8 E-UTRA - NR inter-RAT with E-UTRA serving cell

## 8.0 General

This clause contains test scenarios for E-UTRA - NR inter-RAT with the serving cell in E-UTRA. The NR cells can be in FR1, FR2 or both.

For conformance testing involving FR2 test cases in this specification, the UE under test shall be pre-configured with UL Tx diversity schemes disabled to account for single polarization System Simulator (SS) in the test environment. The UE under test may transmit with dual polarization.

## 8.1 Void

8.2 RRC\_IDLE state mobility

8.2.1 Inter-RAT cell re-selection

#### 8.2.1.0 Minimum conformance requirements

##### 8.2.1.0.1 Minimum conformance requirements for E-UTRA-NR FR1 inter-RAT cell reselection

[TS 36.133, clause 4.2.1]

When the UE is in either *Camped* *Normally* state or *Camped on Any Cell* state on a cell, the UE shall attempt to detect, synchronise, and monitor intra-frequency, inter-frequency and inter-RAT cells indicated by the serving cell. UE measurement activity is also controlled by measurement rules defined in TS36.304, allowing the UE to limit its measurement activity.

[TS 36.133, clause 4.2.2]

The UE shall search every layer of higher priority at least every Thigher\_priority\_search = (60 \* Nlayers) seconds when the UE is not configured with eDRX\_IDLE cycle, and at least every Thigher\_priority\_search = MAX(60 \* Nlayers, one eDRX\_IDLE cycle) when UE is configured with eDRX\_IDLE cycle, where Nlayers is the total number of configured higher priority E-UTRA, UTRA FDD, UTRA TDD, CDMA2000 1x, HRPD and NR carrier frequencies and is additionally increased by one if one or more groups of GSM frequencies is configured as a higher priority.

[TS 36.133, clause 4.2.2.5.6]

If Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ then the UE shall search for inter-RAT NR layers of higher priority at least every Thigher\_priority\_search where Thigher\_priority\_search is described in TS 36.133 clause 4.2.2.

If Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ then the UE shall search for and measure inter-RAT NR layers of higher, lower priority in preparation for possible reselection. In this scenario, the minimum rate at which the UE is required to search for and measure higher priority inter-RAT NR layers shall be the same as that defined below for lower priority RATs.

The requirements in this clause apply for inter-RAT NR measurements. When the measurement rules indicate that inter-RAT NR cells are to be measured, the UE shall measure SS-RSRP and SS-RSRQ of detected NR cells in the neighbour frequency list at the minimum measurement rate specified in this clause.

If Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ, a carrier is indicated to meet high speed requirement if *highSpeedInterRAT-NR-r16* is configured and the carrier to be measured is configured with *highSpeedCarrierNR-r16*. If Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, the UE is required to meet non high speed requirements no matter whether *highSpeedInterRAT-NR-r16* or *highSpeedCarrierNR-r16* is configured or not. The parameter NNR\_carrier is the number of configured NR carriers indicated to meet non high speed requirement in the neighbour frequency list. NNR\_carrier\_HST is the number of configured carriers for reselection indicated to meet high speed requirements. The parameter NNR\_carrier for a UE configured with idle mode DC measurements (while T331 is running) is the combined number of configured NR carriers indicated to meet non high speed requirement in the neighbour frequency list, and NR carriers configured for idle mode DC measurements.

NOTE: Combined total number means that if a carrier is indicated in the neighbour frequency list and additionally a carrier configured for idle mode DC measurements, it only counts as one carrier.

The UE shall filter SS-RSRP and SS-RSRQ measurements of each measured NR cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least half the minimum specified measurement period.

The UE shall be able to evaluate whether a newly detectable inter-RAT NR cell meets the reselection criteria defined in TS 36.304 [1] within NNR\_carrier\_HST \* Tdetect, NR\_HST + NNR\_carrier \* Tdetect, NR

when Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ when Treselection = 0 provided that the reselection criteria is met by a margin of at least 5 dB in FR1 or 6.5 dB in FR2 for reselections based on ranking or 6 dB in FR1 or 7.5 dB in FR2 for SS-RSRP reselections based on absolute priorities or 4 dB in FR1 and 4 dB in FR2 for SS-RSRQ reselections based on absolute priorities.

When higher priority cells are found by the higher priority search, they shall be measured at least every Tmeasure,NR. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the minimum measurement filtering requirements specified later in this clause shall still be met by the UE before it makes any determination that it may stop measuring the cell.

If the UE detects on an inter-RAT NR carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall not consider an inter-RAT NR cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

Cells which have been detected shall be measured at least every NNR\_carrier\_HST \* Tmeasure, NR\_HST + NNR\_carrier \* Tmeasure, NR when Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ.

For a cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that an already identified inter-RAT NR cell has met reselection criterion defined in TS 36.304 [1] within NNR\_carrier\_HST \* Tevaluate, NR\_HST + NNR\_carrier \* Tevaluate, NR when Treselection = 0as specified in Table 8.2.1.0.1-1 and table 8.2.1.0.1-2 provided that the reselection criteria is met by a margin of at least 5dB in FR1 or 6.5 dB in FR2 for reselections based on ranking or 6 dB in FR1 or 7.5 dB in FR2 for SS-RSRP reselections based on absolute priorities or 4 dB in FR1 and 4 dB in FR2 for SS-RSRQ reselections based on absolute priorities.

If Treselection timer has a non-zero value and the inter-RAT NR cell is satisfied with the reselection criteria which are defined in TS 36.304 [1], the UE shall evaluate this NR cell for the Treselection time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

Table 8.2.1.0.1-1: Tdetect,NR, TmeasureNR, and Tevaluate,NR

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DRX cycle length [s] | Scaling Factor (N1) | | Tdetect,NR [s] (number of DRX cycles) | Tmeasure,NR [s] (number of DRX cycles) | Tevaluate,NR  [s] (number of DRX cycles) |
| FR1 | FR2Note1 |
| 0.32 | 1 | 8 | 11.52 x 1.5 x N1  (36 x 1.5 x N1) | 1.28 x 1.5 x N1  (4 x 1.5 x N1) | 5.12 x 1.5 x N1  (16 x 1.5 x N1) |
| 0.64 | 5 | 17.92 x N1  (28 x N1) | 1.28 x N1  (2 x N1) | 5.12 x N1  (8 x N1) |
| 1.28 | 4 | 32 x N1  (25 x N1) | 1.28 x N1  (1 x N1) | 6.4 x N1  (5 x N1) |
| 2.56 | 3 | 58.88 x N1  (23 x N1) | 2.56 x N1  (1 x N1) | 7.68 x N1  (3 x N1) |
| NOTE: Applies for UE supporting power class 2&3&4. For UE supporting power class 1, N1 = 8 for all DRX cycle length. | | | | | |

Table 8.2.1.0.1-2: Tdetect,NR\_HST, TmeasureNR\_HST, and Tevaluate,NR\_HST for UE configured with highSpeedInterRAT-NR-r16

|  |  |  |  |
| --- | --- | --- | --- |
| DRX cycle length [s] | Tdetect,NR\_HST [s] (number of DRX cycles) | Tmeasure,NR\_HST [s] (number of DRX cycles) | Tevaluate,NR\_HST  [s] (number of DRX cycles) |
|
| 0.32 | 4.16 x M2 (13 x M2)Note 2 | 0.64 x M3 (2 x M3)Note 2 | 0.96 x M4 (3 x M4) Note 2 |
| 0.64 | 7.68 (12)) | 1.28 (2) | 1.92 (3) |
| 1.28 | 12.8(10) | 1.28 (1) | 3.84 (3) |
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) |
| NOTE 1: FR2 high speed requirements are not specified.  NOTE 2: M2=1.5, M3=2 and M4=2 if SMTC periodicity of measured intra-frequency cell > 40 ms; otherwise M2=1. | | | |

The normative reference for this requirement is TS 36.133 clause 4.2.1, 4.2.2, 4.2.2.5.6.

#### 8.2.1.1 E-UTRA - NR FR1 cell re-selection to higher priority NR target cell

8.2.1.1.1 Test purpose

The purpose of this test is to verify the requirement for the E-UTRAN to NR inter-RAT cell reselection requirements specified in TS 36.133 [23] clause 4.2.2.5.6.

8.2.1.1.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

8.2.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.2.1.0.

The normative reference for this requirement is TS 38.133 [6] clause A.8.2.1.1.

8.2.1.1.4 Test description

There are two cells configured in this test, the E-UTRA Cell 1 and NR Cell 2. NR Cell 2 is the PCell and E-UTRA Cell 1 is the neighbour cell. This 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.

8.2.1.1.4.1 Initial conditions

This test shall be tested under any of the test configuration in Table 8.2.1.1.4.1-1.

Table 8.2.1.1.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 8.2.1.1-1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.2.1.1-2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.2.1.1-3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 8.2.1.1-4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.2.1.1-5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.2.1.1-6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test requirement and the DUT according to the parameters in Table 8.2.1.1.4.1-2.

