | | | AWGN | | | |
| Antenna Configuration |  | 2x1 | | | | 2x1 | | | |
| Timing offset to Cell 1 (Synchronous cells) | μs | - | | | | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | |

#### A.6.1.22.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T4, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA TDD inter frequency cell shall be less than 7 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

TUE\_re-establish\_delay = 50 ms + Nfreq\* Tsearch + TSI-EUTRA-M1-CEModeB + TPRACH

Nfreq = 2

Tsearch = 100 ms

TSI-EUTRA-M1-CEModeB = 6400 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN TDD cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 6665 ms, allow 7 s in the test case.

### A.6.1.23 E-UTRAN TDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage

#### A.6.1.23.1 Test Purpose and Environment

The purpose is to verify that the NB-IoT TDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements for Cat-NB1 UE in clause 6.5.

The test parameters are given in table A.6.1.23.1-1 and table A.6.1.23.1-2 below. nCell1 and nCell2 are NB-IoT cells on different frequency carriers. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be indicated with the carrier frequency of nCell 2 to ensure that the UE has the context of the carrier frequency of nCell 2.

Table A.6.1.23.1-1: General test parameters for TDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NB-IOT operational mode | |  | In-band |  |
| Initial condition | Active cell |  | nCell1 |  |
| Neighbour cells |  | eCell1, nCell2 |  |
| Final condition | Active cell |  | nCell2 |  |
| E-UTRA RF Channel Number | |  | 1 | One carrier frequency is used for eCell. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| NPRACH Configuration | |  | NPRACH.R-2 | As specified in A.3.18 |
| NPDCCH repetition level | |  | 16 | The value shall be used for all cells in the test. |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 15000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| T1 | | s | 5 |  |
| T2 | | ms | 400 |  |
| T3 | | s | 15 |  |

Table A.6.1.23.1-2: nCell 1, nCell 2 specific test parameters for TDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | nCell 1 | | | nCell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | kHz | 200 | | | 200 | | |
| PRB location within eCell | - | eCell1 BWchannel 10MHz: 30 | | | eCell1 BWchannel 10MHz: 35 | | |
| NPDSCH parameters |  | eCell1 BWchannel 10MHz: R.14 NB-TDD | | | eCell1 BWchannel 10MHz: R.14 NB-TDD | | |
| NPDCCH parameters |  | eCell1 BWchannel 10MHz: R.26 NB-TDD | | | eCell1 BWchannel 10MHz: R.26 NB-TDD | | |
| NPBCH\_RA | dB | 0 | | | 0 | | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote 1 | dB |
| NOCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | Specified in Table A.6.1.23.1-3 | | | | | |
|  | dB | 7 | -Infinity | -Infinity | -Infinity | 4 | 4 |
| Note2 | dB | 7 | -Infinity | -Infinity | -Infinity | 4 | 4 |
| NRSRP Note2 | dBm/15 kHz | -91 | -Infinity | -Infinity | -Infinity | -94 | -94 |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 1x1 | | | 1x1 | | |
| Timing offset to nCell 1 | μs | - | | | 3 | | |
| Note 1: NOCNG 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: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

Table A.6.1.23.1-3: eCell 1 specific test parameters for TDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | eCell 1 | | |
| T1 | T2 | T3 |
| BWchannel | MHz | 10 | | |
| NOCNG Patterns |  | BWchannel 10MHz: NOP.1 TDD | | |
| PBCH\_RA | dB | 0 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | -98 | | |
|  | dB | 4 | 4 | 4 |
| Note2 | dB | 4 | 4 | 4 |
| RSRP Note2 | dBm/15 kHz | -94 | -94 | -94 |
| Propagation Condition |  | AWGN | | |
| Antenna Configuration |  | 1x1 | | |
| Note 1: OCNG shall be used such that the eCell is 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 .  Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

#### A.6.1.23.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send NPRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NB-IoT TDD inter frequency cell shall be less than 12 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE-re-establish\_delay\_NB-IoT.

Where:

- TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The NPRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

- TUE-re-establish\_delay\_NB-IoT = 100 ms + NNB-Iot-freq\*Tsearch\_NB-IoT + TSI\_NB-IoT + TRACH\_NB-IoT

- NNB-Iot-freq = 2

- Tsearch\_NB-IoT = 1400 ms

- TSI\_NB-IoT = 8320 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 [2] for the target NB-IoT TDD cell.

- TPRACH\_NB-IoT = 80 ms; it is the additional delay caused by the random access procedure.

### A.6.1.24 E-UTRAN TDD - TDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage

#### A.6.1.24.1 Test Purpose and Environment

The purpose is to verify that the NB-IoT TDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements for Cat-NB1 UE in clause 6.5.

The test parameters are given in table A.6.1.24.1-1 and table A.6.1.24.1-2 below. nCell1 and nCell2 are NB-IoT cells with different physical cell ID on the same frequency carrier. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.1.24.1-1: General test parameters for TDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NB-IOT operational mode | |  | In-band |  |
| Initial condition | Active cell |  | nCell1 |  |
| Neighbour cells |  | eCell1, eCell2, nCell2 |  |
| Final condition | Active cell |  | nCell2 |  |
| E-UTRA RF Channel Number | |  | 1 | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | |  | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | |  | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| NPRACH Configuration | |  | NPRACH.R-2 | As specified in A.3.18 |
| NPDCCH repetition level | |  | 16 | NPDCCH Rmax |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | Ms | 0 | Radio link failure timer; T310 is disabled |
| T311-v13xy | | Ms | 60000 | RRC re-establishment timer |
| DRX | |  | OFF |  |
| T1 | | S | 5 |  |
| T2 | | Ms | 400 |  |
| T3 | | S | 60 |  |

Table A.6.1.24.1-2: nCell 1, nCell 2 specific test parameters for TDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | nCell 1 | | | nCell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | kHz | 200 | | | 200 | | |
| PRB location within eCell | - | eCell1 BWchannel 10MHz: 30 | | | eCell1 BWchannel 10MHz: 30 | | |
| NPDSCH parameters |  | eCell1 BWchannel 10MHz: R.14 NB-TDD | | | eCell1 BWchannel 10MHz: R.14 NB-TDD | | |
| NPDCCH parameters |  | eCell1 BWchannel 10MHz: R.26 NB-TDD | | | eCell1 BWchannel 10MHz: R.26 NB-TDD | | |
| NPBCH\_RA | dB | 0 | | | 0 | | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote 1 | dB |
| NOCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | Specified in Table A.6.1.24.1-3 | | | | | |
|  | dB | 7 | -Infinity | -Infinity | -Infinity | -12.6 | -12.6 |
| Note2 | dB | 7 | -Infinity | -Infinity | -Infinity | -12.6 | -12.6 |
| NRSRP Note2 | dBm/15 kHz | -91 | -Infinity | -Infinity | -Infinity | -110.6 | -110.6 |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 1x1 | | | 1x1 | | |
| Timing offset to nCell 1 | ms | - | | | 3 | | |
| Note 1: NOCNG 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: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

Table A.6.1.24.1-3: eCell 1 and eCell2 specific test parameters for TDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | MHz | 10 | | | 10 | | |
| NOCNG Patterns |  | BWchannel 10MHz: NOP.1 TDD | | | BWchannel 10MHz: NOP.1 TDD | | |
| PBCH\_RA | | dB | 0 | | | 0 | | |
| PBCH\_RB | | dB |
| PSS\_RA | | dB |
| SSS\_RA | | dB |
| PDCCH\_RA | | dB |
| PDCCH\_RB | | dB |
| PCFICH\_RB | | dB |
| OCNG\_RANote 1 | | dB |
| OCNG\_RBNote 1 | | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Note2 | dBm/15 kHz | -98 | | | -98 | | |
|  | dBm | -12.6 | -12.6 | -12.6 | -12.6 | -12.6 | -12.6 |
| Propagation Condition |  | AWGN | | | AWGN | | |
| Antenna Configuration |  | 1x1 | | | 1x1 | | |
| Timing offset to eCell 1 | ms | - | | | 3 | | |
| Note 1: OCNG shall be used such that the eCell is 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 .  Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

#### A.6.1.24.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send NPRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NB-IoT TDD intra frequency cell shall be less than 60 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE-re-establish\_delay\_NB-IoT.

Where:

- TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The NPRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

- TUE-re-establish\_delay\_NB-IoT = 100 ms + NNB-Iot-freq\*Tsearch\_NB-IoT + TSI\_NB-IoT + TPRACH\_NB-IoT

- NNB-Iot-freq = 1

- Tsearch\_NB-IoT = 14800 ms

- TSI\_NB-IoT = 41560 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target NB-IoT TDD cell.

- TPRACH\_NB-IoT = 2560 ms; it is the additional delay caused by the random access procedure.

## A.6.2 Random Access

### A.6.2.1 E-UTRAN FDD – Contention Based Random Access Test

#### A.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2 and Clause 7.1.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.1.1-1 and A.6.2.1.1-2.

Table A.6.2.1.1-1: General test parameters for FDD contention based random access test

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | **Comments** |
| E-UTRA RF Channel Number |  | 1 |  |
| BWchannel | MHz | 10 |  |
| OCNG Pattern Note 1 |  | OP.1/2 FDD Note 1 | As defined in A.3.2.1.1/2. |
| PDSCH parameters Note 4 |  | DL Reference Measurement Channel R.0 FDD Note 4 | As defined in A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters |  | DL Reference Measurement Channel R.6 FDD | As defined in A.3.1.2.1. |
| PBCH\_RA | dB | 0 |  |
| PBCH\_RB | dB |  |
| PSS\_RA | dB |  |
| SSS\_RA | dB |  |
| PCFICH\_RB | dB |  |
| PHICH\_RA | dB |  |
| PHICH\_RB | dB |  |
| PDCCH\_RA | dB |  |
| PDCCH\_RB | dB |  |
| PDSCH\_RA | dB |  |
| PDSCH\_RB | dB |  |
| OCNG\_RA Note 1 | dB |  |
| OCNG\_RB Note 1 | dB |  |
|  | dB | 3 |  |
|  | dBm/15 KHz | -98 |  |
|  | dB | 3 |  |
| Io Note 2 | dBm/9 MHz | -65.5 |  |
| RSRP Note 3 | dBm/15 KHz | -95 |  |
| referenceSignalPower | dBm/15 KHz | -5 | As defined in clause 6.3.2 in TS 36.331. |
| Configured UE transmitted power () | dBm | 23 | As defined in clause 6.2.5 in TS 36.101. |
| PRACH Configuration Index | - | 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. |
| 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: Io level has been derived from other parameters for information purpose. It is not a settable parameter.  Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter.  Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required. | | | |

Table A.6.2.1.1-2: RACH-Configuration parameters for FDD contention based random access test

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| powerRampingStep | dB2 |  |
| preambleInitialReceivedTargetPower | dBm-120 |  |
| preambleTransMax | n6 |  |
| ra-ResponseWindowSize | sf10 | 10 sub-frames |
| mac-ContentionResolutionTimer | sf48 | 48 sub-frames |
| maxHARQ-Msg3Tx | 4 |  |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | |

#### A.6.2.1.2 Test Requirements

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

##### A.6.2.1.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.1.1 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, 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 -30 dBm. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

##### A.6.2.1.2.2 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 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

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 -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

##### A.6.2.1.2.3 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.6.2.1.2.4 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.6.2.1.2.5 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.6.2.1.2.6 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.6.2.2 E-UTRAN FDD – Non-Contention Based Random Access Test

#### A.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2 and Clause 7.1.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.2.1-1 and A.6.2.2.1-2.

Table A.6.2.2.1-1: General test parameters for FDD non-contention based random access test

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | **Comments** |
| E-UTRA RF Channel Number |  | 1 |  |
| BWchannel | MHz | 10 |  |
| OCNG Pattern |  | OP.1 FDD | As defined in A.3.2.1.1. |
| PDSCH parameters |  | DL Reference Measurement Channel R.0 FDD | As defined in A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters |  | DL Reference Measurement Channel R.6 FDD | As defined in A.3.1.2.1. |
| PBCH\_RA | dB | 0 |  |
| PBCH\_RB | dB |  |
| PSS\_RA | dB |  |
| SSS\_RA | dB |  |
| PCFICH\_RB | dB |  |
| PHICH\_RA | dB |  |
| PHICH\_RB | dB |  |
| PDCCH\_RA | dB |  |
| PDCCH\_RB | dB |  |
| PDSCH\_RA | dB |  |
| PDSCH\_RB | dB |  |
| OCNG\_RA Note 1 | dB |  |
| OCNG\_RB Note 1 | dB |  |
|  | dB | 3 |  |
|  | dBm/15 KHz | -98 |  |
|  | dB | 3 |  |
| Io Note 2 | dBm/9 MHz | -65.5 |  |
| RSRP Note 3 | dBm/15 KHz | -95 |  |
| referenceSignalPower | dBm/15 KHz | -5 | As defined in clause 6.3.2 in TS 36.331. |
| Configured UE transmitted power () | dBm | 23 | As defined in clause 6.2.5 in TS 36.101. |
| PRACH Configuration Index | - | 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. |
| 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.  Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter.  Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter. | | | |

Table A.6.2.2.1-2: RACH-Configuration parameters for FDD non-contention based random access test

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| powerRampingStep | dB2 |  |
| preambleInitialReceivedTargetPower | dBm-120 |  |
| preambleTransMax | n6 |  |
| ra-ResponseWindowSize | sf10 | 10 sub-frames |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | |

#### A.6.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink.

##### A.6.2.2.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.2.1 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, 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) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-transmit the preamblewith the calculated PRACH transmission power 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 -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

##### A.6.2.2.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power.

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 -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

### A.6.2.3 E-UTRAN TDD – Contention Based Random Access Test

#### A.6.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2 and Clause 7.1.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.3.1-1 and A.6.2.3.1-2.

Table A.6.2.3.1-1: General test parameters for TDD contention based random access test

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | **Comments** |
| E-UTRA RF Channel Number | - | 1 |  |
| BWchannel | MHz | 10 |  |
| OCNG Pattern Note 1 | - | OP.1/2 TDD Note 1 | As defined in A.3.2.2.1/2. |
| PDSCH parameters Note 4 | - | DL Reference Measurement Channel R.0 TDD Note 4 | As defined in A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters | - | DL Reference Measurement Channel R.6 TDD | As defined in A.3.1.2.2. |
| Special subframe configuration | - | 6 | As specified in table 4.2-1 in TS 36.211. |
| Uplink-downlink configuration | - | 1 | As specified in table 4.2-2 in TS 36.211. |
| PBCH\_RA | dB | 0 |  |
| PBCH\_RB | dB |  |
| PSS\_RA | dB |  |
| SSS\_RA | dB |  |
| PCFICH\_RB | dB |  |
| PHICH\_RA | dB |  |
| PHICH\_RB | dB |  |
| PDCCH\_RA | dB |  |
| PDCCH\_RB | dB |  |
| PDSCH\_RA | dB |  |
| PDSCH\_RB | dB |  |
| OCNG\_RA Note 1 | dB |  |
| OCNG\_RB Note 1 | dB |  |
|  | dB | 3 |  |
|  | dBm/15 KHz | -98 |  |
|  | dB | 3 |  |
| Io Note 2 | dBm/9 MHz | -65.5 |  |
| RSRP Note 3 | dBm/15 KHz | -95 |  |
| referenceSignalPower | dBm/15 KHz | -5 | As defined in clause 6.3.2 in TS 36.331. |
| Configured UE transmitted power () | dBm | 23 | As defined in clause 6.2.5 in TS 36.101. |
| PRACH Configuration Index | - | 53 | As defined in table 5.7.1-3 in TS 36.211. |
| Backoff Parameter Index | - | 2 | As defined in table 7.2-1 in TS 36.321. |
| 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: Io level has been derived from other parameters for information purpose. It is not a settable parameter.  Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter.  Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required. | | | |

Table A.6.2.3.1-2: RACH-Configuration parameters for TDD contention based random access test

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| numberOfRA-Preambles | n52 |  |
| sizeOfRA-PreamblesGroupA | n52 | No group B. |
| powerRampingStep | dB2 |  |
| preambleInitialReceivedTargetPower | dBm-120 |  |
| preambleTransMax | n6 |  |
| ra-ResponseWindowSize | sf10 | 10 sub-frames |
| mac-ContentionResolutionTimer | sf48 | 48 sub-frames |
| maxHARQ-Msg3Tx | 4 |  |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | |

#### A.6.2.3.2 Test Requirements

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

##### A.6.2.3.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.1.1 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, 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 -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

##### A.6.2.3.2.2 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 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

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 -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

##### A.6.2.3.2.3 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.6.2.3.2.4 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.6.2.3.2.5 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.6.2.3.2.6 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.6.2.4 E-UTRAN TDD – Non-Contention Based Random Access Test

#### A.6.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2 and Clause 7.1.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.4.1-1 and A.6.2.4.1-2.