Table 8.2.1.1.4.1-2: Initial conditions for E-UTRA - NR FR1 cell re-selection to  
higher priority NR target cell

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.2.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.2.1.1.4.1-3.

2. Message contents are defined in clause 8.2.1.1.4.3.

3. The test scenario comprises of one NR cell and one E-UTRAN cell. NR Cell 2 is the PCell and E-UTRA Cell 1 is the neighbour cell. E-UTRA Cell 1 is configured according to TS 36.521-3 [26] clauses C.1.0 and C.1.1 and NR Cell 2 is configured according to clauses C.1.1 and C.1.2.

Table 8.2.1.1.4.1-3: General test parameters for E-UTRA -  
NR FR1 cell re-selection to higher priority NR target cell

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4, 5, 6 | Cell2 | The UE camps on cell 2 in the initial phase |
|  | Neighbour cells |  | 1, 2, 3, 4, 5, 6 | Cell1 |  |
| T1 end condition | Active cell |  |  | Cell1 | During T1 period the UE reselects to cell 1 |
|  | Neighbour cell |  |  | Cell2 |  |
| T3 end condition | Active cell |  | 1, 2, 3, 4, 5, 6 | Cell2 | The UE shall perform reselection to cell 2 during T3 |
| Neighbour cell |  | 1, 2, 3, 4, 5, 6 | Cell1 |
| RF Channel Number | |  | 1, 2, 3, 4, 5, 6 | 1, 2 | E-UTRAN radio channel (1) and NR radio channel (2) are used for this test |
| Time offset between cells | |  | 1, 4 | 3 ms | Asynchronous cells |
| 2, 5 | 3 μs | Synchronous cells |
| 3, 6 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3, 4, 5, 6 | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1, 2, 3, 4, 5, 6 | 1.28 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2, 3, 4, 5, 6 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| T1 | | s | 1, 2, 3, 4, 5, 6 | 15 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3, 4, 5, 6 | >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 | 1, 2, 3, 4, 5, 6 | 75 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

8.2.1.1.4.2 Test procedure

Two cells are deployed in the test, which are one NR PCell (NR Cell 2) and a E-UTRA neighbour cell (E-UTRA Cell 1). 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. NR Cell 2 is of higher priority than E-UTRA Cell 1.

In the following test procedure "UE responds" means "UE starts transmitting preamble on PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure.

1. The SS shall send a *RRCRelease* message on NR Cell 2 to ensure the UE is in State RRC\_IDLE with generic procedure parameters connectivity = *NR* with Test Mode *On* according to TS 38.508-1 [14] clause 4.5 on Cell 2.

2. The SS shall set the parameters according to T1 in Table 8.2.1.1.5-1 and 8.2.1.1.5-2 at the same time instance *RRCRelease* message is sent on NR Cell 2, T1 starts.

3. The SS waits for random access requests information from the UE to perform cell re-selection on the lower priority cell, E-UTRA Cell 1.

4. If the UE responds on lower priority cell, E-UTRA Cell 1 during time duration T1 within 8 seconds from the beginning of time period T1, then count a success for the event "Re-select lower priority Cell 1". Otherwise count a fail for the event "Re-select lower priority Cell 1".

5. If the UE has re-selected E-UTRA Cell 1 within T1, after the re-selection or when T1 expires, continue with step 5a. Otherwise, if T1 expires and the UE has not yet re-selected Cell 1, the TE shall switch off and on the UE and skip to step 11.

5a. The SS shall send an *RRCConnectionRelease* message to ensure that the UE is in state RRC\_IDLE on Cell 1.

6. The SS shall switch the power setting from T1 to T2 as specified in Table 8.2.1.1.5-1. During time duration T2, Cell 2 shall be powered OFF and the physical cell identity = ((current Cell 2 physical cell identity + 1) mod 1008) shall be changed to ensure Cell 2 is not detected by the UE, T2 starts.

7. When T2 expires, the SS shall switch the power setting from T2 to T3 as specified in Table 8.2.1.1.5-1, T3 starts.

8. The SS waits for random access requests information from the UE to perform cell re-selection on the higher priority cell, NR Cell 2.

9. If the UE responds on higher priority cell, NR Cell 2 during time duration T3 within 68 seconds from the beginning of time period T3, then count a success for the event "Re-select higher priority Cell 2". Otherwise count a fail for the event "Re-select higher priority Cell 2".

10. If the UE has re-selected Cell 2 within T3, after the re-selection or when T3 expires, continues with step 10a.  
Otherwise, if T3 expires and the UE has not yet re-selected Cell 2, the TE shall switch off and on the UE and continue with step 11.

10a.The SS shall send an *RRCRelease* message on NR Cell 2 to ensure that the UE is in state RRC\_IDLE with generic procedure parameters connectivity = NR with Test Mode On according to TS 38.508-1 [14] clause 4.5 on Cell 2.

11. The SS shall set the parameters according to T1 in Table 8.2.1.1.5-1 and 8.2.1.1.5-2 at the same time instance *RRCRelease* message is sent on NR Cell 2.

12. Repeat step 2-11 until a test verdict has been achieved.  
Each of the events "Re-select lower priority Cell 1" and "Re-select higher priority Cell 2" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G clause G.2 is achieved. Different events may require different times for a verdict.  
If both events pass, the test passes. If one event fails, the test fails.

8.2.1.1.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.2.1.1.4.3-1: Common Exception messages

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions | Table H.2.3-1  Table H.2.3-2 with condition lower priority  Table H.2.3-3 with condition lower priority |
| Default RRC messages and information elements contents exceptions |  |

Table 8.2.1.1.4.3-2: *SystemInformationBlockType3*

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 Table 4.4.3.3-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| SystemInformationBlockType3 ::= SEQUENCE { |  |  |  |
| cellReselectionServingFreqInfo SEQUENCE { |  |  |  |
| s-NonIntraSearch | 25 | Actual value = 50 dB |  |
| threshServingLow | 22 | Actual value = 44 dB |  |
| } |  |  |  |
| } |  |  |  |

Table 8.2.1.1.4.3-3: SystemInformationBlockType24

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508, Table 4.4.3.3-20 with Condition FR1 | | | |
| Information Element | Value/remark | Comment | Condition |
| SystemInformationBlockType24-r15 ::= SEQUENCE { |  |  |  |
| carrierFreqListNR-r15 SEQUENCE (SIZE (1..maxFreq)) OF SEQUENCE { | 1 entry |  |  |
| measTimingConfig-r15[1] SEQUENCE { |  |  |  |
| periodicityAndOffset-r15 CHOICE { |  |  |  |
| sf20-r15 | 0 |  |  |
| } |  |  |  |
| ssb-Duration-r15 | sf5 | Asynchronous cells | Configuration 1,4 |
|  | sf2 | Synchronous cells | Configuration 2,3,5,6 |
| } |  |  |  |
| subcarrierSpacingSSB-r15[1] | kHz15 |  | Configuration 1,2,4,5 |
|  | kHz30 |  | Configuration 3,6 |
| threshX-High-r15[1] | 24 | Actual value = 48 dB |  |
| threshX-Low-r15[1] | 25 | Actual value = 50 dB |  |
| q-RxLevMin-r15[1] | -70 | Actual value = -140 dBm | Configuration 1,2,4,5 |
|  | -69 | Actual value = -137 dBm, Round down | Configuration 3,6 |
| } |  |  |  |
| } |  |  |  |

Table 8.2.1.1.4.3-4: Void

Table 8.2.1.1.4.3-5: Void

8.2.1.1.5 Test requirement

Tables 8.2.1.1.4.1-3, 8.2.1.1.5-1 and 8.2.1.1.5-2 define the primary level settings including test tolerances for higher priority NR cell re-selection test case.

Table 8.2.1.1.5-1: NR Cell specific test parameters for E-UTRA -  
NR FR1 cell re-selection to higher priority NR target cell

| Parameter | Unit | Test configuration | Cell 2 | | |
| --- | --- | --- | --- | --- | --- |
| T1 | T2 | T3 |
| TDD configuration |  | 1, 4 | N/A | | |
| 2, 5 | TDDConf.1.1 | | |
| 3, 6 | TDDConf.2.1 | | |
| PDSCH Reference measurement channel |  | 1, 4 | SR.1.1 FDD | | |
| 2, 5 | SR.1.1 TDD | | |
| 3, 6 | SR.2.1 TDD | | |
| RMSI CORESET Reference Channel |  | 1, 4 | CR.1.1 FDD | | |
| 2, 5 | CR.1.1 TDD | | |
| 3, 6 | CR.2.1 TDD | | |
| RMC CORESET Reference Channel |  | 1, 4 | CCR.1.1 FDD | | |
| 2, 5 | CCR.1.1 TDD | | |
| 3, 6 | CCR.2.1 TDD | | |
| OCNG Patterns |  | 1, 2, 3, 4, 5, 6 | OP.1 | | |
| SMTC configuration |  | 1, 2, 3, 4, 5, 6 | SMTC.1 | | |
| SSB configuration |  | 1, 4 | SSB.1 FR1 | | |
| 2, 5 | SSB.1 FR1 | | |
| 3, 6 | SSB.2 FR1 | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4, 5, 6 | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6 | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2, 4, 5 | -140 | | |
| 3, 6 | -137 | | |
| Pcompensation | dB | 1, 2, 3, 4, 5, 6 | 0 | | |
| Qhysts | dB | 1, 2, 3, 4, 5, 6 | 0 | | |
| Qoffsets, n | dB | 1, 2, 3, 4, 5, 6 | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3, 4, 5, 6 | SS-RSRP | | |
|  | dB | 1, 4 | -3.65 | -infinity | 13.55 |
| 2, 5 |
| 3, 6 |
| Note2 | dBm/SCS | 1, 4 | -99.90 | -98 | -98 |
| 2, 5 | -99.90 | -98 | -98 |
| 3, 6 | -96.90 | -95 | -95 |
| Note2 | dBm/15 kHz | 1, 4 | -99.90 | -98 | -98 |
| 2, 5 |
| 3, 6 |
|  | dB | 1, 4 | -3.65 | -infinity | 13.55 |
| 2, 5 |
| 3, 6 |
| SS-RSRP Note3 | dBm/SCS | 1, 4 | -103.55 | -infinity | -84.45 |
| 2, 5 | -103.55 | -infinity | -84.45 |
| 3, 6 | -100.54 | -infinity | -81.44 |
| Io | dBm/9.36 MHz | 1, 4 | -70.39 | -70.05 | -56.31 |
| dBm/9.36 MHz | 2, 5 | -70.39 | -70.05 | -56.31 |
| dBm/38.16 MHz | 3, 6 | -64.29 | -63.94 | -50.21 |
| Treselection | s | 1, 2, 3, 4, 5, 6 | 0 | 0 | 0 |
| SnonintrasearchP | dB | 1, 2, 3, 4, 5, 6 | 50 | | |
| Threshx, highP | dB | 1, 2, 3, 4, 5, 6 | 48 | | |
| Threshserving, lowP | dB | 1, 2, 3, 4, 5, 6 | 44 | | |
| Threshx, lowP | dB | 1, 2, 3, 4, 5, 6 | 50 | | |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | 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: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

Table 8.2.1.1.5-2: E-UTRA Cell specific test parameters for for E-UTRA - NR FR1 cell re-selection to higher priority NR target cell

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | |
| T1 | T2 | T3 |
| E-UTRA RF Channel number |  | 1 | | |
| BWchannel | MHz | 10 | | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | | |
| 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/15 kHz | -98 | | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -82.45 |
|  | dB | 14 | 14 | 15.55 |
|  | dB | 14 | 14 | 15.55 |
| TreselectionEUTRAN | S | 0 | | |
| SnonintrasearchP | dB | 50 | | |
| Threshx, highP | dB | 48 | | |
| Threshserving, lowP | dB | 44 | | |
| Threshx, lowP | dB | 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. | | | | |

The cell reselection delay to a higher priority NR cell 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 *RRCSetupRequest* message to perform a Registration procedure for mobility on cell 2.

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

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

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

Where:

Thigher\_priority\_search is the higher priority search period, Thigher\_priority\_search = 60 s according to TS 36.133 [23], clause 4.2.2;

Tevaluate, NR is the evaluation time for NR Cell, Tevaluate, NR = 6400 ms according TS 36.133 [23], Table 4.2.2.5.6-1;

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

Tevaluate, E-UTRAN is the evaluation time for E-UTRAN Cell, Tevaluate, E-UTRAN = 6400 ms according TS 38.133 [6], Table 4.2.2.5-1;

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

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority NR cell and 7.68 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 8 s.

#### 8.2.1.2 E-UTRA - NR FR1 Cell reselection to lower priority NR target Cell in FR1 for UE configured with highSpeedInterRAT-NR-r16

8.2.1.2.1 Test purpose

The purpose of this test is to verify the requirement for the E-UTRAN to NR inter-RAT cell reselection requirements specified in TS 36.133 [23] clause 4.2.2.5.6.

8.2.1.2.2 Test applicability

This test applies to all types of NR UE configured with highSpeedInterRAT-NR-r16 from Release 15 onwards.

8.2.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.2.1.0.

The normative reference for this requirement is TS 38.133 [6] clause A.8.2.1.2.

8.2.1.2.4 Test description

8.2.1.2.4.1 Initial conditions

This test shall be tested under any of the test configuration in Table 8.2.1.2.4.1-1.

Table 8.2.1.2.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 8.2.1.2-1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.2.1.2-2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.2.1.2-3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 8.2.1.2-4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.2.1.2-5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.2.1.2-6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test requirement and the DUT according to the parameters in Table 8.2.1.2.4.1-2.

Table 8.2.1.2.4.1-2: Initial conditions for E-UTRA - NR FR1 cell re-selection to lower priority NR target cell in FR1 for UE configured with highSpeedInterRAT-NR-r16

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.2.1.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.2.1.2.4.1-3.

2. Message contents are defined in clause 8.2.1.2.4.3.

3. The test scenario comprises of one NR cell and one E-UTRAN cell. E-UTRA Cell 1 is configured according to TS 36.521-3 [26] clause C.1.0 and C.1.1 and NR Cell 2 is configured according to clauses C.1.1 and C.1.2.

4. In SIB of the E-UTRA cell, highSpeedInterRAT-NR-r16 is configured and the carrier of NR cell is configured with highSpeedCarrierNR-r16.

Table 8.2.1.2.4.1-3: General test parameters for E-UTRA - NR FR1 cell re-selection  
to lower priority NR target cell in FR1 for UE configured with highSpeedInterRAT-NR-r16

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4, 5, 6 | Cell1 | The UE camps on cell 1 in the initial phase |
| T1 end condition | Active cell |  | 1, 2, 3, 4, 5, 6 | Cell2 | The UE shall perform reselection to cell 2 during T1 |
|  | Neighbour cells |  | 1, 2, 3, 4, 5, 6 | Cell1 |
| T2 end condition | Active cell |  | 1, 2, 3, 4, 5, 6 | Cell1 | The UE shall perform reselection to cell 1 during T2 for iteration of the tests. |
|  | Neighbour cells |  | 1, 2, 3, 4, 5, 6 | Cell2 |
| RF Channel Number | |  | 1, 2, 3, 4, 5, 6 | 1, 2 | E-UTRAN radio channel (1) and NR radio channel (2) are used for this test |
| Time offset between cells | |  | 1, 4 | 3 ms | Asynchronous cells |
|  | | 2, 5 | 3 μs | Synchronous cells |
|  | | 3, 6 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3, 4, 5, 6 | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1, 2, 3, 4, 5, 6 | 0.32 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2, 3, 4, 5, 6 | 102 | The detailed configuration is specified in TS 38.211 [7] clause 6.3.3.2 |
| T1 | | s | 1, 2, 3, 4, 5, 6 | 15 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3, 4, 5, 6 | 75 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |

8.2.1.2.4.2 Test procedure

Two cells are deployed in the test, which are one E-UTRA Cell 1 and NR Cell 2. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cells are already identified by the UE prior to the start of the test. NR Cell 2 is of lower priority than E-UTRA Cell 1. UE is camped on E-UTRA Cell 1 during the initial phase of the test.

In the following test procedure "UE responds" means "UE starts transmitting preamble on PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure.

1. Ensure the UE is in State RRC\_IDLE with generic procedure parameters Connectivity EUTRA/EPC with Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to T2 in Table 8.2.1.2.5-1 and 8.2.1.2.5-2. Then wait 5s to ensure that Cell 2 has been detected by the UE.

3. Set the parameters according to T1 in Table 8.2.1.2.5-1 and 8.2.1.2.5-2, T1 starts.

4. The SS waits for random access requests information from the UE to perform cell re-selection on the lower priority NR Cell 2.

5. If the UE responds on lower priority cell, NR Cell 2 during time duration T1 within 3 seconds from the beginning of time period T1, then count a success for the event "Re-select lowe priority Cell 2".  
Otherwise count a fail for the event "Re-select lower priority Cell 2".

6. If the UE has re-selected Cell 2 within T1, after the re-selection or when T1 expires, continue with step 7.   
Otherwise, if T1 expires and the UE has not yet re-selected Cell 2, skip to step 10.

7. The SS shall switch the power setting from T1 to T2 as specified in Table Table 8.2.1.2.5-1 and 8.2.1.2.5-2. T2 starts.

8. The SS waits for random access requests information from the UE to perform cell re-selection on the higher priority E-UTRA Cell 1.

9. If the UE has re-selected Cell 1 within T2, after the re-selection or when T2 expires, skip to step 11.  
Otherwise, if T2 expires and the UE has not yet re-selected Cell 1, the TE shall switch off and on the UE and continue with step 10.

10. Ensure the UE is in state RRC\_IDLE with generic procedure parameters Connectivity EUTRA/EPC with Test Mode *On* according to TS 38.508-1 [14] clause 4.5 in Cell 1.