Table A.6.2.4.1-1: General test parameters for TDD non-contention based random access test

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | **Comments** |
| E-UTRA RF Channel Number | - | 1 |  |
| BWchannel | MHz | 10 |  |
| OCNG Pattern | - | OP.1 TDD | As defined in A.3.2.2.1. |
| PDSCH parameters | - | DL Reference Measurement Channel R.0 TDD | As defined in A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters | - | DL Reference Measurement Channel R.6 TDD | As defined in A.3.1.2.2. |
| Special subframe configuration | - | 6 | As specified in table 4.2-1 in TS 36.211. |
| Uplink-downlink configuration | - | 1 | As specified in table 4.2-2 in TS 36.211. |
| PBCH\_RA | dB | 0 |  |
| PBCH\_RB | dB |  |
| PSS\_RA | dB |  |
| SSS\_RA | dB |  |
| PCFICH\_RB | dB |  |
| PHICH\_RA | dB |  |
| PHICH\_RB | dB |  |
| PDCCH\_RA | dB |  |
| PDCCH\_RB | dB |  |
| PDSCH\_RA | dB |  |
| PDSCH\_RB | dB |  |
| OCNG\_RA Note 1 | dB |  |
| OCNG\_RB Note 1 | dB |  |
|  | dB | 3 |  |
|  | dBm/15 KHz | -98 |  |
|  | dB | 3 |  |
| Io Note 2 | dBm/9 MHz | -65.5 |  |
| RSRP Note 3 | dBm/15 KHz | -95 |  |
| referenceSignalPower | dBm/15 KHz | -5 | As defined in clause 6.3.2 in TS 36.331. |
| Configured UE transmitted power () | dBm | 23 | As defined in clause 6.2.5 in TS 36.101. |
| PRACH Configuration Index | - | 53 | As defined in table 5.7.1-3 in TS 36.211. |
| Backoff Parameter Index | - | 2 | As defined in table 7.2-1 in TS 36.321. |
| 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.  Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter.  Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter. | | | |

Table A.6.2.4.1-2: RACH-Configuration parameters for TDD non-contention based random access test

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| powerRampingStep | dB2 |  |
| preambleInitialReceivedTargetPower | dBm-120 |  |
| preambleTransMax | n6 |  |
| ra-ResponseWindowSize | sf10 | 10 sub-frames |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | |

#### A.6.2.4.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink.

##### A.6.2.4.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.2.1 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, 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) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-transmit the preamblewith the calculated PRACH transmission power 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 -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

##### A.6.2.4.2.2 No Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power.

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 -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

### A.6.2.5 E-UTRAN FDD – Contention Based Random Access Test for 5MHz bandwidth

#### A.6.2.5.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.6.2.1.1.

The parameters of this test are the same as defined in Subclause A.6.2.1.1 except that the values of the parameters in the Table A.6.2.5.1-1 will replace the values of the corresponding parameters in A.6.2.1.1-1

Table A.6.2.5.1-1: General test parameters for FDD contention based random access test for 5MHz bandwidth

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comments |
| BWchannel | MHz | 5 |  |
| OCNG Pattern Note 1 |  | OP.15/16 FDD Note 1 | As defined in A.3.2.1.15/16. |
| PDSCH parameters Note 2 |  | DL Reference Measurement Channel R.5 FDD Note 2 | As defined in A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters |  | DL Reference Measurement Channel R.11 FDD | As defined in A.3.1.2.1. |
| Io Note 2 | dBm/4.5 MHz | -68.5 |  |
| 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 DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: See Table A.6.2.1.1-1 for the other parameters.  Note 4: This test is according to the principle defined in section A.3.7.2. | | | |

#### A.6.2.5.2 Test Requirements

The test requirements defined in section A.6.2.1.2 shall apply to this test case.

### A.6.2.6 E-UTRAN FDD – Non-contention Based Random Access Test for 5MHz bandwidth

#### A.6.2.6.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.6.2.2.1.

The parameters of this test are the same as defined in Subclause A.6.2.2.1except that the values of the parameters in the Table A.6.2.6.1-1will replace the values of the corresponding parameters in A.6.2.2.1-1

Table A.6.2.6.1-1: General test parameters for FDD non-contention based random access test for 5MHz bandwidth

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comments |
| BWchannel | MHz | 5 |  |
| OCNG Pattern Note 1 |  | OP.15 FDD Note 1 | As defined in A.3.2.1.15. |
| PDSCH parameters Note 2 |  | DL Reference Measurement Channel R.5 FDD Note 2 | As defined in A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters |  | DL Reference Measurement Channel R.11 FDD | As defined in A.3.1.2.1. |
| Io Note 2 | dBm/4.5 MHz | -68.5 |  |
| 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.  Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter  Note 3: See Table A.6.2.2.1-1 for the other parameters.  Note 4: This test is according to the principle defined in section A.3.7.2. | | | |

#### A.6.2.6.2 Test Requirements

The test requirements defined in section A.6.2.2.2 shall apply to this test case.

### A.6.2.7 E-UTRAN FDD – Non-Contention Based Random Access Test For SCell

#### A.6.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure, for the SCell, is according to the requirements and that the PRACH power settings and timing, for the SCell, are within specified limits. This test will verify the requirements in Clause 6.2.2 and Clause 7.1.2 in an AWGN model.

For this test two cells are used. Cell 1 is PCell and Cell 2 is SCell. PCell and SCell are different timing advance group. Cell 1 is in the primary Timing Advance Group (pTAG) and Cell 2 is in the secondary Timing Advance Group (sTAG). The purpose of the PCell is to allow the SCell to be configured and to handle the Random Access Response which takes place on PCell. The test parameters are given in tables A.6.2.7.1-1 and A.6.2.7.1-2.

Table A.6.2.7.1-1: General test parameters for FDD non-contention based random access test

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | **Cell 2** | **Comments** |
| E-UTRA RF Channel Number |  | 1 | 2 |  |
| BWchannel | MHz | 10 | 10 |  |
| Active PCell |  | Cell 1 |  | Primary cell of RF channel number 1. |
| Active SCell |  |  | Cell 2 | Secondary cell of RF channel number 2. |
| TAG configuration |  | pTAG | sTAG | pTAG+sTAG configures Cell 1 and Cell 2 to separate TAGs |
| OCNG Pattern |  | OP.1 FDD | OP.1 FDD | As defined in A.3.2.1.11. |
| PDSCH parameters |  | DL Reference Measurement Channel R.0 FDD | DL Reference Measurement Channel R.0 FDD | As defined in A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters |  | DL Reference Measurement Channel R.6 FDD | DL Reference Measurement Channel R.6 FDD | As defined in A.3.1.2.1. |
| PBCH\_RA | dB | 0 | 0 |  |
| PBCH\_RB | dB |  |
| PSS\_RA | dB |  |
| SSS\_RA | dB |  |
| PCFICH\_RB | dB |  |
| PHICH\_RA | dB |  |
| PHICH\_RB | dB |  |
| PDCCH\_RA | dB |  |
| PDCCH\_RB | dB |  |
| PDSCH\_RA | dB |  |
| PDSCH\_RB | dB |  |
| OCNG\_RA Note 1 | dB |  |
| OCNG\_RB Note 1 | dB |  |
|  | dB | 3 | 3 |  |
|  | dBm/15 KHz | -98 | -98 |  |
|  | dB | 3 | 3 |  |
| Io Note 2 | dBm/9 MHz | -65.5 | -65.5 |  |
| RSRP Note 3 | dBm/15 KHz | -95 | -95 |  |
| referenceSignalPower | dBm/15 KHz | -5 | -5 | As defined in clause 6.3.2 in TS 36.331. |
| Configured UE transmitted power () | dBm | 23 | 23 | As defined in clause 6.2.5 in TS 36.101. |
| PRACH Configuration Index | - | 4 | 4 | As defined in table 5.7.1-2 in TS 36.211. |
| Backoff Parameter Index | - | 2 | 2 | As defined in table 7.2-1 in TS 36.321. |
| Propagation Condition | - | AWGN | 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.  Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter.  Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter. | | | | |

Table A.6.2.7.1-2: RACH-Configuration parameters for FDD non-contention based random access test

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| powerRampingStep | dB2 |  |
| preambleInitialReceivedTargetPower | dBm-120 |  |
| preambleTransMax | n6 |  |
| ra-ResponseWindowSize | sf10 | 10 sub-frames |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | |

#### A.6.2.7.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink.

##### A.6.2.7.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.2.1 the System Simulator shall transmit, on Cell 1, the PCell, a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator, on Cell 2. In response to the first 4 preambles, 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) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-transmit the preamblewith the calculated PRACH transmission power 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 -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

##### A.6.2.7.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.2.2.2.2 the System Simulator shall transmit, on Cell 1, the PCell, a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator on Cell 2. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power.

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 -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

##### A.6.2.7.2.3 Stop Preamble transmission if maximum number of preamble transmission counter has been reached

To test the UE behavior specified in Subclause 6.2.2 the System Simulator shall transmit, in response to the first 6 preambles, a Random Access Response *not* corresponding to the transmitted Random Access Preamble on Cell 1, the PCell. The UE shall stop transmitting preambles after 6 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power.

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 -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

### A.6.2.8 E-UTRAN TDD – Non-Contention Based Random Access Test For SCell

#### A.6.2.8.1 Test Purpose and Environment

This test is applicable for UE supporting the optional capability of Multiple Timing Advance.

The purpose of this test is to verify that the behavior of the random access procedure, for the SCell, is according to the requirements and that the PRACH power settings and timing, for the SCell, are within specified limits. This test will verify the requirements in Clause 6.2.2 and Clause 7.1.2 in an AWGN model.

For this test two cells are used. Cell 1 is PCell and Cell 2 is SCell. PCell and SCell are different timing advance group. Cell 1 is in the primary Timing Advance Group (pTAG) and Cell 2 is in the secondary Timing Advance Group (sTAG). The purpose of the PCell is to allow the SCell to be configured and to handle the Random Access Response which takes place on PCell. The test parameters are given in tables A.6.2.8.1-1 and A.6.2.8.1-2.

Table A.6.2.8.1-1: General test parameters for TDD non-contention based random access test

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | Cell 2 | Comments |
| E-UTRA RF Channel Number | - | 1 | 1 |  |
| BWchannel | MHz | 10 | 10 |  |
| Active PCell |  | Cell 1 |  | Primary cell of RF channel number 1. |
| Active SCell |  |  | Cell 2 | Secondary cell of RF channel number 2. |
| TAG configuration |  | pTAG | sTAG | pTAG+sTAG configures Cell 1 and Cell 2 to separate TAGs |
| OCNG Pattern | - | OP.1 TDD | OP.1 TDD | As defined in A.3.2.2.1. |
| PDSCH parameters | - | DL Reference Measurement Channel R.0 TDD | DL Reference Measurement Channel R.0 TDD | As defined in A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters | - | DL Reference Measurement Channel R.6 TDD | DL Reference Measurement Channel R.6 TDD | As defined in A.3.1.2.2. |
| Special subframe configuration | - | 6 | 6 | As specified in table 4.2-1 in TS 36.211. |
| Uplink-downlink configuration | - | 1 | 1 | As specified in table 4.2-2 in TS 36.211. |
| PBCH\_RA | dB | 0 | 0 |  |
| PBCH\_RB | dB |  |
| PSS\_RA | dB |  |
| SSS\_RA | dB |  |
| PCFICH\_RB | dB |  |
| PHICH\_RA | dB |  |
| PHICH\_RB | dB |  |
| PDCCH\_RA | dB |  |
| PDCCH\_RB | dB |  |
| PDSCH\_RA | dB |  |
| PDSCH\_RB | dB |  |
| OCNG\_RA Note 1 | dB |  |
| OCNG\_RB Note 1 | dB |  |
|  | dB | 3 | 3 |  |
|  | dBm/15 KHz | -98 | -98 |  |
|  | dB | 3 | 3 |  |
| Io Note 2 | dBm/9 MHz | -65.5 | -65.5 |  |
| RSRP Note 3 | dBm/15 KHz | -95 | -95 |  |
| referenceSignalPower | dBm/15 KHz | -5 | -5 | As defined in clause 6.3.2 in TS 36.331. |
| Configured UE transmitted power () | dBm | 23 | 23 | As defined in clause 6.2.5 in TS 36.101. |
| PRACH Configuration Index | - | 53 | 53 | As defined in table 5.7.1-3 in TS 36.211. |
| Backoff Parameter Index | - | 2 | 2 | As defined in table 7.2-1 in TS 36.321. |
| Propagation Condition | - | AWGN | 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.  Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter.  Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter. | | | | |

Table A.6.2.8.1-2: RACH-Configuration parameters for TDD non-contention based random access test

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| powerRampingStep | dB2 |  |
| preambleInitialReceivedTargetPower | dBm-120 |  |
| preambleTransMax | n6 |  |
| ra-ResponseWindowSize | sf10 | 10 sub-frames |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | |

#### A.6.2.8.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink.

##### A.6.2.8.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.2.1 the System Simulator shall transmit, on Cell 1, the PCell, a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator, on Cell 2. In response to the first 4 preambles, 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) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-transmit the preamblewith the calculated PRACH transmission power 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 -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

##### A.6.2.8.2.2 No Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.2.2 the System Simulator shall transmit, on Cell 1, the PCell, a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator, on Cell 2. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power.

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 -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

##### A.6.2.8.2.3 Stop Preamble transmission if maximum number of preamble transmission counter has been reached

To test the UE behavior specified in Subclause 6.2.2 the System Simulator shall transmit, in response to the first 6 preambles, a Random Access Response *not* corresponding to the transmitted Random Access Preamble on Cell 1, the PCell. The UE shall stop transmitting preambles after 6 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power.

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 -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

### A.6.2.9 3DL/3UL TDD CA Non-Contention Based Random Access Test for 2 SCells

#### A.6.2.9.1 Test Purpose and Environment

This test is applicable for UE supporting the optional capability of Multiple Timing Advance.

The purpose of this test is to verify that the behavior of the random access procedure, for the two SCells, is according to the requirements and that the PRACH power settings and timing, for the SCell, are within specified limits. This test will verify the requirements in Clause 6.2.2 and Clause 7.1.2 in an AWGN model.

For this test three cells are used. Cell 1 is PCell, Cell 2 is SCell1 and Cell 3 is SCell2. Cell 1 and Cell 2/Cell 3 belong to different timing advance groups. Cell 1 is in the primary Timing Advance Group (pTAG). Cell 2 and Cell3 are in the same secondary Timing Advance Group (sTAG). The purpose of the Cell 1 is to allow Cell 2 and Cell 3 to be configured and to handle the Random Access Response which takes place on Cell 1. The test parameters are given in tables A.6.2.9.1-1 and A.6.2.9.1-2.