11. Repeat step 3-9 the confidence level according to Table G.2.3-1 in Annex G is achieved.

8.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.2.1.2.4.3-1: Common Exception messages

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions | Table H.2.1-3 with Condition HighSpeedMeas  Table H.2.3-1  Table H.2.3-2 with condition higher priority  Table H.2.3-3 with condition higher priority |
| Default RRC messages and information elements contents exceptions |  |

Table 8.2.1.2.4.3-2: SystemInformationBlockType3

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [25] Table 4.4.3.3-2 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| SystemInformationBlockType3 ::= SEQUENCE { |  |  |  |
| cellReselectionServingFreqInfo SEQUENCE { |  |  |  |
| s-NonIntraSearch | 25 | Actual value = 50 dB |  |
| threshServingLow | 22 | Actual value = 44 dB |  |
| cellReselectionPriority | 5 |  | higher priority E-UTRA |
| } |  |  |  |
| } |  |  |  |

Table 8.2.1.2.4.3-3: highSpeedCarrierNR-r16 in SystemInformationBlockType24

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508, Table 4.4.3.3-20 with Condition FR1 | | | |
| Information Element | Value/remark | Comment | Condition |
| SystemInformationBlockType24-r15 ::= SEQUENCE { |  |  |  |
| carrierFreqListNR-r15 SEQUENCE (SIZE (1..maxFreq)) OF SEQUENCE { | 1 entry |  |  |
| measTimingConfig-r15[*n*] SEQUENCE { |  |  |  |
| periodicityAndOffset-r15 CHOICE { |  |  |  |
| sf20 | 0 |  |  |
| } |  |  |  |
| ssb-Duration-r15 | sf5 | Asynchronous cells | Configuration 1,4 |
|  | sf2 | Synchronous cells | Configuration 2,3,5,6 |
| } |  |  |  |
| subcarrierSpacingSSB-r15[1] | kHz15 |  | Configuration 1,2,4,5 |
| kHz30 |  | Configuration 3,6 |
| cellReselectionPriority-r15[*n*] | 4 |  | higher priority E-UTRA |
| threshX-High-r15[1] | 24 | Actual value = 48 dB |  |
| threshX-Low-r15[1] | 25 | Actual value = 50 dB |  |
| q-RxLevMin-r15[1] | -70 | Actual value = -140 dBm | Configuration 1,2,4,5 |
| -69 | Actual value = -137 dBm, Round down | Configuration 3,6 |
| } |  |  |  |
| carrierFreqListNR-v1610 ::= SEQUENCE {(SIZE (1..maxFreq)) OF SEQUENCE { | 1 entry |  |  |
| highSpeedCarrierNR-r16 | TRUE |  |  |
| } |  |  |  |

Table 8.2.1.2.4.3-4: highSpeedInterRAT-NR-r16 configuration

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 Table 4.6.3-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| RadioResourceConfigCommonSIB::= SEQUENCE { |  |  |  |
| highSpeedInterRAT-NR-r16 | TRUE |  |  |
| } |  |  |  |

Table 8.2.1.2.4.3-5: *SIB2*

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1, Table 4.6.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB2 ::= SEQUENCE { |  |  |  |
| cellReselectionServingFreqInfo SEQUENCE { |  |  |  |
| s-NonIntraSearchP | Not present |  |  |
| } |  |  |  |
| } |  |  |  |

Table 8.2.1.2.4.3-6: SIB5

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: Table H.2.3-3 with Condition higher priority | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB5 ::= SEQUENCE { |  |  |  |
| carrierFreqListEUTRA-v1610 SEQUENCE (SIZE (1..maxEUTRA-Carrier)) OF CarrierFreqEUTRA-v1610 { | 1 entry | carrierFreqListEUTRA-v1610 and carrierFreqListEUTRA contain same number of entries. And the entries are listed in the same order |  |
| CarrierFreqEUTRA-v1610[1] SEQUENCE { |  | entry 1 |  |
| highSpeedEUTRACarrier-r16 | true |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

8.2.1.2.5 Test requirement

Tables 8.2.1.2.4.1-3, 8.2.1.2.5-1 and 8.2.1.2.5-2 define the primary level settings including test tolerances for higher priority E-UTRA cell re-selection test case.

Table 8.2.1.2.5-1: NR Cell specific test parameters for E-UTRA - NR FR1 cell re-selection to  
lower priority NR target cell for UE configured with highSpeedInterRAT-NR-r16

| Parameter | Unit | Test configuration | Cell 2 | |
| --- | --- | --- | --- | --- |
|  |  | T1 | T2 |
| TDD configuration |  | 1, 4 | N/A | |
|  |  | 2, 5 | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | |
| PDSCH Reference measurement channel |  | 1, 4 | SR.1.1 FDD | |
|  |  | 2, 5 | SR.1.1 TDD | |
|  |  | 3, 6 | SR.2.1 TDD | |
| RMSI CORESET Reference Channel |  | 1, 4 | CR.1.1 FDD | |
|  |  | 2, 5 | CR.1.1 TDD | |
|  |  | 3, 6 | CR.2.1 TDD | |
| RMC CORESET Reference Channel |  | 1, 4 | CCR.1.1 FDD | |
|  |  | 2, 5 | CCR.1.1 TDD | |
|  |  | 3, 6 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration |  | 1, 2, 3, 4, 5, 6 | SMTC.1 | |
| SSB configuration |  | 1, 4 | SSB.1 FR1 | |
|  |  | 2, 5 | SSB.1 FR1 | |
|  |  | 3, 6 | SSB.2 FR1 | |
| Initial DL BWP configuration |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2, 3, 4, 5, 6 | ULBWP.0.1 | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6 | SSB | |
| Qrxlevmin | dBm/SCS | 1, 2, 4, 5 | -140 | |
|  |  | 3, 6 | -137 | |
| Pcompensation | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| Qhysts | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| Qoffsets, n | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3, 4, 5, 6 | SS-RSRP | |
|  | dB | 1, 4 | 17.45 | 14 |
|  |  | 2, 5 |  |  |
|  |  | 3, 6 |  |  |
| Note2 | dBm/SCS | 1, 4 | -99.9 | |
|  |  | 2, 5 | -99.9 | |
|  |  | 3, 6 | -96.9 | |
| Note2 | dBm/15 kHz | 1, 4 | -99.9 | |
|  |  | 2, 5 |  | |
|  |  | 3, 6 |  | |
|  | dB | 1, 4 | 17.45 | 14 |
|  |  | 2, 5 |  |  |
|  |  | 3, 6 |  |  |
| SS-RSRP Note3 | dBm/SCS | 1, 4 | -82.45 | -85.90 |
|  |  | 2, 5 | -82.45 | -85.90 |
|  |  | 3, 6 | -79.45 | -82.90 |
| Io | dBm/9.36 MHz | 1, 4 | -54.42 | -57.78 |
|  | dBm/9.36 MHz | 2, 5 | -54.42 | -57.78 |
|  | dBm/38.16 MHz | 3, 6 | -48.32 | -51.68 |
| Treselection | s | 1, 2, 3, 4, 5, 6 | 0 | |
| Snonintrasearch | dB | 1, 2, 3, 4, 5, 6 | Not sent | |
| Threshx, high | dB | 1, 2, 3, 4, 5, 6 | 48 | |
| Threshserving, low | dB | 1, 2, 3, 4, 5, 6 | 44 | |
| Threshx, low | dB | 1, 2, 3, 4, 5, 6 | 50 | |
| Propagation Condition |  | 1, 2, 4, 56 | AWGN 1944 Note 4 | |
| 3, 6 | AWGN 3334 Note 5 | |
| 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: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: The AWGN 1944 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1944 Hz.  NOTE 5: The AWGN 3334 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 3334 Hz. | | | | |

Table 8.2.1.2.5-2: E-UTRA Cell specific test parameters for for E-UTRA - NR FR1 cell re-selection to  
lower priority NR target cell for UE configured with highSpeedInterRAT-NR-r16

| Parameter | Unit | Cell 1 | |
| --- | --- | --- | --- |
|  |  | T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in TS 36.133 [23] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | |
| 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/15 kHz | -99.9 | |
| RSRP Note 3 | dBm/15 KHz | -103.55 | -84.45 |
|  | dB | -3.65 | 15.45 |
|  | dB | -3.65 | 15.45 |
| TreselectionEUTRAN | S | 0 | |
| Snonintrasearch | dB | 50 | |
| Threshx, high | dB | 48 | |
| Threshserving, low | dB | 44 | |
| Threshx, low | dB | 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.  NOTE 4: Void | | | |

The cell reselection delay to a lower priority NR cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRCSetupRequest message to perform a Registration procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 3 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90% with a confidence level of 95%.

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: Tevaluate, NR\_HST + TSI-NR,

Where:

Tevaluate, NR\_HST See Table 4.2.2.5.6-2 in clause 4.2.2.5.6 in TS 36.133 [23]

TSI-NR 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 2.24 s, allow 3 s for the cell re-selection delay to a lower priority NR cell.

8.2.2 E-UTRA - NR Inter-RAT Early Measurement Reporting

#### 8.2.2.0 Minimum conformance requirements

A UE supporting *ca-IdleModeMeasurements* shall perform the idle mode measurement on the inter-frequency CA candidate frequencies/cells indicated by higher layers and meet the requirement specified in this clause. A UE supporting *nr-IdleInactiveMeasFR1-r16* and/or *nr-IdleInactiveMeasFR2-r16* shall perform the idle mode measurement on the NR inter-RAT EN-DC candidate frequencies/cells indicated by higher layers and meet the requirement specified in this section.

Additionally, a UE supporting *ca-IdleModeMeasurements* or *nr-IdleInactiveMeasFR1-r16*/*nr-IdleInactiveMeasFR2-r16* shall perform the idle mode measurement on serving cell and meet the requirement specified in this section.

A UE only supporting *ca-IdleModeMeasurements* shall fulfil the requirements defined for a UE supporting *ca-IdleModeMeasurements* as defined in this section.

A UE only supporting *nr-IdleInactiveMeasFR1-r16*/*nr-IdleInactiveMeasFR2-r16* shall fulfil the requirements defined for a UE supporting *nr-IdleInactiveMeasFR1-r16*/*nr-IdleInactiveMeasFR2-r16* as defined in this section.

A UE supporting both *ca-IdleModeMeasurements* and *nr-IdleInactiveMeasFR1-r16*/*nr-IdleInactiveMeasFR2-r16* shall fulfil the requirements for a UE supporting *ca-IdleModeMeasurements* and *nr-IdleInactiveMeasFR1-r16*/*nr-IdleInactiveMeasFR2-r16* as defined in this section.

The requirements in clause 4.9 apply provided that the UE is provided with a valid timer T331 by dedicated RRC signalling and T331 is running.

For a UE which supports *ca-IdleModeMeasurements* the UE shall support the idle mode CA measurements on the serving cell, overlapping and non-overlapping carriers.

For inter-frequency idle mode measurements, an overlapping carrier is defined as a carrier configured by higher layer for early measurement reporting and inter-frequency mobility measurements. A non-overlapping carrier is defined as a carrier configured by higher layer for early measurement reporting while not configured for inter-frequency mobility measurements.

This clause defines the requirements for the detected cell status for the idle mode CA measurement when UE transitions from RRC Connected mode to Idle mode and after UE has entered Idle mode. The requirements are applicable to an E-UTRAN carrier aggregation or EN-DC capable UE which has been configured with one or more downlink SCells or NR PSCell and one or more downlink NR SCells during the Connected mode and which supports *ca-IdleModeMeasurements* or *nr-IdleInactiveMeasFR1-r16*/*nr-IdleInactiveMeasFR2-r16.* The requirements are applicable for E-UTRAN FDD and TDD SCell(s), and NR PSCell and SCells.

Upon releasing the connection and if the UE has been configured with idle mode CA measurement reporting, following requirements apply concerning the detected cells in Connected mode upon state transitioning to Idle mode and during Idle mode:

- A cell which is detected cell in Connected mode prior to connection release, shall remain detected after UE has entered Idle mode and during Idle mode, provided that the following conditions are met:

- The UE has been provided with a list of cells and/or carrier frequencies for early measurement reporting by dedicated RRC signalling and

- The detected cell is among the list of cells or on a carrier frequency provided for early measurement reporting, and

- The UE is provided with a valid timer T331 by dedicated RRC signalling, and

- For inter-frequency carrier, the detected cell remains detectable until UE reconnects to the network and transmits the early measurement report, or for NR inter-RAT carrier, the detected cell and SSBs of the detected cell remains detectable until UE reconnects to the network and transmits the early measurement report.

- The carrier frequency of the detected cell and the carrier frequency of the serving cell are among the supported band combination of the UE.

An inter-frequency cell is considered detectable according to RSRP, RSRP Ês/Iot, SCH\_RP and SCH Ês/Iot defined in Annex B.1.1 and Annex B.1.2 for a corresponding Band. An inter-RAT NR cell is considered detectable according to the conditions in B.1.3 of [50] for a corresponding band. An SSB of an inter-RAT NR cell is considered detectable according to SSB\_RP and SSB Ês/Iot defined in Annex B.1.3 of [50] for a corresponding Band.

In the absence or expiration of T331, it is up to UE implementation to apply the requirements on the detected cell status in this subclause.

The UE shall measure the RSRP and RSRQ level of the serving cell and evaluate the cell selection criterion S defined in section 4.2.2.1 and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements of the serving cell to higher layers, with measurement accuracy as specified in clauses 9.1.2B.2 and 9.1.5B.2, respectively.

While T331 is running, the UE shall perform measurement on the configured NR inter-RAT carriers for idle mode measurement reporting.

In addition to the requirements defined in section 4.2.2.9 and 4.2.2.9a, a UE which supports *nr-IdleInactiveMeasFR1-r16 or nr-IdleInactiveMeasFR2-r16* shall be able to support idle mode DC measurements of.

- at least 8 inter-RAT NR carriers which are also configured for inter-RAT mobility measurements, and

- at least 2 inter-RAT NR carrier which are not configured for inter-RAT mobility measurements.

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 8 inter-RAT NR carriers for idle mode DC measurements comprising of carriers configured for inter-RAT mobility measurements and carriers not configured for inter-RAT mobility measurements.

For idle mode DC measurements on NR inter-RAT carriers, if Srxlev ≤ SnonIntraSearchP and Squal ≤ SnonIntraSearchQ, the NR inter-RAT measurement requirements defined in clause 4.2.2.5.6 shall apply, where UE shall search for and measure inter-RAT layers configured for idle mode DC measurements in preparation for possible reporting.If Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, the UE shall search for NR inter-RAT layers configured for idle mode DC measurements at least every Thigher\_priority\_search where Thigher\_priority\_search is described in clause 4.2.2, where UE shall search for and measure NR inter-RAT layers configured for idle mode DC measurements in preparation for possible reporting.

For UE supporting *nr-IdleInactiveBeamMeasFR1-r16* and/or *nr-IdleInactiveBeamMeasFR2-r16*, if the UE is configured with *beamMeasConfigIdle-r16* on one or more carriers for idle mode DC measurement, the UE, on each carrier, shall be able to

- detect a newly detectable inter-RAT NR cell and perform RSRP/RSRQ measurement in preparation for reporting, and

- detect and acquire the SSB index for a newly detectable inter-RAT NR cell if *beamMeasConfigIdle-r16* is configured on this carrier and perform RSRP/RSRQ measurement in preparation for reporting,

within the requirements defined in clause 4.2.2.5.6 plus k\*TSSB\_index,NR, where k is the number of carriers configured for idle mode DC measurement with *beamMeasConfigIdle-r16*, and TSSB\_index,NR is the additional time period used to acquire the index of the SSB being measured as defined in Table 4.9.2.4-1.

Table 4.9.2.4-1: TSSB\_index,NR

|  |  |  |  |
| --- | --- | --- | --- |
| DRX cycle length [s] | Scaling Factor (N1) | | TSSB\_index,NR [s] (number of DRX cycles) |
| FR1 | FR2Note1 |
| 0.32 | 1 | 8 | N2 x 1.28 x 1.5 x N1  (N2 x 4 x 1.5 x N1) |
| 0.64 | 5 | N2 x 1.28 x N1  (N2 x 2 x N1) |
| 1.28 | 4 | N2 x 1.28 x N1  (N2 x 1 x N1) |
| 2.56 | 3 | N2 x 2.56 x N1  (N2 x 1 x N1) |
| NOTE 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1, N1 = 8 for all DRX cycle length.  NOTE 2: N2 = 3 if the NR inter-RAT carrier for idle mode DC measurement reporting is in FR1, and N2= 5 if the NR inter-RAT carrier for idle mode DC measurement reporting is in FR2. | | | |

For UE supporting *nr-IdleInactiveBeamMeasFR1-r16* and/or *nr-IdleInactiveBeamMeasFR2-r16*, if the UE is configured with *beamMeasConfigIdle-r16* for idle mode DC measurement, the UE shall be capable of performing SS-RSRP, SS-RSRQ for at least

- 7 SSBs with different SSB index and/or PCI on an NR inter- RAT layer in FR1,

- 10 SSBs with different SSB index and/or PCI on an NR inter- RAT layer in FR2.

In the absence or expiration of T331, it is up to UE implementation to perform the idle mode DC measurement.

The UE shall be capable of performing SS-RSRP and SS-RSRQ measurements of the carriers for idle mode DC measurements, and the UE physical layer shall be capable of reporting SS-RSRP and SS-RSRQ measurements of the carriers for idle mode DC measurements to higher layers, with measurement accuracy as specified in sub-clauses 9.11.1A and 9.11.2A, respectively. The UE shall be able to report idle mode DC measurements when idle mode DC measurement reporting is requested by the network.