Table A.6.2.9.1-1: General test parameters for 3DL/3UL TDD CA non-contention based random access test

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Comments |
| E-UTRA RF Channel Number | - | 1 | 2 | 3 |  |
| BW**channel** | - | 5MHz: NRB,c = 25  10MHz: NRB,c = 50  20MHz: NRB,c = 100 | 5MHz: NRB,c = 25  10MHz: NRB,c = 50  20MHz: NRB,c = 100 | 5MHz: NRB,c = 25  10MHz: NRB,c = 50  20MHz: NRB,c = 100 |  |
| TAG configuration | - | pTAG | sTAG | sTAG | Cell 2 and Cell 3 are in the same sTAG |
| PDSCH parameters:  DL Reference Measurement Channel | - | 5MHz: R.4 TDD  10MHz: R.0 TDD  20MHz: R.3 TDD | 5MHz: R.4 TDD  10MHz: R.0 TDD  20MHz: R.3 TDD | 5MHz: R.4 TDD  10MHz: R.0 TDD  20MHz: R.3 TDD | As defined in A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement Channel | - | 5MHz: R.11 TDD  10MHz: R.6 TDD  20MHz: R.10 TDD | 5MHz: R.11 TDD  10MHz: R.6 TDD  20MHz: R.10 TDD | 5MHz: R.11 TDD  10MHz: R.6 TDD  20MHz: R.10 TDD | As defined in A.3.1.2.2. |
| OCNG Patterns | - | 5MHz: OP.9 TDD  10MHz: OP.1 TDD  20MHz: OP.7 TDD | 5MHz: OP.9 TDD  10MHz: OP.1 TDD  20MHz: OP.7 TDD | 5MHz: OP.9 TDD  10MHz: OP.1 TDD  20MHz: OP.7 TDD | As defined in A.3.2.2. |
| Special subframe configuration | - | 6 | 6 | 6 | As specified in table 4.2-1 in TS 36.211. |
| Uplink-downlink configuration | - | 1 | 1 | 1 | As specified in table 4.2-2 in TS 36.211. |
| PBCH\_RA | dB | 0 | 0 | 0 |  |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RA Note 1 | dB |
| OCNG\_RB Note 1 | dB |
|  | dB | 3 | 3 | 3 |  |
|  | dBm/15 KHz | -98 | -98 | -98 |  |
|  | dB | 3 | 3 | 3 |  |
| Io Note 2 | dBm/ BW**channel** | -65.5+10log  (NRB,c /50) | -65.5+10log  (NRB,c /50) | -65.5+10log  (NRB,c /50) |  |
| RSRP Note 3 | dBm/15 KHz | -95 | -95 | -95 |  |
| referenceSignalPower | dBm/15 KHz | -5 | -5 | -5 | As defined in clause 6.3.2 in TS 36.331. |
| Configured UE transmitted power () | dBm | 23 | 23 | 23 | As defined in clause 6.2.5 in TS 36.101. |
| PRACH Configuration Index | - | 53 | 53 | 53 | As defined in table 5.7.1-3 in TS 36.211. |
| Backoff Parameter Index | - | 2 | 2 | 2 | As defined in table 7.2-1 in TS 36.321. |
| Propagation Condition | - | AWGN | AWGN | AWGN |  |
| Antenna Configuration |  | 1x2 | 1x2 | 1x2 |  |
| Timing offset to Cell 1 | μs | - | 0 | 0 |  |
| Time alignment error relative to cell 1 Note 4 | μs | - | ≤ TAE | ≤ TAE |  |
| Time alignment error relative to cell 2 Note 4 | μs | - | - | ≤ TAE |  |
| 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.  Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter.  Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter.  Note 4: The time alignment error (TAE) between two cells specified in TS36.104 [30] clause 6.5.3.1 (value depends upon the type of carrier aggregation).  Note 5: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | | |

Table A.6.2.9.1-2: RACH-Configuration parameters for cell2 and cell3 for 3DL/3UL TDD CA non-contention based random access test

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| powerRampingStep | dB2 |  |
| preambleInitialReceivedTargetPower | dBm-120 |  |
| preambleTransMax | n6 |  |
| ra-ResponseWindowSize | sf10 | 10 sub-frames |
| Note 1: For further information see Clause 6.3.2 in TS 36.331. | | |

#### A.6.2.9.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink.

##### A.6.2.9.2.1 Random Access Response Reception

A.6.2.9.2.1.1 Test Requirements for Cell 2

To test the UE behavior specified in Subclause 6.2.2.2.1 the System Simulator shall transmit, on cell 1 a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator, on cell 2. In response to the first 4 preambles, 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) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-transmit the preamblewith the calculated PRACH transmission power 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 -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions on cell 2 shall be within the accuracy specified in Subclause 7.1.2.

A.6.2.9.2.1.2 Test Requirements for Cell 3

To test the UE behavior specified in Subclause 6.2.2.2.1 the System Simulator shall transmit, on cell 1 a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator, on cell 3. In response to the first 4 preambles, 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) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-transmit the preamblewith the calculated PRACH transmission power 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 -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions on cell 3 shall be within the accuracy specified in Subclause 7.1.2.

##### A.6.2.9.2.2 No Random Access Response Reception

A.6.2.9.2.2.1 Test Requirements for Cell 2

To test the UE behavior specified in Subclause 6.2.2.2.2 the System Simulator shall transmit, on cell 1, a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator, on cell 2. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power on cell 2.

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 -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions on cell 2 shall be within the accuracy specified in Subclause 7.1.2.

A.6.2.9.2.2.2 Test Requirements for Cell 3

To test the UE behavior specified in Subclause 6.2.2.2.2 the System Simulator shall transmit, on cell 1, a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator, on cell 3. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power on cell 3.

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 -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions on cell 3 shall be within the accuracy specified in Subclause 7.1.2.

##### A.6.2.9.2.3 Stop Preamble transmission if maximum number of preamble transmission counter has been reached

A.6.2.9.2.3.1 Test Requirements for Cell 2

To test the UE behavior specified in Subclause 6.2.2 the System Simulator shall transmit, in response to the first 6 preambles, a Random Access Response *not* corresponding to the transmitted Random Access Preamble on cell 1. The UE shall stop transmitting preambles after 6 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power on cell 2.

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 -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions on cell 2 shall be within the accuracy specified in Subclause 7.1.2.

A.6.2.9.2.3.2 Test Requirements for Cell 3

To test the UE behavior specified in Subclause 6.2.2 the System Simulator shall transmit, in response to the first 6 preambles, a Random Access Response *not* corresponding to the transmitted Random Access Preamble on cell 1. The UE shall stop transmitting preambles after 6 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power on cell 3.

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 -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions on cell 3 shall be within the accuracy specified in Subclause 7.1.2.

### A.6.2.10 E-UTRAN FDD Contention Based Random Access Test for Cat-M1 UEs in Normal Coverage

#### A.6.2.10.1 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 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 6.2.3 and Clause 7.24.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.10.1-1 and A.6.2.10.1-2.

Table A.6.2.10.1-1: General test parameters for FDD contention based random access test

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | **Comments** |
| E-UTRA RF Channel Number |  | 1 |  | |
| BWchannel | MHz | 10 |  | |
| OCNG Pattern Note 1 |  | OP.21 FDD | As defined in A. A.3.2.1.21. | |
| PDSCH parameters Note 2 |  | R.20 FDD | As defined in A.3.1.4.1 | |
| MPDCCH parameters Note 2 |  | R.16 FDD | As defined in A.3.1.3.1 | |
| PCFICH/PDCCH/PHICH  parameters |  | DL Reference Measurement Channel R.6 FDD | As defined in A.3.1.2.1 | |
| PBCH\_RA | dB | 0 |  | |
| PBCH\_RB | dB |  | |
| PSS\_RA | dB |  | |
| SSS\_RA | dB |  | |
| PCFICH\_RB | dB |  | |
| PHICH\_RA | dB |  | |
| PHICH\_RB | dB |  | |
| PDCCH\_RA | dB |  | |
| PDCCH\_RB | 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.6.2.10.1-2: 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.6.2.10.1-3: 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 36.101 |
| **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.6.2.10.2 Test Requirements

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

##### A.6.2.10.2.1 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 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

##### A.6.2.10.2.2 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 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

##### A.6.2.10.2.3 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.6.2.10.2.4 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.6.2.10.2.5 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.6.2.10.2.6 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.6.2.10.2.7 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.6.2.11 E-UTRAN HD-FDD Contention Based Random Access Test for Cat-M1 UEs in Normal Coverage

#### A.6.2.11.1 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 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 6.2.3 and Clause 7.24.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.11.1-1 and A.6.2.11.1-2.

Table A.6.2.11.1-1: General test parameters for HD-FDD contention based random access test

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comments |
| E-UTRA RF Channel Number |  | 1 |  | |
| BWchannel | MHz | 10 |  | |
| OCNG Pattern Note 1 |  | OP.21 FDD | As defined in A.3.2.1.21. | |
| PDSCH parameters Note 2 |  | R.10 HD-FDD | As defined in A.3.1.4.2 | |
| MPDCCH parameters Note 2 |  | R.6 HD-FDD | As defined in A.3.1.3.2 | |
| PCFICH/PDCCH/PHICH  parameters |  | DL Reference Measurement Channel R.3 HD-FDD | As defined in A.3.1.2.3 | |
| PBCH\_RA | dB | 0 |  | |
| PBCH\_RB | dB |  | |
| PSS\_RA | dB |  | |
| SSS\_RA | dB |  | |
| PCFICH\_RB | dB |  | |
| PHICH\_RA | dB |  | |
| PHICH\_RB | dB |  | |
| PDCCH\_RA | dB |  | |
| PDCCH\_RB | 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.6.2.11.1-2: 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.6.2.11.1-3: 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 36.101 |
| **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.6.2.11.2 Test Requirements

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

##### A.6.2.11.2.1 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 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

##### A.6.2.11.2.2 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 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

##### A.6.2.11.2.3 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.6.2.11.2.4 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.6.2.11.2.5 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.6.2.11.2.6 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.6.2.11.2.7 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.6.2.12 E-UTRAN TDD Contention Based Random Access Test for Cat-M1 UEs in Normal Coverage

#### A.6.2.12.1 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 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 6.2.3 and Clause 7.24.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.12.1-1 and A.6.2.12.1-2.

Table A.6.2.12.1-1: General test parameters for TDD contention based random access test

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comments |
| E-UTRA RF Channel Number |  | 1 |  | |
| BWchannel | MHz | 10 |  | |
| OCNG Pattern Note 1 |  | OP.11 TDD | As defined in A.3.2.2.11. | |
| PDSCH parameters Note 2 |  | R.16 TDD | As defined in A.3.1.4.3 | |
| MPDCCH parameters Note 2 |  | R.14 TDD | As defined in A.3.1.3.3 | |
| PCFICH/PDCCH/PHICH  parameters |  | DL Reference Measurement Channel R.6 TDD | As defined in A.3.1.2.2 | |
| Special subframe configuration | - | 6 | As specified in table 4.2-1 in TS 36.211. | |
| Uplink-downlink configuration | - | 1 | As specified in table 4.2-2 in TS 36.211. | |
| PBCH\_RA | dB | 0 |  | |
| PBCH\_RB | dB |  | |
| PSS\_RA | dB |  | |
| SSS\_RA | dB |  | |
| PCFICH\_RB | dB |  | |
| PHICH\_RA | dB |  | |
| PHICH\_RB | dB |  | |
| PDCCH\_RA | dB |  | |
| PDCCH\_RB | 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.6.2.12.1-2: RACH-Configuration parameters for TDD contention based random access test

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Field | Value | | | | Comment |
| Parameters not per CE Levels | | | | | |
| numberOfRA-Preambles | n52 | | | |  |
| sizeOfRA-PreamblesGroupA | n52 | | | | No group B. |
| 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 1: For further information see Clause 6.3.2 in TS 36.331. | | | | | |

Table A.6.2.12.1-3: PRACH-Configuration parameters for TDD contention based random access test

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Field | Value | | | | Comment |
| Parameters not per CE Levels | | | | | |
| rsrp-ThresholdsPrach | {24, 31, 38} | | | | Corresponding to {-116, -109, -102} 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 36.101 |
| Parameters per PRACH CE Levels | | | | | |
| CE Level | Level 0 | Level 1 | Level 2 | Level 3 |  |
| prach-ConfigIndex | 53 | 53 | 53 | 53 | 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.6.2.12.2 Test Requirements

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

##### A.6.2.12.2.1 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 -30 dBm. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

##### A.6.2.12.2.2 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 -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

##### A.6.2.12.2.3 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.6.2.12.2.4 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.6.2.12.2.5 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.6.2.12.2.6 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.6.2.12.2.7 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.6.2.13 E-UTRAN FDD Contention Based Random Access Test for Cat-M1 UEs in Enhanced Coverage

#### A.6.2.13.1 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 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 7.24.2, Clause 6.2.3 and Clause 7.1.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.13.1-1 and A.6.2.13.1-2.

Table A.6.2.13.1-1: General test parameters for FDD contention based random access test

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comments |
| E-UTRA RF Channel Number |  | 1 |  | |
| BWchannel | MHz | 10 |  | |
| OCNG Pattern Note 1 |  | OP.21 FDD | As defined in A.3.2.1.21. | |
| PDSCH parameters Note 2 |  | R.22 FDD | As defined in A.3.1.4.4 | |
| MPDCCH parameters Note 2 |  | R.18 FDD | As defined in A.3.1.3.4 | |
| PCFICH/PDCCH/PHICH  parameters |  | DL Reference Measurement Channel R.6 FDD | As defined in A.3.1.2.1 | |
| PBCH\_RA | dB | 0 |  | |
| PBCH\_RB | dB |  | |
| PSS\_RA | dB |  | |
| SSS\_RA | dB |  | |
| PCFICH\_RB | dB |  | |
| PHICH\_RA | dB |  | |
| PHICH\_RB | dB |  | |
| PDCCH\_RA | dB |  | |
| PDCCH\_RB | 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.6.2.13.1-2: 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.6.2.13.1-3: 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 36.101 |
| 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.6.2.13.2 Test Requirements

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

##### A.6.2.13.2.1 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 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause7.24.2.

##### A.6.2.13.2.2 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 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

##### A.6.2.13.2.3 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.6.2.13.2.4 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.6.2.13.2.5 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.6.2.13.2.6 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.6.2.13.2.7 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.6.2.14 E-UTRAN HD-FDD Contention Based Random Access Test for Cat-M1 UEs in Enhanced Coverage

#### A.6.2.14.1 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 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 6.2.3 and Clause 7.24.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.14.1-1 and A.6.2.14.1-2.

Table A.6.2.14.1-1: General test parameters for HD-FDD contention based random access test

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comments |
| E-UTRA RF Channel Number |  | 1 |  | |
| BWchannel | MHz | 10 |  | |
| OCNG Pattern Note 1 |  | OP.21 FDD | As defined in A.3.2.1.21. | |
| PDSCH parameters Note 2 |  | R.12 HD-FDD | As defined in A.3.1.4.5 | |
| MPDCCH parameters Note 2 |  | R.8 HD-FDD | As defined in A.3.1.3.5 | |
| PCFICH/PDCCH/PHICH  parameters |  | DL Reference Measurement Channel R.3 HD-FDD | As defined in A.3.1.2.3 | |
| PBCH\_RA | dB | 0 |  | |
| PBCH\_RB | dB |  | |
| PSS\_RA | dB |  | |
| SSS\_RA | dB |  | |
| PCFICH\_RB | dB |  | |
| PHICH\_RA | dB |  | |
| PHICH\_RB | dB |  | |
| PDCCH\_RA | dB |  | |
| PDCCH\_RB | 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.6.2.14.1-2: 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.6.2.14.1-3: 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 36.101 |
| 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.6.2.14.2 Test Requirements

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

##### A.6.2.14.2.1 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 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

##### A.6.2.14.2.2 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 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

##### A.6.2.14.2.3 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.6.2.14.2.4 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.6.2.14.2.5 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.6.2.14.2.6 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.6.2.14.2.7 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.6.2.15 E-UTRAN TDD Contention Based Random Access Test for Cat-M1 UEs in Enhanced Coverage

#### A.6.2.15.1 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 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 6.2.3 and Clause 7.24.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.15.1-1 and A.6.2.15.1-2.