#### 8.2.2.1 E-UTRA – NR FR1 Early Measurement Reporting

8.2.2.1.1 Test purpose

The purpose of this test is to verify the requirement for the E-UTRAN to NR inter-RAT Idle mode DC measurement requirements specified in TS 36.133 [23] clause 4.9.2.4 and verify to the accuracy requirement for the E-UTRAN to NR inter-RAT Idle mode DC measurement requirements specified in TS 36.133 [23] clause 9.11.1A and 9.11.2A.

8.2.2.1.2 Test applicability

This test applies to all types of E-UTRA UE from Release 16 onwards, capable of NR measurements and supporting eNB-configured SSB-based RRM measurements of NR FR1 carrier(s) in RRC\_IDLE and in RRC\_INACTIVE.

8.2.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.2.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.8.2.2.1.

8.2.2.1.4 Test description

8.2.2.1.4.1 Initial conditions

This test shall be tested under any of the test configuration in Table 8.2.2.1.4.1-1.

Table 8.2.2.1.4.1-1: Supported test configurations for E-UTRA - NR FR1 Inter-RAT Early Measurement Reporting

|  |  |
| --- | --- |
| Test Case ID | Description |
| 8.2.2.1-1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.2.2.1-2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.2.2.1-3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 8.2.2.1-4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.2.2.1-5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.2.2.1-6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Configure the test requirement and the DUT according to the parameters in Table 8.2.2.1.4.1-2.

Table 8.2.2.1.4.1-2: Initial conditions for E-UTRA – NR FR1 Inter-RAT Early Measurement Reporting

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.2.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.1. 6.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.2.2.1.4.1-3.

2. Message contents are defined in clause 8.2.2.1.4.3.

3. The test scenario comprises of one NR cell and one E-UTRAN cell. E-UTRA Cell 1 is the PCell and Cell 2 is the neighbour cell. E-UTRA Cell 1 is configured according to TS 36.521-3 [26] clauses C.1.0 and C.1.1 and Cell 2 is configured according to clauses C.1.1 and C.1.2.

Table 8.2.1.1.4.1-3: General test parameters for E-UTRA – NR FR1 Inter-RAT Early Measurement Reporting

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | Comment |
|  |  | configuration |  |  |
| Active cell |  | 1, 2, 3, 4, 5, 6 | E-UTRAN Cell 1 |  |
| Neighbour cell |  | 1, 2, 3, 4, 5, 6 | NR Cell 2 | Cell 2 is of higher priority. |
| RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1: Cell 1  2: Cell 2 |  |
| DRX cycle length | s | 1, 2, 3, 4, 5, 6 | 1.28 |  |
| Time offset between Cell 1 and Cell 2 |  | 1, 2, 3, 4, 5, 6 | 3 μs |  |
| T1 | s | 1, 2, 3, 4, 5, 6 | 0.5 |  |
| T2 | s | 1, 2, 3, 4, 5, 6 | 71 |  |
| T3 | s | 1, 2, 3, 4, 5, 6 | 2 |  |
| T331 | s | 1, 2, 3, 4, 5, 6 | 300 |  |

8.2.2.1.4.2 Test procedure

In this test there are two cells, E-UTRA PCell (Cell 1) and neighbour NR Cell (Cell 2). The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Prior to the start of the test the UE shall be connected to Cell 1. During T1, NR Cell 2 shall be powered off.

At the end of T1, the RRC connection to Cell 1 is released and UE is configured Idle mode DC measurement on the carrier frequency of Cell 2.

1. Ensure the UE is in State RRC\_IDLE with generic procedure parameters Connectivity EUTRA/EPC with Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. The SS shall set the parameters for T1 according to Table 8.8.2.2.1.5-1 and Table 8.8.2.2.1.5-2 as appropriate. T1 starts.

3. After T1 expires, the SS shall send the RRCConnectionRelease with configuration of Idle mode DC measurement on the carrier frequency of Cell 2.

4. The SS shall set the parameters for T2 according to Table 8.8.2.2.1.5-1 and Table 8.8.2.2.1.5-2 as appropriate. T2 starts.

5. During the time period T2 the UE is in Idle mode configured to perform inter-RAT idle mode CA/DC measurements on Cell 2. The UE shall not perform reselection.

6. After T2 expires, the SS shall set the parameters for T3 according to Table 8.8.2.2.1.5-1 and Table 8.8.2.2.1.5-2 as appropriate. T3 starts.

7. The SS transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity). During the connection setup the UE is reports idleMeasAvailable-r15 in the *RRCConnectionSetupComplete* message.

8. The SS shall send the *UEInformationRequest* message, requesting UE to report idle mode CA/DC measurements.

9. If UE responds with *UEInformationResponse* messagecontaining the idle mode measurement results with SS-RSRP values within the limits in Table 8.2.2.1.5-3 for configuration 1, 2, 4 and 5 and Table 8.2.2.1.5-4 for configuration 3 and 6 and SS-RSRQ values within the limits in Table 8.2.2.1.5-5 for configuration 1, 2, 3, 4, 5 and 6 the number of passed iterations is increased by one. Otherwise, the number of failed iterations is increased by one.

10. If paging in step 7 succeeds, go to step 12, otherwise switch off the UE.

11. Switch on the UE and ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR with Connected without release On according to TS 38.508-1 [14] clause 4.5.

12. Repeat step 2-12 until a test verdict has been achieved.

8.2.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 8.2.2.1.4.3-2: *SystemInformationBlockType2*

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 Table 4.4.3.3-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| SystemInformationBlockType2 ::= SEQUENCE { |  |  |  |
| idleModeMeasurementsNR-r16 | true |  |  |
| } |  |  |  |

Table 8.2.2.1.4.3-2: *RRCConnectionRelease*

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 Table 4.6.1-15 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCConnectionRelease ::= SEQUENCE { |  |  |  |
| rrc-TransactionIdentifier | RRC-TransactionIdentifier-DL |  |  |
| criticalExtensions CHOICE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| measIdleConfig-r15 SEQUENCE { |  |  |  |
| measIdleCarrierListNR-r16 ::= SEQUENCE { |  |  |  |
| carrierFreqNR-r16 | ARFCN of Cell2 |  |  |
| subcarrierSpacingSSB-r16 | kHz15 | 8.2.2.1-1  8.2.2.1-2  8.2.2.1-4  8.2.2.1-5 |  |
| subcarrierSpacingSSB-r16 | kHz30 | 8.2.2.1-3  8.2.2.1-6 |  |
| reportQuantitiesNR-r16 | both |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 8.2.2.1.4.3-2: *RRCConnectionSetupComplete*

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 Table 4.6.1-18 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCConnectionSetupComplete ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| idleMeasAvailable-r15 | true |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 8.2.2.1.4.3-3: *UEInformationRequest*

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 Table 4.6.1-23A | | | |
| Information Element | Value/remark | Comment | Condition |
| UEInformationRequest-r9 ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| idleModeMeasurementReq-r15 |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 4.6.1-23B: *UEInformationResponse*

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.331 clause 6.2.2 | | | |
| Information Element | Value/remark | Comment | Condition |
| UEInformationResponse-r9 ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| measResultListIdleNR-r16 SEQUENCE { |  |  |  |
| carrierFreqNR-r16 | ARFCN of Cell2 |  |  |
| measResultsPerCellListIdleNR-r16 SEQUENCE { |  |  |  |
| physCellIdNR-r16 | Cell ID of Cell2 |  |  |
| rsrpResultNR-r16 | INTEGER (0..127) |  |  |
| rsrqResultNR-r16 | INTEGER (0..127) |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

8.2.2.1.5 Test requirement

Tables 8.2.2.1.5-1 and 8.2.2.1.5-2 define the primary level settings including test tolerances for and tables 8.2.2.1.5-3, 8.2.2.1.5-4, 8.2.2.1.5-5 and 8.2.2.1.5-6 define accuracy requirements E-UTRA - NR FR1 Early Measurement Reporting test case.