Table A.6.2.15.1-1: General test parameters for TDD contention based random access test

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comments |
| E-UTRA RF Channel Number |  | 1 |  | |
| BWchannel | MHz | 10 |  | |
| OCNG Pattern Note 1 |  | OP.11 TDD | As defined in A.3.2.2.11. | |
| PDSCH parameters Note 2 |  | R.18 TDD | As defined in A.3.1.4.6 | |
| MPDCCH parameters Note 2 |  | R.16 TDD | As defined in A.3.1.3.6 | |
| PCFICH/PDCCH/PHICH  parameters |  | DL Reference Measurement Channel R.6 TDD | As defined in A.3.1.2.2 | |
| Special subframe configuration | - | 6 | As specified in table 4.2-1 in TS 36.211. | |
| Uplink-downlink configuration | - | 1 | As specified in table 4.2-2 in TS 36.211. | |
| PBCH\_RA | dB | 0 |  | |
| PBCH\_RB | dB |  | |
| PSS\_RA | dB |  | |
| SSS\_RA | dB |  | |
| PCFICH\_RB | dB |  | |
| PHICH\_RA | dB |  | |
| PHICH\_RB | dB |  | |
| PDCCH\_RA | dB |  | |
| PDCCH\_RB | 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.6.2.15.1-2: RACH-Configuration parameters for TDD contention based random access test

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Field | Value | | | | Comment |
| Parameters not per CE Levels | | | | | |
| numberOfRA-Preambles | n52 | | | |  |
| sizeOfRA-PreamblesGroupA | n52 | | | | No group B. |
| 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.6.2.15.1-3: PRACH-Configuration parameters for TDD 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 36.101 |
| Parameters per PRACH CE Levels | | | | | |
| *CE Level* | *Level 0* | *Level 1* | *Level 2* | *Level 3* |  |
| prach-ConfigIndex | 53 | 53 | 53 | 53 | 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.6.2.15.2 Test Requirements

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

##### A.6.2.15.2.1 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 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

##### A.6.2.15.2.2 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 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

##### A.6.2.15.2.3 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.6.2.15.2.4 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.6.2.15.2.5 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.6.2.15.2.6 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.6.2.15.2.7 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.6.2.16 Contention Based Random Access Test for UE category NB1 UEs In-band mode in normal coverage

#### A.6.2.16.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a category NB1 UE in Normal Coverage is according to the requirements, whether the NPRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the NRSRP measurement and the configured criterion in NRSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.6.2, Clause 6.6.3 and Clause 7.20.2 in an AWGN model.

For this test a single NB-IoT cell and a single LTE cell are used. The test parameters are given in tables A.6.2.16.1-1, A.6.2.16.1-2 and A.6.2.16.1-4.

Table A.6.2.16.1-1: nCell specific test parameters for HD-FDD contention based random access test for UE category NB1 In-Band mode in Normal Coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | Comments | |
| NB-IOT operational mode |  | In-band |  | |
| BWchannel | kHz | 200 |  | |
| PRB location within eCell | - | eCell1 BWchannel 5MHz: 17  eCell1 BWchannel 10MHz: 30 |  | |
| NPDSCH parameters Note 2 |  | eCell1 BWchannel 5MHz: R.17 HD-FDD  eCell1 BWchannel 10MHz: R.15 HD-FDD | As defined in A.3.1.5.1 | |
| NPDCCH parameters Note 2 |  | eCell1 BWchannel 5MHz: R.39 HD-FDD  eCell1 BWchannel 10MHz: R.27 HD-FDD | As defined in A.3.1.6.1 | |
| NPBCH\_RA | dB | -3 |  | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RA Note 1 | dB |
| NOCNG\_RB Note 1 | dB |
| DRX |  | OFF |  | |
|  | dBm/15 kHz | Specified in Table A.6.2.16.1-2 |  | |
|  | dB | 3 |  | |
| Note 3 | dB | 3 |  | |
| NRSRP Note 3 | dBm/15 kHz | -95 |  | |
| Io Note 3 | dBm/180 KHz | -82.45 |  | |
| Propagation Condition | - | AWGN |  | |
| Antenna Configuration |  | 2x1 |  | |
| Note 1: NOCNG 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 NPDSCH and NPDCCH 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, NRSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | |

Table A.6.2.16.1-2: eCell specific test parameters for HD-FDD contention based random access test for UE category NB1 In-Band mode in Normal Coverage

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| E-UTRA RF Channel Number |  | 1 |
| BWchannel | MHz | 5 or 10 |
| NOCNG Pattern Note 1 | - | BWchannel 5MHz: NOP.4 FDD  BWchannel 10MHz: NOP.1 FDD |
| PBCH\_RA | dB | -3 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RA Note 1 | dB |
| OCNG\_RB Note 1 | dB |
|  | dBm/15 kHz | -98 |
|  | dB | 3 |
| Propagation Condition | - | AWGN |
| Antenna Configuration | - | 2x1 |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

Table A.6.2.16.1-3: Void

Table A.6.2.16.1-4: NPRACH-Configuration parameters for HD-FDD contention based random access test for UE category NB1 In-Band mode in Normal Coverage

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Field | Value | | | | Comment | |
| Parameters not per NPRACH resource | | | | | | |
| RSRP-ThresholdsNPRACH-InfoList | {40, 55} | | | | Corresponding to {-116, -101} dBm as defined in Section 9.1.22.9 | |
| nprach-CP-Length | us66dot7 | | | |  | |
| nrs-Power | -5 dBm/15 kHz | | | | As defined in clause 6.7.3 in TS 36.331. | |
| Backoff Parameter Index | 1 | | | | As defined in table 7.2-2 in TS 36.321 | |
| Configured UE transmitted power () | 23 dBm for power class 3,  20 dBm for power class 5,  14 dBm for power class 6 | | | | As defined in clause 6.2.5F in TS 36.101 | |
| powerRampingStep | dB2 | | | |  | |
| preambleInitialReceivedTargetPower | dBm-112 | | | |  | |
| preambleTransMax-CE | n6 | | | |  | |
| **Parameters per NPRACH Resource** | | | | | | |
| ***NPRACH Resource*** | ***Level 0*** | ***Level 1*** | ***Level 2*** |  | |
| nprach-Periodicity | ms40 | ms240 | ms1280 |  | |
| nprach-StartTime | ms8 | ms64 | ms512 |  | |
| nprach-SubcarrierOffset | n0 | n0 | n0 |  | |
| nprach-NumSubcarriers | n12 | n12 | n12 |  | |
| nprach-SubcarrierMSG3-RangeStart | zero | zero | zero |  | |
| maxNumPreambleAttemptCE | n3 | n6 | n10 |  | |
| numRepetitionsPerPreambleAttempt | n2 | n8 | n64 |  | |
| npdcch-NumRepetitions-RA | r4 | r16 | r128 |  | |
| npdcch-StartSF-CSS-RA | v1dot5 | v1dot5 | v1dot5 |  | |
| npdcch-Offset-RA | zero | zero | Zero |  | |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 |  | |
| ra-ResponseWindowSize (per NPRACH Resource) | pp2 | pp2 | pp2 |  | |
| mac-ContentionResolutionTimer (per NPRACH Resource) | pp8 | pp8 | pp8 |  | |
| Note 1: See Clause 6.7.3 in TS 36.331 for further information on the parameters in this table. | | | | | | |

#### A.6.2.16.2 Test Requirements

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

##### A.6.2.16.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.6.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 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 2 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 NPRACH 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 6.6.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5F.2 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

##### A.6.2.16.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated NPRACH 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 6.6.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5F.2 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

##### A.6.2.16.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.6.2.3, 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 re-transmissions defined by *maxNumPreambleAttemptCE* in the table A.6.2.16.1-4 is reached.

##### A.6.2.16.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, 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 NPRACH 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.6.2.16.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, 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.6.2.16.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.6.2.5, the System Simulator shall *not* send a response to a msg3.

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

##### A.6.2.16.2.7 NPRACH Resource Selection

The UE shall select NPRACH resources and transmits or re- transmits NPRACH preambles using the NPRACH resources and NPRACH configuration corresponding to the coverage enhancement level 0. The rate of correct coverage enhancement level selection during repeated tests shall be at least 90%.

Note: Correct coverage enhancement level selection is a prerequisite for testing the other NPRACH requirements.

### A.6.2.17 Contention Based Random Access Test for UE category NB1 UEs In-band mode in Enhanced Coverage

#### A.6.2.17.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a category NB1 UE in Enhanced Coverage is according to the requirements, whether the NPRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the NRSRP measurement and the configured criterion in NRSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.6.2, Clause 6.6.3 and Clause 7.20.2 in an AWGN model.

For this test a single NB-IoT cell and a single LTE cell are used. The test parameters are given in tables A.6.2.17.1-1, A.6.2.17.1-2 and A.6.2.17.1-4.

Table A.6.2.17.1-1: nCell specific test parameters for HD-FDD contention based random access test for UE category NB1 In-Band mode in Enhanced Coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | Comments | |
| NB-IOT operational mode |  | In-band |  | |
| BWchannel | kHz | 200 |  | |
| PRB location within eCell | - | eCell1 BWchannel 5MHz: 17  eCell1 BWchannel 10MHz: 30 |  | |
| NPDSCH parameters Note 2 |  | eCell1 BWchannel 5MHz: R.17 HD-FDD  eCell1 BWchannel 10MHz: R.15 HD-FDD | As defined in A.3.1.5.1 | |
| NPDCCH parameters Note 2 |  | eCell1 BWchannel 5MHz: R.39 HD-FDD  eCell1 BWchannel 10MHz: R.27 HD-FDD | As defined in A.3.1.6.1 | |
| NPBCH\_RA | dB | -3 |  | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RA Note 1 | dB |
| NOCNG\_RB Note 1 | dB |
| DRX |  | OFF |  | |
|  | dBm/15 kHz | Specified in Table A.6.2.17.1-2 |  | |
|  | dB | -12.5 |  | |
| Note 3 | dB | -12.5 |  | |
| NRSRP Note 3 | dBm/15 kHz | -110.5 |  | |
| Io Note 3 | dBm/180KHz | -86.97 |  | |
| Propagation Condition | - | AWGN |  | |
| Antenna Configuration |  | 2x1 |  | |
| Note 1: NOCNG 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 NPDSCH and NPDCCH 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, NRSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | |

Table A.6.2.17.1-2: eCell specific test parameters for HD-FDD contention based random access test for UE category NB1 In-Band mode in Enhanced Coverage

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| E-UTRA RF Channel Number |  | 1 |
| BWchannel | MHz | 5 or 10 |
| NOCNG Pattern Note 1 | - | BWchannel 5MHz: NOP.4 FDD  BWchannel 10MHz: NOP.1 FDD |
| PBCH\_RA | dB | -3 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RA Note 1 | dB |
| OCNG\_RB Note 1 | dB |
|  | dBm/15 kHz | -98 |
|  | dB | 3 |
| Propagation Condition | - | AWGN |
| Antenna Configuration | - | 2x1 |
| 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. | | |

Table A.6.2.17.1-3: Void

Table A.6.2.17.1-4: NPRACH-Configuration parameters for HD-FDD contention based random access test for UE category NB1 In-Band mode in Enhanced Coverage

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Field | Value | | | | Comment | |
| Parameters not per NPRACH resource | | | | | | |
| RSRP-ThresholdsNPRACH-InfoList | {35, 56} | | | | Corresponding to {-121, -100} dBm as defined in Section 9.1.22.9 | |
| nprach-CP-Length | us266dot7 | | | |  | |
| nrs-Power | -5 dBm/15 kHz | | | | As defined in clause 6.7.3 in TS 36.331. | |
| Backoff Parameter Index | 1 | | | | As defined in table 7.2-2 in TS 36.321 | |
| Configured UE transmitted power () | 23 dBm for power class 3,  20 dBm for power class 5,  14 dBm for power class 6 | | | | As defined in clause 6.2.5F in TS 36.101 | |
| powerRampingStep | dB2 | | | |  | |
| preambleInitialReceivedTargetPower | dBm-120 | | | |  | |
| preambleTransMax-CE | n6 | | | |  | |
| Parameters per NPRACH Resource | | | | | | |
| ***NPRACH Resource*** | *Level 0* | *Level 1* | *Level 2* |  | |
| nprach-Periodicity | ms40 | ms240 | ms1280 |  | |
| nprach-StartTime | ms8 | ms64 | ms512 |  | |
| nprach-SubcarrierOffset | n0 | n0 | n0 |  | |
| nprach-NumSubcarriers | n12 | n12 | n12 |  | |
| nprach-SubcarrierMSG3-RangeStart | zero | zero | zero |  | |
| maxNumPreambleAttemptCE | n3 | n6 | n10 |  | |
| numRepetitionsPerPreambleAttempt | n2 | n8 | n64 |  | |
| npdcch-NumRepetitions-RA | r4 | r16 | r128 |  | |
| npdcch-StartSF-CSS-RA | v1dot5 | v1dot5 | v1dot5 |  | |
| npdcch-Offset-RA | zero | zero | Zero |  | |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 |  | |
| ra-ResponseWindowSize (per NPRACH Resource) | pp2 | pp2 | pp2 |  | |
| mac-ContentionResolutionTimer (per NPRACH Resource) | pp8 | pp8 | pp8 |  | |
| Note 1: See Clause 6.7.3 in TS 36.331 for further information on the parameters in this table. | | | | | | |

#### A.6.2.17.2 Test Requirements

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

##### A.6.2.17.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.6.2, 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 NPRACH 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 6.6.2. The power of the first preamble shall be 23 dBm for power class 3, 20 dBm for power class 5 and 14 dBm for power class 6 with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

##### A.6.2.17.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.6.2.2, 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 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 NPRACH 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 23 dBm for power class 3, 20 dBm for power class 5 and 14 dBm for power class 6 with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

##### A.6.2.17.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.6.2.3, 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 re-transmissions defined by *maxNumPreambleAttemptCE* in the table A.6.2.17.1-4 is reached.

##### A.6.2.17.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, 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 NPRACH 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.6.2.17.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, 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.6.2.17.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.6.2.5, the System Simulator shall *not* send a response to a msg3.

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

##### A.6.2.17.2.7 NPRACH Resource Selection

The UE shall select NPRACH resources and transmits or re- transmits NPRACH preambles using the NPRACH resources and NPRACH configuration corresponding to the coverage enhancement level 1. The rate of correct coverage enhancement level selection during repeated tests shall be at least 90%.

Note: Correct coverage enhancement level Sselection requirement is a prerequisite already assumed for testing the other NPRACH requirements.

### A.6.2.18 Contention Based Random Access on Non-anchor Carrier Test for UE category NB1 UEs In-band mode in Enhanced Coverage

#### A.6.2.18.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a category NB1 UE in Enhanced Coverage is according to the requirements, whether the NPRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the NRSRP measurement and the configured criterion in NRSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.6.2, Clause 6.6.3 and Clause 7.20.2 in an AWGN model.

For this test a single NB-IoT cell and a single LTE cell are used. The test parameters are given in tables A.6.2.18.1-1, A.6.2.18.1-2 and A.6.2.18.1-3.