Table 8.2.2.1.5-1: Cell specific test parameters for NR cell 2 for E-UTRA – NR FR1 Inter-RAT Early Measurement Reporting

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | | |
|  |  |  | T1 | T2 | T3 |
| TDD configuration |  | 1, 4 | N/A | | |
|  |  | 2, 5 | TDDConf.1.1 | | |
|  |  | 3, 6 | TDDConf.2.1 | | |
| PDSCH Reference measurement channel |  | 1, 4 | SR.1.1 FDD | | |
|  |  | 2, 5 | SR.1.1 TDD | | |
|  |  | 3, 6 | SR.2.1 TDD | | |
| RMSI CORESET Reference Channel |  | 1, 4 | CR.1.1 FDD | | |
|  |  | 2, 5 | CR.1.1 TDD | | |
|  |  | 3, 6 | CR.2.1 TDD | | |
| RMC CORESET Reference Channel |  | 1, 4 | CCR.1.1 FDD | | |
|  |  | 2, 5 | CCR.1.1 TDD | | |
|  |  | 3, 6 | CCR.2.1 TDD | | |
| OCNG Patterns |  | 1, 2, 3, 4, 5, 6 | OP.1 | | |
| SMTC configuration |  | 1, 2, 3, 4, 5, 6 | SMTC.1 | | |
| SSB configuration |  | 1, 4 | SSB.1 FR1 | | |
|  |  | 2, 5 | SSB.1 FR1 | | |
|  |  | 3, 6 | SSB.2 FR1 | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4, 5, 6 | ULBWP.0.1 | | |
| Qrxlevmin | dBm/SCS | 1, 2, 4, 5 | -140 | | |
|  |  | 3, 6 | -137 | | |
| Pcompensation | dB | 1, 2, 3, 4, 5, 6 | 0 | | |
| Qhysts | dB | 1, 2, 3, 4, 5, 6 | 0 | | |
| Qoffsets, n | dB | 1, 2, 3, 4, 5, 6 | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3, 4, 5, 6 | SS-RSRP | | |
|  | dB | 1, 4 | -infinity | -4 | 4 |
|  |  | 2, 5 |  |  |  |
|  |  | 3, 6 |  |  |  |
| Note2 | dBm/SCS | 1, 4 | -98 | | |
|  |  | 2, 5 | -98 | | |
|  |  | 3, 6 | -95 | | |
| Note2 | dBm/15 kHz | 1, 4 | -98 | | |
|  |  | 2, 5 |  | | |
|  |  | 3, 6 |  | | |
|  | dB | 1, 4 | -infinity | -3.7 | -3.7 |
|  |  | 2, 5 |  |  |  |
|  |  | 3, 6 |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1, 4 | -infinity | -101.7 | -101.7 |
|  |  | 2, 5 | -infinity | -101.7 | -101.7 |
|  |  | 3, 6 | -infinity | -98.7 | -98.7 |
| SS-RSRQ Note3 | dB | 1, 4 | -infinity | -16.03 | -16.03 |
| 2, 5 | -infinity | -16.03 | -16.03 |
| 3, 6 | -infinity | -16.03 | -16.03 |
| Io | dBm/9.36 MHz | 1, 4 | -70.05 | -68. 51 | -68. 51 |
|  | dBm/9.36 MHz | 2, 5 | -70.05 | -68. 51 | -68. 51 |
|  | dBm/38.16 MHz | 3, 6 | -63.94 | -62.40 | -62.40 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | 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: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

Table 8.2.2.1.5-2: Cell specific test parameters for E-UTRA cell 1 for E-UTRA – NR FR1 Inter-RAT Early Measurement Reporting

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | |
|  |  | T1 | T2 | T3 |
| E-UTRA RF Channel number |  | 1 | | |
| BWchannel | MHz | 10 | | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | | |
| 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/15 kHz | -98 | | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 |
| RSRQ Note 3 | dB | -10.96 | -10.96 | -10.96 |
|  | dB | 14 | 14 | 14 |
|  | dB | 14 | 14 | 14 |
| TreselectionEUTRAN | S | 0 | | |
| SnonintrasearchP | dB | 50 | | |
| Threshx, highP | dB | 48 | | |
| Threshserving, lowP | dB | 44 | | |
| Threshx, lowP | dB | 50 | | |
| beamMeasConfigIdle |  | True | | |
| 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 8.2.2.1.5-3: Absolute accuracy requirements for the Cell 2 SS-RSRP reported values for test configurations 1 and 2

|  |  |
| --- | --- |
| Normal Conditions | T3 |
| Lowest reported value (Cell 2) | 44 |
| Highest reported value (Cell 2) | 66 |

Table 8.2.2.1.5-4: Absolute accuracy requirements for the Cell 2 SS-RSRP reported values for test configurations 3

|  |  |
| --- | --- |
| Normal Conditions | T3 |
| Lowest reported value (Cell 2) | 47 |
| Highest reported value (Cell 2) | 69 |

Table 8.2.2.1.5-5: Absolute accuracy requirements for the Cell 2 SS-RSRQ reported values for test configurations 1, 2 and 3

|  |  |
| --- | --- |
| Normal Conditions | T3 |
| Lowest reported value (Cell 2) | 44 |
| Highest reported value (Cell 2) | 65 |

At the beginning of the time-period T2 the connection is released, and UE enters idle mode. During the time period T2 the UE is in Idle mode and Cell 2 is active. The UE shall not perform reselection. The UE shall perform Idle Mode DC measurement according to clause 4.9.2.4 in TS 36.133 [23]. UE shall be able to detect, acquire the SSB index and measure the SS-RSRP and SS-RSRQ from Cell 2 for Idle mode DC measurement during T2.

At the start of T3 the UE is paged for connection setup. During the connection setup the UE is requested to transmit early measurement report. The UE shall send early measurement report to the PCell.

After receiving the requested early measurement report, the test equipment verifies the accuracy of measurement reported for serving Cell 1 and Cell 2 meets the requirements in Section 9.1.2B in TS 36.133 [23] and Section 9.1.3B, respectively and test ends.

The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

#### 8.2.2.2 E-UTRA – NR FR2 Early Measurement Reporting

Editor's Note: This test case has been completed for the following configurations:

- Test frequency f ≤ 40.8 GHz

- UE PC3

- Normal conditions

- The test is incomplete for UE power classes other than PC3

- The test is incomplete for test frequencies > 40.8 GHz

- The test is incomplete for extreme conditions

- E-UTRA - FR2 OTA testability is still FFS.

8.2.2.2.1 Test purpose

The purpose of this test is to verify the requirement for the E-UTRAN to NR inter-RAT Idle mode DC measurement requirements specified in TS 36.133 [23] clause 4.9.2.4 and verify to the accuracy requirement for the E-UTRAN to NR inter-RAT Idle mode DC measurement requirements specified in TS 36.133 [23] clause 9.11.1A and 9.11.2A.

8.2.2.2.2 Test applicability

This test applies to all types of NR UE from Release 16 onwards, capable of NR measurements and supporting eNB-configured SSB-based RRM measurements of NR FR2 carrier(s) in RRC\_IDLE and in RRC\_INACTIVE.

8.2.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.2.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.8.2.2.2.

8.2.2.2.4 Test description

8.2.2.2.4.1 Initial conditions

This test shall be tested under any of the test configuration in Table 8.2.2.2.4.1-1.

Table 8.2.2.2.4.1-1: Supported test configurations for E-UTRA - NR FR2 Inter-RAT Early Measurement Reporting

|  |  |
| --- | --- |
| **Test ID** | **Description** |
| 8.2.2.2-1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 8.2.2.2-2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Configure the test requirement and the DUT according to the parameters in Table 8.2.2.2.4.1-2.

Table 8.2.2.2.4.1-2: Initial conditions for E-UTRA - NR FR2 Inter-RAT Early Measurement Reporting

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.2.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.3.3.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.4.1.1 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.2.2.2.4.1-3.

2. Message contents are defined in clause 8.2.2.2.4.3.

3. The test scenario comprises of one NR cell and one E-UTRAN cell. E-UTRA Cell 1 is the PCell and Cell 2 is the neighbour cell. E-UTRA Cell 1 is configured according to TS 36.521-3 [26] clauses C.1.0 and C.1.1 and Cell 2 is configured according to clauses C.1.1 and C.1.2.

4. The UE Rx beam peak direction has been obtained previously using one of the Rx Beam Peak Search procedures as described in Annex I. Ensure that the UE is receiving NR Cell 2 from the Rx Beam Peak direction.

Table 8.2.2.2.4.1-3: General test parameters for E-UTRA – NR FR2 Inter-RAT Early Measurement Reporting

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Value** | **Comment** |
|  |  | **configuration** |  |  |
| Active cell |  | 1, 2 | E-UTRAN Cell 1 | E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2. |
| Neighbour cell |  | 1, 2 | NR Cell 2 |  |
| E-UTRA RF Channel Number |  | 1, 2 | 1 | One E-UTRA carrier frequency is used. |
| NR RF Channel Number |  | 1, 2 | 1 | One FR2 NR carrier frequency is used. |
| DRX cycle length | s | 1, 2 | 1.28 |  |
| Time offset between Cell 1 and Cell 2 |  | 1, 2 | 3 μs |  |
| T1 | s | 1, 2 | 0.5 |  |
| T2 | s | 1, 2 | 128 |  |
| T3 | s | 1, 2 | 2 |  |
| T331 | s | 1, 2 | 300 |  |

8.2.2.2.4.2 Test procedure

Same test procedure as in 8.2.2.1.4.2.

8.2.2.2.4.3 Message contents

Same message content as in 8.2.2.1.4.3.

8.2.2.2.5 Test requirement

Table8.2.2.2.5-1 define the primary level settings including test tolerances and tables 8.2.2.2.5-2, 8.2.2.2.5-3 define accuracy requirements for E-UTRA - NR FR2 Early Measurement Reporting test case.