Table A.6.2.18.1-1: nCell specific test parameters for HD-FDD contention based random access on non-achor carrier test for UE category NB1 In-Band mode in Enhanced Coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | Comments | |
| NB-IOT operational mode |  | In-band |  | |
| BWchannel | kHz | 200 |  | |
| Anchor PRB location within eCell | - | eCell1 BWchannel 5MHz: 17  eCell1 BWchannel 10MHz: 30 |  | |
| Non-anchor PRB location within eCell |  | eCell1 BWchannel 5MHz: 18  eCell1 BWchannel 10MHz: 31 |  | |
| NPDSCH parameters Note 2 |  | eCell1 BWchannel 5MHz: R.17 HD-FDD  eCell1 BWchannel 10MHz: R.15 HD-FDD | As defined in A.3.1.5.1 | |
| NPDCCH parameters Note 2 |  | eCell1 BWchannel 5MHz: R.39 HD-FDD  eCell1 BWchannel 10MHz: R.27 HD-FDD | As defined in A.3.1.6.1 | |
| NPBCH\_RA | dB | -3 |  | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RA Note 1 | dB |
| NOCNG\_RB Note 1 | dB |
| DRX |  | OFF |  | |
|  | dBm/15 kHz | Specified in Table A.6.2.18.1-2 |  | |
|  | dB | -12.5 |  | |
| Note 3 | dB | -12.5 |  | |
| NRSRP Note 3 | dBm/15 kHz | -110.5 |  | |
| Io Note 3 | dBm/180 KHz | -86.97 |  | |
| Propagation Condition | - | AWGN |  | |
| Antenna Configuration |  | 2x1 |  | |
| Note 1: NOCNG 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 NPDSCH and NPDCCH 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, NRSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | |

Table A.6.2.18.1-2: eCell specific test parameters for HD-FDD contention based random access on non-achor carrier test for UE category NB1 In-Band mode in Enhanced Coverage

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| E-UTRA RF Channel Number |  | 1 |
| BWchannel | MHz | 5 or 10 |
| NOCNG Pattern Note 1 | - | BWchannel 5MHz: NOP.4 FDD  BWchannel 10MHz: NOP.1 FDD |
| PBCH\_RA | dB | -3 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RA Note 1 | dB |
| OCNG\_RB Note 1 | dB |
|  | dBm/15 kHz | -98 |
|  | dB | 3 |
| Propagation Condition | - | AWGN |
| Antenna Configuration | - | 2x1 |
| 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. | | |

Table A.6.2.18.1-3: NPRACH-Configuration parameters for HD-FDD contention based random access on non-anchor carrier test for UE category NB1 In-Band mode in Enhanced Coverage

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Field | Value | | | | Comment | |
| Parameters not per NPRACH resource | | | | | | |
| RSRP-ThresholdsNPRACH-InfoList | {35, 56} | | | | Corresponding to {-121, -100} dBm as defined in Section 9.1.22.9 | |
| nprach-CP-Length | us266dot7 | | | |  | |
| nrs-Power | -5 dBm/15 kHz | | | | As defined in clause 6.7.3 in TS 36.331. | |
| Backoff Parameter Index | 1 | | | | As defined in table 7.2-2 in TS 36.321 | |
| Configured UE transmitted power () | 23 dBm for power class 3,  20 dBm for power class 5,  14 dBm for power class 6 | | | | As defined in clause 6.2.5F in TS 36.101 | |
| powerRampingStep | dB2 | | | |  | |
| preambleInitialReceivedTargetPower | dBm-120 | | | |  | |
| preambleTransMax-CE | n6 | | | |  | |
| Parameters per NPRACH Resource | | | | | | |
| ***NPRACH Resource*** | *Level 0* | *Level 1* | *Level 2* |  | |
| nprach-ProbabilityAnchor | zero | zero | zero |  | |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 |  | |
| nprach-Periodicity | ms40 | ms240 | ms1280 |  | |
| nprach-StartTime | ms8 | ms64 | ms512 |  | |
| nprach-SubcarrierOffset | n0 | n0 | n0 |  | |
| nprach-NumSubcarriers | n12 | n12 | n12 |  | |
| nprach-SubcarrierMSG3-RangeStart | zero | zero | zero |  | |
| maxNumPreambleAttemptCE | n3 | n6 | n10 |  | |
| numRepetitionsPerPreambleAttempt | n2 | n8 | n64 |  | |
| npdcch-NumRepetitions-RA | r4 | r16 | r128 |  | |
| npdcch-StartSF-CSS-RA | v1dot5 | v1dot5 | v1dot5 |  | |
| npdcch-Offset-RA | zero | zero | Zero |  | |
| ra-ResponseWindowSize (per NPRACH Resource) | pp2 | pp2 | pp2 |  | |
| mac-ContentionResolutionTimer (per NPRACH Resource) | pp8 | pp8 | pp8 |  | |
| Note 1: See Clause 6.7.3 in TS 36.331 for further information on the parameters in this table. | | | | | |

#### A.6.2.18.2 Test Requirements

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

##### A.6.2.18.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.6.2, 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 NPRACH 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 6.6.2. The power of the first preamble shall be 23 dBm for power class 3, 20 dBm for power class 5 and 14 dBm for power class 6 with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

##### A.6.2.18.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.6.2.2, 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 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 NPRACH 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 6.6.2. The power of the first preamble shall be 23 dBm for power class 3, 20 dBm for power class 5 and 14 dBm for power class 6 with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

##### A.6.2.18.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.6.2.3, 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 re-transmissions defined by *maxNumPreambleAttemptCE* in the table A.6.2.18.1-3 is reached.

##### A.6.2.18.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, 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 NPRACH 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.6.2.18.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, 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.6.2.18.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.6.2.5, the System Simulator shall *not* send a response to a msg3.

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

##### A.6.2.18.2.7 NPRACH Resource Selection

The UE shall select NPRACH resources in non-anchor carrier and transmits or re- transmits NPRACH preambles using the NPRACH resources and NPRACH configuration corresponding to the coverage enhancement level 1. The rate of correct coverage enhancement level selection during repeated tests shall be at least 90%.

Note: Correct coverage enhancement level selection is a prerequisite for testing the other NPRACH requirements.

### A.6.2.19 TDD Contention Based Random Access Test for UE category NB1 UEs In-band mode in normal coverage

#### A.6.2.19.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a category NB1 UE in Normal Coverage is according to the requirements, whether the NPRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the NRSRP measurement and the configured criterion in NRSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.6.2, Clause 6.6.3 and Clause 7.20.2 in an AWGN model.

For this test a single NB-IoT cell and a single LTE cell are used. The test parameters are given in tables A.6.2.19.1-1, A.6.2.19.1-2 and A.6.2.19.1-3.

Table A.6.2.19.1-1: nCell specific test parameters for TDD contention based random access test for UE category NB1 In-Band mode in Normal Coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | Comments | |
| NB-IOT operational mode |  | In-band |  | |
| BWchannel | kHz | 200 |  | |
| PRB location within eCell | - | eCell1 BWchannel 10MHz: 30 |  | |
| NPDSCH parameters Note 2 |  | R.15 NB-TDD | Specified in section A.3.1.5.7 | |
| NPDCCH parameters Note 2 |  | R.27 NB-TDD | Specified in section A.3.1.6.1 | |
| NPBCH\_RA | dB | -3 |  | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RA Note 1 | dB |
| NOCNG\_RB Note 1 | dB |
| DRX |  | OFF |  | |
|  | dBm/15 kHz | Specified in Table A.6.2.19.1-2 |  | |
|  | dB | 3 |  | |
| Note 3 | dB | 3 |  | |
| NRSRP Note 3 | dBm/15 kHz | -95 |  | |
| Io Note 3 | dBm/180 KHz | -82.45 |  | |
| Propagation Condition | - | AWGN |  | |
| Antenna Configuration |  | 2x1 |  | |
| Note 1: NOCNG 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 NPDSCH and NPDCCH 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, NRSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | |

Table A.6.2.19.1-2: eCell specific test parameters for TDD contention based random access test for UE category NB1 In-Band mode in Normal Coverage

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| E-UTRA RF Channel Number |  | 1 |
| BWchannel | MHz | 10 |
| NOCNG Pattern Note 1 | - | NOP.1 TDD |
| PBCH\_RA | dB | -3 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RA Note 1 | dB |
| OCNG\_RB Note 1 | dB |
|  | dBm/15 kHz | -98 |
|  | dB | 3 |
| Propagation Condition | - | AWGN |
| Antenna Configuration | - | 2x1 |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

Table A.6.2.19.1-3: NPRACH-Configuration parameters for TDD contention based random access test for UE category NB1 In-Band mode in Normal Coverage

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Field | Value | | | | Comment | |
| Parameters not per NPRACH resource | | | | | | |
| RSRP-ThresholdsNPRACH-InfoList | {40, 55} | | | | Corresponding to {-116, -101} dBm as defined in Section 9.1.22.9 | |
| nprach-PreambleFormat | fmt-0 | | | | See TS 36.211 section 10.1.6 | |
| nrs-Power | -5 dBm/15 kHz | | | | As defined in clause 6.7.3 in TS 36.331. | |
| Backoff Parameter Index | 1 | | | | As defined in table 7.2-2 in TS 36.321 | |
| Configured UE transmitted power () | 23 dBm for power class 3,  20 dBm for power class 5,  14 dBm for power class 6 | | | | As defined in clause 6.2.5F in TS 36.101 | |
| powerRampingStep | dB2 | | | |  | |
| preambleInitialReceivedTargetPower | dBm-112 | | | |  | |
| preambleTransMax-CE | n6 | | | |  | |
| **Parameters per NPRACH Resource** | | | | | | |
| ***NPRACH Resource*** | ***Level 0*** | ***Level 1*** | ***Level 2*** |  | |
| nprach-Periodicity | ms80 | ms640 | ms5120 |  | |
| nprach-StartTime | ms10 | ms80 | ms640 |  | |
| nprach-SubcarrierOffset | n0 | n0 | n0 |  | |
| nprach-NumSubcarriers | n12 | n12 | n12 |  | |
| nprach-SubcarrierMSG3-RangeStart | zero | zero | zero |  | |
| maxNumPreambleAttemptCE | n3 | n6 | n10 |  | |
| numRepetitionsPerPreambleAttempt | n2 | n8 | n64 |  | |
| npdcch-NumRepetitions-RA | r4 | r16 | r128 |  | |
| npdcch-StartSF-CSS-RA | v4 | v4 | v4 |  | |
| npdcch-Offset-RA | zero | zero | Zero |  | |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 |  | |
| ra-ResponseWindowSize (per NPRACH Resource) | pp2 | pp2 | pp2 |  | |
| mac-ContentionResolutionTimer (per NPRACH Resource) | pp8 | pp8 | pp8 |  | |
| Note 1: See Clause 6.7.3 in TS 36.331 [2] for further information on the parameters in this table. | | | | | | |

#### A.6.2.19.2 Test Requirements

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

##### A.6.2.19.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.6.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 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 2 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 NPRACH 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 6.6.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5F.2 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

##### A.6.2.19.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated NPRACH 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 6.6.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5F.2 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

##### A.6.2.19.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.6.2.3, 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 re-transmissions defined by *maxNumPreambleAttemptCE* in the table A.6.2.19.1-3 is reached.

##### A.6.2.19.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, 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 NPRACH 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.6.2.19.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, 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.6.2.19.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.6.2.5, the System Simulator shall *not* send a response to a msg3.

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

##### A.6.2.19.2.7 NPRACH Resource Selection

The UE shall select NPRACH resources and transmits or re- transmits NPRACH preambles using the NPRACH resources and NPRACH configuration corresponding to the coverage enhancement level 0. The rate of correct coverage enhancement level selection during repeated tests shall be at least 90%.

Note: Correct coverage enhancement level selection is a prerequisite for testing the other NPRACH requirements.

### A.6.2.20 TDD Contention Based Random Access Test for UE category NB1 UEs In-band mode in enhanced coverage

#### A.6.2.20.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a category NB1 UE in Enhanced coverage is according to the requirements, whether the NPRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the NRSRP measurement and the configured criterion in NRSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.6.2, Clause 6.6.3 and Clause 7.20.2 in an AWGN model.

For this test a single NB-IoT cell and a single LTE cell are used. The test parameters are given in tables A.6.2.20.1-1, A.6.2.20.1-2 and A.6.2.20.1-3.

Table A.6.2.20.1-1: nCell specific test parameters for TDD contention based random access test for UE category NB1 In-Band mode in Enhanced coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | Comments | |
| NB-IOT operational mode |  | In-band |  | |
| BWchannel | kHz | 200 |  | |
| PRB location within eCell | - | eCell1 BWchannel 10MHz: 30 |  | |
| NPDSCH parameters Note 2 |  | R.15 NB-TDD | Specified in section A.3.1.5.7 | |
| NPDCCH parameters Note 2 |  | R.27 NB-TDD | Specified in section A.3.1.6.1 | |
| NPBCH\_RA | dB | -3 |  | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RA Note 1 | dB |
| NOCNG\_RB Note 1 | dB |
| DRX |  | OFF |  | |
|  | dBm/15 kHz | Specified in Table A.6.2.20.1-2 |  | |
|  | dB | -12.5 |  | |
| Note 3 | dB | -12.5 |  | |
| NRSRP Note 3 | dBm/15 kHz | -110.5 |  | |
| Io Note 3 | dBm/180 KHz | -86.97 |  | |
| Propagation Condition | - | AWGN |  | |
| Antenna Configuration |  | 2x1 |  | |
| Note 1: NOCNG 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 NPDSCH and NPDCCH 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, NRSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | |

Table A.6.2.20.1-2: eCell specific test parameters for TDD contention based random access test for UE category NB1 In-Band mode in Enhanced coverage

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| E-UTRA RF Channel Number |  | 1 |
| BWchannel | MHz | 10 |
| NOCNG Pattern Note 1 | - | NOP.1 TDD |
| PBCH\_RA | dB | -3 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RA Note 1 | dB |
| OCNG\_RB Note 1 | dB |
|  | dBm/15 kHz | -98 |
|  | dB | 3 |
| Propagation Condition | - | AWGN |
| Antenna Configuration | - | 2x1 |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

Table A.6.2.20.1-3: NPRACH-Configuration parameters for TDD contention based random access test for UE category NB1 In-Band mode in Enhanced coverage

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Field | Value | | | | Comment | |
| Parameters not per NPRACH resource | | | | | | |
| RSRP-ThresholdsNPRACH-InfoList | {35, 56} | | | | Corresponding to {-116, -101} dBm as defined in Section 9.1.22.9 | |
| nprach-PreambleFormat | fmt-0 | | | | See TS 36.211 section 10.1.6 | |
| nrs-Power | -5 dBm/15 kHz | | | | As defined in clause 6.7.3 in TS 36.331. | |
| Backoff Parameter Index | 1 | | | | As defined in table 7.2-2 in TS 36.321 | |
| Configured UE transmitted power () | 23 dBm for power class 3,  20 dBm for power class 5,  14 dBm for power class 6 | | | | As defined in clause 6.2.5F in TS 36.101 | |
| powerRampingStep | dB2 | | | |  | |
| preambleInitialReceivedTargetPower | dBm-120 | | | |  | |
| preambleTransMax-CE | n6 | | | |  | |
| **Parameters per NPRACH Resource** | | | | | | |
| ***NPRACH Resource*** | ***Level 0*** | ***Level 1*** | ***Level 2*** |  | |
| nprach-Periodicity | ms80 | ms640 | ms5120 |  | |
| nprach-StartTime | ms10 | ms80 | ms640 |  | |
| nprach-SubcarrierOffset | n0 | n0 | n0 |  | |
| nprach-NumSubcarriers | n12 | n12 | n12 |  | |
| nprach-SubcarrierMSG3-RangeStart | zero | zero | zero |  | |
| maxNumPreambleAttemptCE | n3 | n6 | n10 |  | |
| numRepetitionsPerPreambleAttempt | n2 | n8 | n64 |  | |
| npdcch-NumRepetitions-RA | r4 | r16 | r128 |  | |
| npdcch-StartSF-CSS-RA | v4 | v4 | v4 |  | |
| npdcch-Offset-RA | zero | zero | Zero |  | |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 |  | |
| ra-ResponseWindowSize (per NPRACH Resource) | pp2 | pp2 | pp2 |  | |
| mac-ContentionResolutionTimer (per NPRACH Resource) | pp8 | pp8 | pp8 |  | |
| Note 1: See Clause 6.7.3 in TS 36.331 [2] for further information on the parameters in this table. | | | | | | |

#### A.6.2.20.2 Test Requirements

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

##### A.6.2.20.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.6.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 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 2 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 NPRACH 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 6.6.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5F.2 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

##### A.6.2.20.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.6.2.2, 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 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 NPRACH 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 23 dBm for power class 3, 20 dBm for power class 5 and 14 dBm for power class 6 with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

##### A.6.2.20.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.6.2.3, 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 re-transmissions defined by *maxNumPreambleAttemptCE* in the table A.6.2.20.1-3 is reached.

##### A.6.2.20.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, 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 NPRACH 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.6.2.20.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, 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.6.2.20.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.6.2.5, the System Simulator shall *not* send a response to a msg3.

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

##### A.6.2.20.2.7 NPRACH Resource Selection

The UE shall select NPRACH resources and transmits or re- transmits NPRACH preambles using the NPRACH resources and NPRACH configuration corresponding to the coverage enhancement level 1. The rate of correct coverage enhancement level selection during repeated tests shall be at least 90%.

Note: Correct coverage enhancement level Sselection requirement is a prerequisite already assumed for testing the other NPRACH requirements.

### A.6.2.21 TDD Contention Based Random Access on Non-anchor Carrier Test for UE category NB1 UEs In-band mode in Enhanced Coverage

#### A.6.2.21.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a category NB1 UE in Enhanced Coverage is according to the requirements, whether the NPRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the NRSRP measurement and the configured criterion in NRSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.6.2, Clause 6.6.3 and Clause 7.20.2 in an AWGN model.

For this test a single NB-IoT cell and a single LTE cell are used. The test parameters are given in tables A.6.2.21.1-1, A.6.2.21.1-2 and A.6.2.21.1-3.

Table A.6.2.21.1-1: nCell specific test parameters for TDD contention based random access on non-anchor test for UE category NB1 In-Band mode in Enhanced Coverage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | Comments | |
| NB-IOT operational mode |  | In-band |  | |
| BWchannel | kHz | 200 |  | |
| PRB location within eCell | - | eCell1 BWchannel 10MHz: 30 |  | |
| NPDSCH parameters Note 2 |  | R.15 NB-TDD | Specified in section A.3.1.5.7 | |
| NPDCCH parameters Note 2 |  | R.27 NB-TDD | Specified in section A.3.1.6.1 | |
| NPBCH\_RA | dB | -3 |  | |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RA Note 1 | dB |
| NOCNG\_RB Note 1 | dB |
| DRX |  | OFF |  | |
|  | dBm/15 kHz | Specified in Table A.6.2.21.1-2 |  | |
|  | dB | -12.5 |  | |
| Note 3 | dB | -12.5 |  | |
| NRSRP Note 3 | dBm/15 kHz | -110.5 |  | |
| Io Note 3 | dBm/180 KHz | -86.97 |  | |
| Propagation Condition | - | AWGN |  | |
| Antenna Configuration |  | 2x1 |  | |
| Note 1: NOCNG 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 NPDSCH and NPDCCH 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, NRSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | |

Table A.6.2.21.1-2: eCell specific test parameters for TDD contention based random access on non-anchor test for UE category NB1 In-Band mode in Enhanced Coverage

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| E-UTRA RF Channel Number |  | 1 |
| BWchannel | MHz | 10 |
| NOCNG Pattern Note 1 | - | NOP.1 TDD |
| PBCH\_RA | dB | -3 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RA Note 1 | dB |
| OCNG\_RB Note 1 | dB |
|  | dBm/15 kHz | -98 |
|  | dB | 3 |
| Propagation Condition | - | AWGN |
| Antenna Configuration | - | 2x1 |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

Table A.6.2.21.1-3: NPRACH-Configuration parameters for TDD contention based random access on non-anchor test for UE category NB1 In-Band mode in Enhanced Coverage

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Field | Value | | | | Comment | |
| Parameters not per NPRACH resource | | | | | | |
| RSRP-ThresholdsNPRACH-InfoList | {35, 56} | | | | Corresponding to {-116, -101} dBm as defined in Section 9.1.22.9 | |
| nprach-PreambleFormat | fmt-0 | | | | See TS 36.211 section 10.1.6 | |
| nrs-Power | -5 dBm/15 kHz | | | | As defined in clause 6.7.3 in TS 36.331. | |
| Backoff Parameter Index | 1 | | | | As defined in table 7.2-2 in TS 36.321 | |
| Configured UE transmitted power () | 23 dBm for power class 3,  20 dBm for power class 5,  14 dBm for power class 6 | | | | As defined in clause 6.2.5F in TS 36.101 | |
| powerRampingStep | dB2 | | | |  | |
| preambleInitialReceivedTargetPower | dBm-120 | | | |  | |
| preambleTransMax-CE | n6 | | | |  | |
| **Parameters per NPRACH Resource** | | | | | | |
| ***NPRACH Resource*** | ***Level 0*** | ***Level 1*** | ***Level 2*** |  | |
| nprach-Periodicity | ms80 | ms640 | ms5120 |  | |
| nprach-StartTime | ms10 | ms80 | ms640 |  | |
| nprach-SubcarrierOffset | n0 | n0 | n0 |  | |
| nprach-NumSubcarriers | n12 | n12 | n12 |  | |
| nprach-SubcarrierMSG3-RangeStart | zero | zero | zero |  | |
| maxNumPreambleAttemptCE | n3 | n6 | n10 |  | |
| numRepetitionsPerPreambleAttempt | n2 | n8 | n64 |  | |
| npdcch-NumRepetitions-RA | r4 | r16 | r128 |  | |
| npdcch-StartSF-CSS-RA | v4 | v4 | v4 |  | |
| npdcch-Offset-RA | zero | zero | Zero |  | |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 |  | |
| ra-ResponseWindowSize (per NPRACH Resource) | pp2 | pp2 | pp2 |  | |
| mac-ContentionResolutionTimer (per NPRACH Resource) | pp8 | pp8 | pp8 |  | |
| Note 1: See Clause 6.7.3 in TS 36.331 [2] for further information on the parameters in this table. | | | | | | |

#### A.6.2.21.2 Test Requirements

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

##### A.6.2.21.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.6.2, 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 NPRACH 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 6.6.2. The power of the first preamble shall be 23 dBm for power class 3, 20 dBm for power class 5 and 14 dBm for power class 6 with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

##### A.6.2.21.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.6.2.2, 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 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 NPRACH 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 6.6.2. The power of the first preamble shall be 23 dBm for power class 3, 20 dBm for power class 5 and 14 dBm for power class 6 with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

##### A.6.2.21.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.6.2.3, 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 re-transmissions defined by *maxNumPreambleAttemptCE* in the table A.6.2.21.1-3 is reached.

##### A.6.2.21.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, 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 NPRACH 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.6.2.21.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, 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.6.2.21.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.6.2.5, the System Simulator shall *not* send a response to a msg3.

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

##### A.6.2.21.2.7 NPRACH Resource Selection

The UE shall select NPRACH resources in non-anchor carrier and transmits or re- transmits NPRACH preambles using the NPRACH resources and NPRACH configuration corresponding to the coverage enhancement level 1. The rate of correct coverage enhancement level selection during repeated tests shall be at least 90%.

Note: Correct coverage enhancement level selection is a prerequisite for testing the other NPRACH requirements.

## A.6.3 RRC Connection Release with Redirection

### A.6.3.1 Redirection from E-UTRAN FDD to UTRAN FDD

#### A.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct performing the RRC connection release with redirection to the target UTRAN FDD cell. This test will partly verify the RRC connection release with redirection to UTRAN FDD cell requirements in clause 6.3.2.1.

The test parameters are given in Tables A.6.3.1.1-1, A.6.3.1.1-2 and A.6.3.1.1-3 below. The test consists of two successive time periods, with time duration of T1, and T2 respectively. The “*RRCConnectionRelease*” message containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.6.3.1.1-1: General test parameters for RRC Connection Release with Redirection from E-UTRAN FDD to UTRAN FDD under AWGN propagation conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters (E-UTRAN FDD) |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters  (E-UTRAN FDD) |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Active cell |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| CP length |  | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 |  |
| UTRA RF Channel Number |  | 1 | One UTRA FDD carrier frequency is used. |
| Inter-RAT (UTRA FDD) measurement quantity |  | CPICH Ec/Io |  |
| Filter coefficient |  | 0 | L3 filtering is not used. |
| DRX |  | OFF |  |
| UTRA FDD cell list size |  | 16 | UTRA cells on UTRA RF channel 1 provided in the “*RRCConnectionRelease*” message from the E-UTRAN |
| T1 | s | ≤5 |  |
| T2 | s | 1 |  |

Table A.6.3.1.1-2: Cell specific test parameters for cell #1 E-UTRAN FDD to UTRAN FDD RRC release with redirection under AWGN propagation conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) |  | OP.1 FDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | 4 |
| Note 3 | dBm/15 kHz | -98 | |
|  | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH\_RP | dBm/15 kHz | -94 | -94 |
| 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.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: 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 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

Table A.6.3.1.1-3: Cell specific test parameters for cell #2 E-UTRAN FDD to UTRAN FDD RRC release with redirection under AWGN propagation conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
| T1 | T1 |
| UTRA RF Channel Number |  | 1 | |
| CPICH\_Ec/Ior | dB | -10 | |
| PCCPCH\_Ec/Ior | dB | -12 | |
| SCH\_Ec/Ior | dB | -12 | |
| PICH\_Ec/Ior | dB | -15 | |
| DPCH\_Ec/Ior | dB | N/A | |
| OCNS |  | -0.941 | |
|  | dB | -∞ | 0.02 |
|  | dBm/3.84 MHz | -70 | |
| CPICH\_Ec/IoNote 3 | dB | -∞ | -13 |
| Propagation Condition |  | AWGN | |
| Note 1: The DPCH level is controlled by the power control loop.  Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior.  Note 3: This gives an SCH Ec/Io of -15dB | | | |

#### A.6.3.1.2 Test Requirements

The UE shall start to transmit random access to Cell 2 less than 650 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to UTRAN FDD observed during repeated tests shall be at least 90%.

NOTE: The Re-establishment delay in this case can be expressed as

Tconnection\_release\_redirect\_UTRA FDD = TRRC\_procedure\_delay + Tidentify-UTRA FDD + TSI-UTRA FDD + TRA

where

TRRC\_procedure\_delay = 110 ms

Tidentify-UTRA FDD = 500 ms

TSI-UTRA FDD = the time required for acquiring all the relevant system information of the target UTRA FDD cell. This time depends upon whether the UE is provided with the relevant system information of the target UTRA FDD cell or not by the E-UTRAN before the RRC connection is released. 0 ms is assumed in this test case.

TRA = The additional delay caused by the random access procedure. 40 ms is assumed in this test case.

This gives a total of 650 ms.

### A.6.3.2 Redirection from E-UTRAN TDD to UTRAN FDD

#### A.6.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct performing the RRC connection release with redirection to the target UTRAN FDD cell. This test will partly verify the RRC connection release with redirection to UTRAN FDD cell requirements in clause 6.3.2.1.

The test parameters are given in Tables A.6.3.2.1-1, A.6.3.2.1-2 and A.6.3.2.1-3 below. The test consists of two successive time periods, with time duration of T1, and T2 respectively. The “*RRCConnectionRelease*” message containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of cell 2. Cell 2 is powered up at the beginning of the T2,

Table A.6.3.2.1-1: General test parameters for RRC Connection Release with Redirection from E-UTRAN TDD to UTRAN FDD under AWGN propagation conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters (E-UTRAN TDD) |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters  (E-UTRAN TDD) |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Active cell |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| CP length |  | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 |  |
| Special subframe configuration |  | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| UTRA RF Channel Number |  | 1 | One UTRA FDD carrier frequency is used. |
| Inter-RAT (UTRA FDD) measurement quantity |  | CPICH Ec/Io |  |
| Filter coefficient |  | 0 | L3 filtering is not used. |
| DRX |  | OFF |  |
| UTRA FDD cell list size |  | 16 | UTRA cells on UTRA RF channel 1 provided in the “*RRCConnectionRelease*” message from the E-UTRAN |
| T1 | s | ≤5 |  |
| T2 | s | 1 |  |

Table A.6.3.2.1-2: Cell specific test parameters for cell #1 E-UTRAN TDD to UTRAN FDD RRC release with redirection under AWGN propagation conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) |  | OP.1 TDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | 4 |
| Note 3 | dBm/15 kHz | -98 | |
|  | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH\_RP | dBm/15 kHz | -94 | -94 |
| 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.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: 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 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

Table A.6.3.2.1-3: Cell specific test parameters for cell #2 E-UTRAN TDD to UTRAN FDD RRC release with redirection under AWGN propagation conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
| T1 | T2 |
| UTRA RF Channel Number |  | 1 | |
| CPICH\_Ec/Ior | dB | -10 | |
| PCCPCH\_Ec/Ior | dB | -12 | |
| SCH\_Ec/Ior | dB | -12 | |
| PICH\_Ec/Ior | dB | -15 | |
| DPCH\_Ec/Ior | dB | N/A | |
| OCNS |  | -0.941 | |
|  | dB | -∞ | 0.02 |
|  | dBm/3.84 MHz | -70 | |
| CPICH\_Ec/IoNote 3 | dB | -∞ | -13 |
| Propagation Condition |  | AWGN | |
| Note 1: The DPCH level is controlled by the power control loop.  Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior.  Note 3: This gives an SCH Ec/Io of -15dB | | | |

#### A.6.3.2.2 Test Requirements

The UE shall start to transmit random access to Cell 2 less than 650 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to UTRA FDD observed during repeated tests shall be at least 90%.

NOTE: The Re-establishment delay in this case can be expressed as

Tconnection\_release\_redirect\_UTRA FDD = TRRC\_procedure\_delay + Tidentify-UTRA FDD + TSI-UTRA FDD + TRA

where

TRRC\_procedure\_delay = 110 ms

Tidentify-UTRA FDD = 500 ms

TSI-UTRA FDD = the time required for acquiring all the relevant system information of the target UTRA FDD cell. This time depends upon whether the UE is provided with the relevant system information of the target UTRA FDD cell or not by the E-UTRAN before the RRC connection is released. 0 ms is assumed in this test case.

TRA = The additional delay caused by the random access procedure. 40 ms is assumed in this test case.

This gives a total of 650 ms.

### A.6.3.3 Redirection from E-UTRAN FDD to GERAN when System Information is provided

#### A.6.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA FDD to the target GERAN cell within Tconnection\_release\_redirect\_GERAN. This test will partly verify the RRC connection release with redirection to GERAN requirements in clause 6.3.2.2.

The test parameters are given in Tables A.6.3.3.1-1, A.6.3.3.1-2 and A.6.3.3.1-3 below. No measurement gaps are configured. 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. The start of T2 is the instant when the last TTI containing the RRC message, “*RRCConnectionRelease*”, is received by the UE from cell 1. The “*RRCConnectionRelease*” message shall contain all the relevant system information of cell 2.

Table A.6.3.3.1-1: General test parameters for RRC connection release with redirection from E-UTRAN FDD to GERAN in AWGN

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters (E-UTRAN FDD) |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters  (E-UTRAN FDD) |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Active cell |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | Cell 2 | Cell 2 is on Absolute RF Channel Number 1 (GSM cell) |
| CP length |  | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 |  |
| DRX |  | OFF |  |
| Monitored GSM cell list size |  | 6 GSM neighbour including ARFCN 1 | GSM cells are provided in the “*RRCConnectionRelease*” message. |
| T1 | s | 5 |  |
| T2 | s | 2 |  |

Table A.6.3.3.1-2: Cell specific test parameters for E-UTRA FDD cell (cell #1) for RRC connection release with redirection from E-UTRAN FDD to GERAN in AWGN

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) |  | OP.1 FDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | 4 |
|  | dB | 4 | 4 |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH\_RP | dBm/15 kHz | -94 | -94 |
| 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.  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. | | | |

Table A.6.3.3.1-3: Cell specific test parameters for GERAN cell (cell #2) for RRC connection release with redirection from E-UTRAN FDD to GERAN in AWGN

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
| T1 | T2 |
| Absolute RF Channel Number |  | ARFNC 1 | |
| RXLEV | dBm | -Infinity | -75 |
| GSM BSIC |  | N/A | Valid |

#### A.6.3.3.2 Test Requirements

The UE shall begin to send access bursts on RACH of the target GERAN cell (cell #2) less than 1120 ms from the beginning of time period T2.

The rate of correct “RRC connection release with redirection to GERAN” observed during repeated tests shall be at least 90%.

NOTE: The test requirement in this test case is expressed as:

Tconnection\_release\_redirect\_ GERAN = TRRC\_procedure\_delay + Tidentify-GERAN + TSI-GERAN + TRA

TRRC\_procedure\_delay = 110 ms, which is the time for processing the received message “*RRCConnectionRelease*.

Tidentify-GERAN = 1000 ms, which is the time for identifying the target GERAN cell.

TSI-GERAN = 0; UE does not have to read the system information of the GERAN cell since all relevant SI is provided to the UE in the “*RRCConnectionRelease”* message.

TRA = 10 ms, which is about 2 GSM frames (2\*4.65 ms) to account for the GSM timing uncertainty.

### A.6.3.4 Redirection from E-UTRAN TDD to GERAN when System Information is provided

#### A.6.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA TDD to the target GERAN cell within Tconnection\_release\_redirect\_GERAN. This test will partly verify the RRC connection release with redirection to GERAN requirements in clause 6.3.2.2.

The test parameters are given in Tables A.6.3.4.1-1, A.6.3.4.1-2 and A.6.3.4.1-3 below. No measurement gaps are configured. 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. The start of T2 is the instant when the last TTI containing the RRC message, “*RRCConnectionRelease*”, is received by the UE from cell 1. The “*RRCConnectionRelease*” message shall contain all the relevant system information of cell 2.

Table A.6.3.4.1-1: General test parameters for RRC connection release with redirection from E-UTRAN TDD to GERAN in AWGN

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | Comment | |
| PDSCH parameters (E-UTRAN TDD) |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. | |
| PCFICH/PDCCH/PHICH parameters  (E-UTRAN TDD) |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. | |
| Active |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. | |
| Neighbour cell |  | Cell 2 | Cell 2 is on Absolute RF Channel Number 1 (GSM cell) | |
| CP length |  | Normal | Applicable to cell 1 | |
| Special subframe configuration |  | 6 | As specified in table 4.2.1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration |  | 1 |  |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA TDD carrier frequency is used. | |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 |  | |
| DRX |  | OFF |  | |
| Monitored GSM cell list size |  | 6 GSM neighbour including ARFCN 1 | GSM cells provided in the “*RRCConnectionRelease*” message. | |
| T1 | s | 5 |  | |
| T2 | s | 2 |  | |

Table A.6.3.4.1-2: Cell specific test parameters for E-UTRA TDD cell (cell #1) for RRC connection release with redirection from E-UTRAN TDD to GERAN in AWGN

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) |  | OP.1 TDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | 4 |
|  | dB | 4 | 4 |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH\_RP | dBm/15 kHz | -94 | -94 |
| 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.  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. | | | |

Table A.6.3.4.1-3: Cell specific test parameters for GERAN cell (cell #2) for RRC connection release with redirection from E-UTRAN TDD to GERAN in AWGN

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
| T1 | T2 |
| Absolute RF Channel Number |  | ARFNC 1 | |
| RXLEV | dBm | -Infinity | -75 |
| GSM BSIC |  | N/A | Valid |

#### A.6.3.4.2 Test Requirements

The UE shall begin to send access bursts on RACH of the target GERAN cell (cell #2) less than 1120 ms from the beginning of time period T2.

The rate of correct “RRC connection release with redirection to GERAN” observed during repeated tests shall be at least 90%.

NOTE: The test requirement in this test case is expressed as:

Tconnection\_release\_redirect\_ GERAN = TRRC\_procedure\_delay + Tidentify-GERAN + TSI-GERAN + TRA

TRRC\_procedure\_delay = 110 ms, which is the time for processing the received message “*RRCConnectionRelease*.

Tidentify-GERAN = 1000 ms, which is the time for identifying the target GERAN cell.

### A.6.3.5 E-UTRA TDD RRC connection release redirection to UTRA TDD

#### A.6.3.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA TDD to the target UTRA TDD cell within Tconnection\_release\_redirect\_UTRA TDD. This test will partly verify the RRC connection release with redirection to UTRA TDD requirements in clause 6.3.2.3.

The test parameters are given in table A.6.3.5.1-1, table A.6.3.5.1-2, and table A.6.3.5.1-3. No measurement gaps are configured. 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. The “*RRCConnectionRelease*” message containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message, “*RRCConnectionRelease*”, is received by the UE from cell 1. The “*RRCConnectionRelease*” message shall contain all the relevant system information of Cell 2.

Table A.6.3.5.1-1: General test parameters for E-UTRA TDD RRC connection release redirection to UTRA TDD

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters (E-UTRAN TDD) |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Active cell |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| Time offset between cells | ms | 3 | Asynchronous cells |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 |  |
| CP length |  | Normal | Applicable to cell 1 |
| Special subframe configuration of cell 1 |  | 6 | As specified in table 4.2.1 in TS 36.211 |
| Uplink-downlink configuration of cell 1 |  | 1 | As specified in table 4.2-2 in TS 36.211 |
| UTRA RF Channel Number |  | 1 | One UTRA TDD carrier frequency is used. |
| UTRA RF Channel Number |  | 1 | One UTRA TDD carrier frequency is used. |
| Filter coefficient |  | 0 | L3 filtering is not used. |
| DRX |  | OFF |  |
| Monitored UTRA TDD cell list size |  | 16 | UTRA cells on UTRA RF channel 1 provided in the “*RRCConnectionRelease*” message from the E-UTRAN |
| T1 | s | 5 |  |
| T2 | s | 1 |  |

Table A.6.3.5.1-2: Cell specific test parameters for cell 1 in E-UTRA TDD RRC connection release redirection to UTRA TDD test

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) |  | OP.1 TDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | 4 |
| Note 3 | dBm/15 kHz | -98 | |
|  | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH\_RP | dBm/15 kHz | -94 | -94 |
| 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.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: 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 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

Table A.6.3.5.1-3: Cell specific test parameters for cell 2 in E-UTRA TDD RRC connection release redirection to UTRA TDD test

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (UTRA TDD) | | | | |
| Timeslot Number |  | 0 | | | DwPTS | |
|  |  | T1 | | T2 | T1 | T2 |
| UTRA RF Channel NumberNote1 |  | Channel 1 | | | | |
| PCCPCH\_Ec/Ior | dB | -4.77 | | -4.77 |  |  |
| DwPCH\_Ec/Ior | dB |  | |  | 0 | 0 |
| OCNS\_Ec/IorNote2 | dB | -1.76 | | -1.76 |  |  |
|  | dB | -inf | | 8 | -inf | 8 |
|  | dBm/1.28 MHz | -80 | | | | |
| PCCPCH RSCP Note3 | dBm | -inf | -76.77 | | n.a. | n.a. |
| PCCPCH\_Ec/Io Note3 | dB | -inf | -5.41 | | n.a. | n.a. |
| DwPCH\_Ec/Io Note3 | dB | n.a. | n.a. | | -inf | -0.64 |
| Propagation Condition |  | AWGN | | | | |
| Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency’s channel number.  Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior.  Note 3: P-CCPCH RSRP, PCCPCH\_Ec/Io and DwPCH\_Ec/Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

#### A.6.3.5.2 Test Requirements

The UE shall start to transmit the SYNCH-UL sequence in the UpPTS to Cell 2 less than 650 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to UTRA TDD observed during repeated tests shall be at least 90%.

NOTE: The time delay can be expressed as: TRRC\_procedure\_delay + Tidentify-UTRA TDD + TSI-UTRA TDD + TRA, where:

TRRC\_procedure\_delay = 110 ms, which is specified in clause 6.3.2.3.

Tidentify-UTRA TDD = 500 ms; which is defined in clause 6.3.2.3.

TSI-UTRA TDD = 0 ms, UE does not have to read the system information of the UTRAN TDD since all relevant SI is provided to the UE in the “*RRCConnectionRelease*” message.

TRA = 40ms. This is the additional delay caused by the random access procedure

It gives a total delay of 650 ms.

### A.6.3.6 E-UTRA FDD RRC connection release redirection to UTRA TDD

#### A.6.3.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA FDD to the target UTRA TDD cell within Tconnection\_release\_redirect\_UTRA TDD. This test will partly verify the RRC connection release with redirection to UTRA TDD requirements in clause 6.3.2.3.

The test parameters are given in table A.6.3.6.1-1, table A.6.3.6.1-2, and table A.6.3.6.1-3. No measurement gaps are configured. 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. The “*RRCConnectionRelease*” message containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message, “*RRCConnectionRelease*”, is received by the UE from cell 1. The “*RRCConnectionRelease*” message shall contain all the relevant system information of Cell 2.

Table A.6.3.6.1-1: General test parameters for E-UTRA FDD RRC connection release redirection to UTRA TDD

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters (E-UTRAN FDD) |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Active cell |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| CP length |  | Normal | Applicable to cell 1 |
| Time offset between cells | ms | 3 | Asynchronous cells |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 |  |
| Filter coefficient |  | 0 | L3 filtering is not used. |
| DRX |  | OFF |  |
| Monitored UTRA TDD cell list size |  | 16 | UTRA cells on UTRA RF channel 1 provided in the “*RRCConnectionRelease*” message from the E-UTRAN |
| T1 | s | 5 |  |
| T2 | s | 1 |  |

Table A.6.3.6.1-2: Cell specific test parameters for cell 1 in E-UTRA FDD RRC connection release redirection to UTRA TDD test

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) |  | OP.1 FDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | 4 |
| Note 3 | dBm/15 kHz | -98 | |
|  | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH\_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition |  | AWGN | |
| 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: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: 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 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

Table A.6.3.6.1-3: Cell specific test parameters for cell 2 in E-UTRA FDD RRC connection release redirection to UTRA TDD test

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (UTRA TDD) | | | | |
| Timeslot Number |  | 0 | | | DwPTS | |
|  |  | T1 | | T2 | T1 | T2 |
| UTRA RF Channel NumberNote1 |  | Channel 1 | | | | |
| PCCPCH\_Ec/Ior | dB | -4.77 | | -4.77 |  |  |
| DwPCH\_Ec/Ior | dB |  | |  | 0 | 0 |
| OCNS\_Ec/IorNote2 | dB | -1.76 | | -1.76 |  |  |
|  | dB | -inf | | 8 | -inf | 8 |
|  | dBm/1.28 MHz | -80 | | | | |
| PCCPCH RSCP Note3 | dBm | -inf | -76.77 | | n.a. | n.a. |
| PCCPCH\_Ec/Io Note3 | dB | -inf | -5.41 | | n.a. | n.a. |
| DwPCH\_Ec/Io Note3 | dB | n.a. | n.a. | | -inf | -0.64 |
| Propagation Condition |  | AWGN | | | | |
| Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency’s channel number.  Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior.  Note 3: P-CCPCH RSRP, PCCPCH\_Ec/Io and DwPCH\_Ec/Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

#### A. 6.3.6.2 Test Requirements

The UE shall start to transmit the SYNCH-UL sequence in the UpPTS to Cell 2 less than 650 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to UTRA TDD observed during repeated tests shall be at least 90%.

NOTE: The time delay can be expressed as: TRRC\_procedure\_delay + Tidentify-UTRA TDD + TSI-UTRA TDD + TRA, where:

TRRC\_procedure\_delay = 110 ms, which is specified in clause 6.3.2.3.

Tidentify-UTRA TDD = 500 ms; which is defined in clause 6.3.2.3.

TSI-UTRA TDD = 0 ms, UE does not have to read the system information of the UTRAN TDD since all relevant SI is provided to the UE in the “*RRCConnectionRelease*” message.

TRA = 40ms. This is the additional delay caused by the random access procedure.

This gives a total delay of 650 ms.

### A.6.3.7 E-UTRA TDD RRC connection release redirection to UTRA TDD without SI provided

#### A.6.3.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA TDD to the target UTRA TDD cell within Tconnection\_release\_redirect\_UTRA TDD. This test will partly verify the RRC connection release with redirection to UTRA TDD requirements in clause 6.3.2.3.

The test parameters are given in table A.6.3.7.1-1, table A.6.3.7.1-2, and table A.6.3.7.1-3. No measurement gaps are configured. 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. The “*RRCConnectionRelease*” message not containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message, “*RRCConnectionRelease*”, is received by the UE from Cell 1.

Table A.6.3.7.1-1: General test parameters for E-UTRA TDD RRC connection release redirection to UTRA TDD without SI provided

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters (E-UTRAN TDD) |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Active cell |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| Time offset between cells | ms | 3 | Asynchronous cells |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 |  |
| CP length |  | Normal | Applicable to cell 1 |
| Uplink-downlink configuration of cell 1 |  | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 |  | 6 | As specified in table 4.2.1 in TS 36.211 |
| UTRA RF Channel Number |  | 1 | One UTRA TDD carrier frequency is used. |
| Filter coefficient |  | 0 | L3 filtering is not used. |
| DRX |  | OFF |  |
| Monitored UTRA TDD cell list size |  | none | No explicit neighbour list is provided to the UE |
| T1 | s | 5 |  |
| T2 | s | 2 |  |

Table A.6.3.7.1-2: Cell specific test parameters for cell 1 in E-UTRA TDD RRC connection release redirection to UTRA TDD test without SI provided

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) |  | OP.1 TDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | 4 |
| Note 3 | dBm/15 kHz | -98 | |
|  | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH\_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition |  | AWGN | |
| 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: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: 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 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

Table A.6.3.7.1-3: Cell specific test parameters for cell 2 in E-UTRA TDD RRC connection release redirection to UTRA TDD test without SI provided

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (UTRA TDD) | | | | |
| Timeslot Number |  | 0 | | | DwPTS | |
|  |  | T1 | | T2 | T1 | T2 |
| UTRA RF Channel NumberNote1 |  | Channel 1 | | | | |
| PCCPCH\_Ec/Ior | dB | -4.77 | | -4.77 |  |  |
| DwPCH\_Ec/Ior | dB |  | |  | 0 | 0 |
| OCNS\_Ec/IorNote2 | dB | -1.76 | | -1.76 |  |  |
|  | dB | -inf | | 8 | -inf | 8 |
|  | dBm/1.28 MHz | -80 | | | | |
| PCCPCH RSCP Note3 | dBm | -inf | -76.77 | | n.a. | n.a. |
| PCCPCH\_Ec/Io Note3 | dB | -inf | -5.41 | | n.a. | n.a. |
| DwPCH\_Ec/Io Note3 | dB | n.a. | n.a. | | -inf | -0.64 |
| Propagation Condition |  | AWGN | | | | |
| Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency’s channel number.  Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior.  Note 3: P-CCPCH RSRP, PCCPCH\_Ec/Io and DwPCH\_Ec/Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

#### A.6.3.7.2 Test Requirements

The UE shall start to transmit the SYNCH-UL sequence in the UpPTS to Cell 2 less than 1930 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to UTRA TDD observed during repeated tests shall be at least 90%.

NOTE: The time delay can be expressed as: TRRC\_procedure\_delay + Tidentify-UTRA TDD + TSI-UTRA TDD + TRA, where:

TRRC\_procedure\_delay = 110 ms, which is specified in clause 6.3.2.3.

Tidentify-UTRA TDD = 500 ms; which is defined in clause 6.3.2.3.

TSI-UTRA TDD: Maximum repetition period of relevant system info blocks that need to be received by the UE during RRC connection release redirection to UTRA TDD cell. 1280 ms is assumed in this test case.

TRA = 40ms, this is the additional delay caused by the random access procedure.

This gives a total delay of 1930 ms.

### A.6.3.8 E-UTRA FDD RRC connection release redirection to UTRA TDD without SI provided

#### A.6.3.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA FDD to the target UTRA TDD cell within Tconnection\_release\_redirect\_UTRA TDD. This test will partly verify the RRC connection release with redirection to UTRA TDD requirements in clause 6.3.2.3.

The test parameters are given in table A.6.3.8.1-1, table A.6.3.8.1-2, and table A.6.3.8.1-3. No measurement gaps are configured. 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. The “*RRCConnectionRelease*” message not containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message, “*RRCConnectionRelease*”, is received by the UE from Cell 1.

Table A.6.3.8.1-1: General test parameters for E-UTRA FDD RRC connection release redirection to UTRA TDD without SI provided

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters (E-UTRAN FDD) |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Active cell |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| Time offset between cells | ms | 3 | Asynchronous cells |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 |  |
| CP length |  | Normal | Applicable to cell 1 |
| UTRA RF Channel Number |  | 1 | One UTRA TDD carrier frequency is used. |
| Filter coefficient |  | 0 | L3 filtering is not used. |
| DRX |  | OFF |  |
| Monitored UTRA TDD cell list size |  | none | No explicit neighbour list is provided to the UE |
| T1 | S | 5 |  |
| T2 | S | 2 |  |

Table A.6.3.8.1-2: Cell specific test parameters for cell 1 in E-UTRA FDD RRC connection release redirection to UTRA TDD test without SI provided

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) |  | OP.1 FDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | 4 |
| Note 3 | dBm/15 kHz | -98 | |
|  | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH\_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition |  | AWGN | |
| 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: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: 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 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

Table A.6.3.8.1-3: Cell specific test parameters for cell 2 in E-UTRA FDD RRC connection release redirection to UTRA TDD test without SI provided

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (UTRA TDD) | | | | |
| Timeslot Number |  | 0 | | | DwPTS | |
|  |  | T1 | | T2 | T1 | T2 |
| UTRA RF Channel NumberNote1 |  | Channel 1 | | | | |
| PCCPCH\_Ec/Ior | dB | -4.77 | | -4.77 |  |  |
| DwPCH\_Ec/Ior | dB |  | |  | 0 | 0 |
| OCNS\_Ec/IorNote2 | dB | -1.76 | | -1.76 |  |  |
|  | dB | -inf | | 8 | -inf | 8 |
|  | dBm/1.28 MHz | -80 | | | | |
| PCCPCH RSCP Note3 | dBm | -inf | -76.77 | | n.a. | n.a. |
| PCCPCH\_Ec/Io Note3 | dB | -inf | -5.41 | | n.a. | n.a. |
| DwPCH\_Ec/Io Note3 | dB | n.a. | n.a. | | -inf | -0.64 |
| Propagation Condition |  | AWGN | | | | |
| Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency’s channel number.  Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior.  Note 3: P-CCPCH RSRP, PCCPCH\_Ec/Io and DwPCH\_Ec/Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

#### A.6.3.8.2 Test Requirements

The UE shall start to transmit the SYNCH-UL sequence in the UpPTS to Cell 2 less than 1930 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to UTRA TDD observed during repeated tests shall be at least 90%.

NOTE: The time delay can be expressed as: TRRC\_procedure\_delay + Tidentify-UTRA TDD + TSI-UTRA TDD + TRA, where:

TRRC\_procedure\_delay = 110 ms, which is specified in clause 6.3.2.3.

Tidentify-UTRA TDD = 500 ms; which is defined in clause 6.3.2.3.

TSI-UTRA TDD: Maximum repetition period of relevant system info blocks that need to be received by the UE during RRC connection release redirection to UTRA TDD cell. 1280 ms is assumed in this test case.

TRA = 40ms, this is the additional delay caused by the random access procedure.

This gives a total delay of 1930 ms.

### A.6.3.9 Redirection from E-UTRAN FDD to UTRAN FDD without System Information

#### A.6.3.9.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct performing the RRC connection release with redirection to the target UTRAN FDD cell. This test will partly verify the RRC connection release with redirection to UTRAN FDD cell requirements in clause 6.3.2.1.

The test parameters are given in Tables A.6.3.9.1-1, A.6.3.9.1-2 and A.6.3.9.1-3 below. The test consists of two successive time periods, with time duration of T1, and T2 respectively. The “*RRCConnectionRelease*” message not containing any system information of Cell 2 shall be sent to the UE during period T1. The start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.6.3.9.1-1: General test parameters for RRC Connection Release with Redirection from E-UTRAN FDD to UTRAN FDD under AWGN propagation conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters (E-UTRAN FDD) |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters  (E-UTRAN FDD) |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Active cell |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| CP length |  | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 |  |
| UTRA RF Channel Number |  | 1 | One UTRA FDD carrier frequency is used. |
| Inter-RAT (UTRA FDD) measurement quantity |  | CPICH Ec/Io |  |
| Filter coefficient |  | 0 | L3 filtering is not used. |
| DRX |  | OFF |  |
| UTRA FDD cell list size |  | None | No explicit neighbour list is provided to the UE |
| T1 | s | ≤5 |  |
| T2 | s | 2 |  |

Table A.6.3.9.1-2: Cell specific test parameters for cell #1 E-UTRAN FDD to UTRAN FDD RRC release with redirection under AWGN propagation conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) |  | OP.1 FDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | 4 |
| Note 3 | dBm/15 kHz | -98 | |
|  | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH\_RP | dBm/15 kHz | -94 | -94 |
| 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.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: 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 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

Table A.6.3.9.1-3: Cell specific test parameters for cell #2 E-UTRAN FDD to UTRAN FDD RRC release with redirection under AWGN propagation conditions

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | | Cell 2 | | | |
| T1 | | T1 | |
| UTRA RF Channel Number | |  | | 1 | | | |
| CPICH\_Ec/Ior | | dB | | -10 | | | |
| PCCPCH\_Ec/Ior | | dB | | -12 | | | |
| SCH\_Ec/Ior | | dB | | -12 | | | |
| PICH\_Ec/Ior | | dB | | -15 | | | |
| DPCH\_Ec/Ior | | dB | | N/A | | | |
| OCNS | |  | | -0.941 | | | |
|  | | dB | | -∞ | | 0.02 | |
|  | | dBm/3.84 MHz | | -70 | | | |
| CPICH\_Ec/IoNote 3 | | dB | | -∞ | | -13 | |
| Propagation Condition | |  | | AWGN | | | |
| Note 1: The DPCH level is controlled by the power control loop.  Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior.  Note 3: This gives an SCH Ec/Io of -15dB | | | | | | | |

#### A.6.3.9.2 Test Requirements

The UE shall start to send random access to the target UTRA FDD cell (Cell 2) less than 1930 ms from the beginning of time period T2.

The rate of correct “RRC connection release with redirection to UTRAN” observed during repeated tests shall be at least 90%.

NOTE: The test requirement in this case can be expressed as

Tconnection\_release\_redirect\_UTRA FDD = TRRC\_procedure\_delay + Tidentify-UTRA FDD + TSI-UTRA FDD + TRA

where

TRRC\_procedure\_delay = 110 ms

Tidentify-UTRA FDD = 500 ms

TSI-UTRA FDD = the time required for acquiring all the relevant system information of the target UTRA FDD cell. This time depends upon whether the UE is provided with the relevant system information of the target UTRA FDD cell or not by the E-UTRAN before the RRC connection is released. Since no SI is provided, 1280 ms is assumed in this test case.

TRA = The additional delay caused by the random access procedure. 40 ms is assumed in this test case.

This gives a total of 1930 ms.

### A.6.3.10 Redirection from E-UTRAN FDD to GERAN when System Information is not provided

#### A.6.3.10.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA FDD to the target GERAN cell within Tconnection\_release\_redirect\_GERAN. This test will partly verify the RRC connection release with redirection to GERAN requirements in clause 6.3.2.2.

The test parameters are given in Tables A.6.3.10.1-1, A.6.3.10.1-2 and A.6.3.10.1-3 below. No measurement gaps are configured. 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. The start of T2 is the instant when the last TTI containing the RRC message, “*RRCConnectionRelease*”, is received by the UE from cell 1. The “*RRCConnectionRelease*” message shall not contain any system information of cell 2.

Table A.6.3.10.1-1: General test parameters for RRC connection release with redirection from E-UTRAN FDD to GERAN in AWGN

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters (E-UTRAN FDD) |  | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters  (E-UTRAN FDD) |  | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Active cell |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | Cell 2 | Cell 2 is on Absolute RF Channel Number 1 (GSM cell) |
| CP length |  | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 |  |
| DRX |  | OFF |  |
| Monitored GSM cell list size |  | 6 GSM neighbour including ARFCN 1 | Only the list of GERAN carrier frequencies is provided in the “*RRCConnectionRelease*” message. |
| T1 | s | ≤5 |  |
| T2 | s | 4 |  |

Table A.6.3.10.1-2: Cell specific test parameters for E-UTRA FDD cell (cell #1) for RRC connection release with redirection from E-UTRAN FDD to GERAN in AWGN

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) |  | OP.1 FDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | 4 |
|  | dB | 4 | 4 |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH\_RP | dBm/15 kHz | -94 | -94 |
| 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.  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. | | | |

Table A.6.3.10.1-3: Cell specific test parameters for GERAN cell (cell #2) for RRC connection release with redirection from E-UTRAN FDD to GERAN in AWGN

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
| T1 | T2 |
| Absolute RF Channel Number |  | ARFNC 1 | |
| RXLEV | dBm | -Infinity | -75 |
| GSM BSIC |  | N/A | Valid |

#### A.6.3.10.2 Test Requirements

The UE shall begin to send access bursts on RACH of the target GERAN cell (cell #2) less than 3020 ms from the beginning of time period T2.

The rate of correct “RRC connection release with redirection to GERAN” observed during repeated tests shall be at least 90%.

NOTE: The test requirement in this test case is expressed as:

Tconnection\_release\_redirect\_ GERAN = TRRC\_procedure\_delay + Tidentify-GERAN + TSI-GERAN + TRA

TRRC\_procedure\_delay = 110 ms, which is the time for processing the received message “*RRCConnectionRelease*.

Tidentify-GERAN = 1000 ms, which is the time for identifying the target GERAN cell.

TSI-GERAN = 1900 ms, which is the maximum time allowed to read BCCH data from the target GERAN cell.

TRA = 10 ms, which is about 2 GSM frames (2\*4.65 ms) to account for the GSM timing uncertainty.

### A.6.3.11 Redirection from E-UTRAN TDD to GERAN when System Information is not provided

#### A.6.3.11.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA TDD to the target GERAN cell within Tconnection\_release\_redirect\_GERAN. This test will partly verify the RRC connection release with redirection to GERAN requirements in clause 6.3.2.2.

The test parameters are given in Tables A.6.3.11.1-1, A.6.3.11.1-2 and A.6.3.11.1-3 below. No measurement gaps are configured. 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. The start of T2 is the instant when the last TTI containing the RRC message, “*RRCConnectionRelease*”, is received by the UE from cell 1. The “*RRCConnectionRelease*” message shall not contain any system information of cell 2.

Table A.6.3.11.1-1: General test parameters for RRC connection release with redirection from E-UTRAN TDD to GERAN in AWGN

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters (E-UTRAN TDD) |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters  (E-UTRAN TDD) |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Active |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | Cell 2 | Cell 2 is on Absolute RF Channel Number 1 (GSM cell) |
| CP length |  | Normal | Applicable to cell 1 |
| Special subframe configuration |  | 6 | As specified in table 4.2.1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration |  | 1 |  |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 |  |
| DRX |  | OFF |  |
| Monitored GSM cell list size |  | 6 GSM neighbour including ARFCN 1 | Only the list of GERAN carrier frequencies is provided in the “*RRCConnectionRelease*” message. |
| T1 | s | ≤5 |  |
| T2 | s | 4 |  |

Table A.6.3.11.1-2: Cell specific test parameters for E-UTRA TDD cell (cell #1) for RRC connection release with redirection from E-UTRAN TDD to GERAN in AWGN

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) |  | OP.1 TDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | 4 |
|  | dB | 4 | 4 |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH\_RP | dBm/15 kHz | -94 | -94 |
| 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.  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. | | | |

Table A.6.3.11.1-3: Cell specific test parameters for GERAN cell (cell #2) for RRC connection release with redirection from E-UTRAN TDD to GERAN in AWGN

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
| T1 | T2 |
| Absolute RF Channel Number |  | ARFNC 1 | |
| RXLEV | dBm | -Infinity | -75 |
| GSM BSIC |  | N/A | Valid |

#### A.6.3.11.2 Test Requirements

The UE shall begin to send access bursts on RACH of the target GERAN cell (cell #2) less than 3020 ms from the beginning of time period T2.

The rate of correct “RRC connection release with redirection to GERAN” observed during repeated tests shall be at least 90%.

NOTE: The test requirement in this test case is expressed as:

Tconnection\_release\_redirect\_ GERAN = TRRC\_procedure\_delay + Tidentify-GERAN + TSI-GERAN + TRA

TRRC\_procedure\_delay = 110 ms, which is the time for processing the received message “*RRCConnectionRelease*.

Tidentify-GERAN = 1000 ms, which is the time for identifying the target GERAN cell.

TSI-GERAN = 1900 ms, which is the maximum time allowed to read BCCH data from the target GERAN cell.

TRA = 10 ms, which is about 2 GSM frames (2\*4.65 ms) to account for the GSM timing uncertainty.

### A.6.3.12 E-UTRAN TDD RRC connection release redirection to UTRAN FDD without SI provided

#### A.6.3.12.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRAN TDD to the target UTRAN FDD cell within Tconnection\_release\_redirect\_UTRAN FDD. This test will partly verify the RRC connection release with redirection to UTRAN FDD requirements in clause 6.3.2.1.

The test parameters are given in table A.6.3.12.1-1, table A.6.3.12.1-2, and table A.6.3.12.1-3. 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. The “*RRCConnectionRelease*” message not containing any system information of Cell 2 shall be sent to the UE during period T1. The start of T2 is the instant when the last TTI containing the RRC message, “*RRCConnectionRelease*”, is received by the UE from Cell 1.

Table A.6.3.12.1-1: General test parameters for E-UTRAN TDD RRC connection release redirection to UTRAN FDD without SI provided

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters (E-UTRAN TDD) |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Active cell |  | Cell 1 | Cell 1 is on E-UTRAN RF channel number 1. |
| Neighbour cell |  | Cell 2 | Cell 2 is on UTRAN RF channel number 1. |
| E-UTRAN RF Channel Number |  | 1 | One E-UTRAN TDD carrier frequency is used. |
| E-UTRAN Channel Bandwidth (BWchannel) | MHz | 10 |  |
| Uplink-downlink configuration of cell 1 |  | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 |  | 6 | As specified in table 4.2.1 in TS 36.211 |
| CP length |  | Normal | Applicable to cell 1 |
| UTRAN RF Channel Number |  | 1 | One UTRAN TDD carrier frequency is used. |
| Filter coefficient |  | 0 | L3 filtering is not used. |
| DRX |  | OFF |  |
| Monitored UTRAN FDD cell list size |  | None | No explicit neighbour list is provided to the UE |
| T1 | s | ≤5 |  |
| T2 | s | 2 |  |

Table A.6.3.12.1-2: Cell specific test parameters for cell 1 in E-UTRAN TDD RRC connection release redirection to UTRAN FDD test without SI provided

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | |
| T1 | T2 |
| E-UTRAN RF Channel Number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) |  | OP.1 TDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 4 | 4 |
| Note 3 | dBm/15 kHz | -98 | |
|  | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH\_RP | dBm/15 kHz | -94 | -94 |
| 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.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: 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 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

Table A.6.3.12.1-3: Cell specific test parameters for cell 2 in E-UTRAN TDD RRC connection release redirection to UTRAN FDD test without SI provided

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | | |
| T1 | T1 | |
| UTRAN RF Channel Number |  | 1 | | |
| CPICH\_Ec/Ior | dB | -10 | | |
| PCCPCH\_Ec/Ior | dB | -12 | | |
| SCH\_Ec/Ior | dB | -12 | | |
| PICH\_Ec/Ior | dB | -15 | | |
| DPCH\_Ec/Ior | dB | N/A | | |
| OCNS |  | -0.941 | | |
|  | dB | -∞ | 0.02 | |
|  | dBm/3.84 MHz | -70 | | |
| CPICH\_Ec/IoNote 3 | dB | -∞ | | -13 |
| Propagation Condition |  | AWGN | | |
| Note 1: The DPCH level is controlled by the power control loop.  Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior.  Note 3: This gives an SCH Ec/Io of -15dB | | | | |

#### A.6.3.12.2 Test Requirements

The UE shall start to send random access to the target UTRAN FDD cell (Cell 2) less than 1930 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to UTRAN FDD observed during repeated tests shall be at least 90%.

NOTE: The time delay can be expressed as: TRRC\_procedure\_delay + Tidentify-UTRAN FDD + TSI-UTRAN FDD + TRA, where:

TRRC\_procedure\_delay = 110 ms, which is specified in clause 6.3.2.1.

Tidentify-UTRAN FDD = 500 ms; which is defined in clause 6.3.2.1.

TSI-UTRAN FDD: Maximum repetition period of relevant system info blocks that need to be received by the UE during RRC connection release redirection to UTRAN FDD cell. 1280 ms is assumed in this test case.

TRA = 40ms, this is the additional delay caused by the random access procedure.

This gives a total delay of 1930 ms.