Table 8.2.2.2.5-1: Cell specific test parameters for NR cell 2 for E-UTRA – NR FR2 Inter-RAT Early Measurement Reporting

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 2** | | |
|  |  |  | **T1** | **T2** | **T3** |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | |
| PDSCH Reference measurement channel |  | 1, 2 | SR.3.1 TDD | | |
| RMSI CORESET Reference Channel |  | 1, 2 | CR.3.1 TDD | | |
| RMC CORESET Reference Channel |  | 1, 2 | CCR.3.1 TDD | | |
| OCNG Patterns |  | 1, 2 | OP.1 | | |
| BWchannel | MHz | 1, 2 | 100 | | |
| Data RBs allocated |  | 1, 2 | 66 | | |
| SMTC configuration |  | 1, 2 | SMTC.1 | | |
| SSB configuration |  | 1, 2 | SSB.1 FR2 | | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | | |
| RLM-RS |  |  | SSB | | |
| Qrxlevmin |  |  | -140 | | |
| Pcompensation |  |  | 0 | | |
| Qhysts |  |  | 0 | | |
| Qoffsets, n |  |  | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  |  | SS-RSRP | | |
| AoA setup |  |  | Setup 1 defined in A.9.1 | | |
| Beam assumptionNote 4 |  |  | Rough | | |
| UE baseband | dB | 1, 4 | -infinity | -3.66 | -3.66 |
| Note2 | dBm/SCS | 1, 4 | -98 | | |
| Note2 | dBm/15kHz | 1, 2 | -107 | | |
|  | dB | 1, 4 | -infinity | -2.4 | -2.4 |
| SSbRP Note3 | dBm/SCS | 1, 4 | -infinity | -100.4 | -100.4 |
| SS-RSRQ Note3 | dB | 1, 4 | -infinity | -16.01 | -16.01 |
| Io | dBm/95.04MHz | 1, 4 | -68.98 | -67.01 | -67.01 |
| Propagation Condition |  | 1, 2 | 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: SSB\_RP, SS-RSRQ levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 5: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | |

Table 8.2.2.2.5-2: Cell specific test parameters for E-UTRA cell 1 for E-UTRA – NR FR2 Inter-RAT Early Measurement Reporting

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | |
|  |  | **T1** | **T2** | **T3** |
| E-UTRA RF Channel number |  | 1 | | |
| BWchannel | MHz | 10 | | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | | |
| 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/15 kHz | -98 | | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 |
| RSRQ Note 3 | dB | -10.96 | -10.96 | -10.96 |
|  | dB | 14 | 14 | 14 |
|  | dB | 14 | 14 | 14 |
| TreselectionEUTRAN | S | 0 | | |
| SnonintrasearchP | dB | N/A | | |
| Threshx, highP | dB | 51 | | |
| Threshserving, lowP | dB | 44 | | |
| Threshx, lowP | dB | 50 | | |
| beamMeasConfigIdle |  | False | | |
| 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 8.2.2.2.5-3: Absolute accuracy requirements for the Cell 2 SS-RSRP reported values

|  |  |
| --- | --- |
| Normal Conditions | T3 |
| Lowest reported value (Cell 2) | 28 |
| Highest reported value (Cell 2) | 86 |

Table 8.2.2.2.5-4: Absolute accuracy requirements for the Cell 2 SS-RSRQ reported values

|  |  |
| --- | --- |
| Normal Conditions | T3 |
| Lowest reported value (Cell 2) | 44 |
| Highest reported value (Cell 2) | 65 |

At the beginning of the time-period T2 the connection is released, and UE enters idle mode. During the time period T2 the UE is in Idle mode and Cell 2 is active. The UE shall not perform reselection. The UE shall perform Idle Mode DC measurement according to clause 4.9.2.4 in TS 36.133 [23]. UE shall be able to detect, acqure the SSB index and measure the SS-RSRP and SS-RSRQ from Cell 2 for Idle mode DC measurement during T2.

At the start of T3 the UE is paged for connection setup. During the connection setup the UE is requested to transmit early measurement report. The UE shall send early measurement report to the PCell.

After receiving the requested early measurement report, the test equipment verifies the accuracy of measurement reported for serving Cell 1 and Cell 2 meets the requirements in Section 9.1.2B in TS 36.133 [23] and Section 9.1.3B, respectively and test ends.

The rate of correct events observed during repeated tests shall be at least 90% with confidence level of 95%.

8.3 RRC\_CONNECTED state mobility

8.3.1 Inter-RAT cell handover

#### 8.3.1.0 Minimum conformance requirements

##### 8.3.1.0.1 Minimum conformance requirements for E-UTRA - NR FR1 handover

[TS 36.133, clause 5.3.4.2]

When the UE receives a RRC message implying inter-RAT handover to the UE shall be ready to start the transmission of the uplink PRACH channel in NR within Dhandover seconds from the end of the last TTI containing the RRC command. Dhandover is defined as:

Dhandover = TRRC\_procedure\_delay + Tinterruption

Where:

TRRC\_procedure\_delay: it is the RRC procedure delay which is [50] ms.

Tinterruption: it is the time between end of the last TTI containing the RRC command on the PDSCH in E-UTRAN and the time the UE starts transmission of the PRACH in NR, excluding TRRC\_procedure\_delay. Tinterruption is defined in TS 36.133 clause 5.3.4.3.

[TS 36.133, clause 5.3.4.3]

When inter-RAT handover to NR is commanded, the interruption time shall be less than Tinterruption

Tinterruption = Tsearch + TIU + Trs+20 ms

Where:

Tsearch is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then Tsearch = 0 ms. If the target cell is an unknowncell and target cell Es/Iot ≥ [-2] dB, then Tsearch = 3▪Trs + 2 ms. Regardless of whether DRX is in use by the UE, Tsearch shall still be based on non-DRX target cell search times.

TIU is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. TIU can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213.

NOTE: The actual value of TIU shall depend upon the PRACH configuration used in the target cell.

Trs is the SMTC period of the target NR cell if the UE has been provided with an SMTC configuration for the target cell prior to, or in the handover command, otherwise Trs is the target cell SSB transmission period, if such is provided. If the UE is not provided with an SMTC configuration or SSB transmission period, the requirement in this clause is applied with Trs = 5 ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms. If UE is provided with both SMTC configuration and SSB transmission period the requirement shall be based on SMTC periodicity.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in clauses 8.1.2.4.21 and 8.1.2.4.22.

The normative reference for this requirement is TS 38.133 [6] clause 5.3.4.2 and 5.3.4.3.

#### 8.3.1.1 E-UTRA - NR FR1 handover with known target cell

8.3.1.1.1 Test purpose

The purpose of this test is to verify the E-UTRAN to NR FR1 handover requirements as specified in TS 36.133 [23] clause 5.3.4.

8.3.1.1.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards and capable of NR measurements.

##### 8.3.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.3.1.0.

The normative reference for this requirement is TS 38.133 [6] clause A.8.3.1.1.

8.3.1.1.4 Test description

The test comprises of one E-UTRA carrier and one NR carrier. There are two cells and one cell on each carrier. Cell 1 is the E-UTRAN PCell and Cell 2 is an inter-RAT NR neighbour cell. 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 of TS 36.133 [23] is configured before T2 begins to enable inter-RAT frequency monitoring.

8.3.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.3.1.1.4.1-1.

Table 8.3.1.1.4.1-1: Supported test configurations for  
E-UTRA - NR FR1 handover with known target cell

|  |  |
| --- | --- |
| Configuration | Description |
| 8.3.1.1-1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.3.1.1-2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.3.1.1-3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 8.3.1.1-4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.3.1.1-5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.3.1.1-6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test requirement and the DUT according to the parameters in Table 8.3.1.1.4.1-2.

Table 8.3.1.1.4.1-2: Initial conditions for E-UTRA - NR FR1 handover with known target cell

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.3.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.3.1.1.4.1-3.

2. Message contents are defined in clause 8.3.1.1.4.3.

3. There are two carriers and two cells specified in the test, where E-UTRA Cell 1 is the E-UTRA PCell on the E‑UTRA carrier and Cell 2 is the NR neighbour cell on the NR carrier. E-UTRA Cell 1 is configured according to TS 36.521-3 [26] clause C.1.0 and C.1.1.

Table 8.3.1.1.4.1-3: General test parameters for E-UTRA - NR FR1 handover with known target cell

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | 1 NR carrier frequency is used in the test |
| LTE RF Channel Number | |  | 2 | 1 E-UTRAN carrier frequency is used in the test |
| Initial conditions | Active cell |  | Cell 1 | E-UTRAN cell |
| Neighbouring cell |  | Cell 2 | NR cell |
| Final condition | Active cell |  | Cell 2 |  |
| NR measurement quantity | |  | SS-RSRP |  |
| E-UTRAN measurement quantity | |  | RSRP |  |
| b2-Threshold1 | | dBm | -83 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2NR | | dBm | As specified in Table 8.3.1.1.5-2 | Absolute NR SS-RSRP 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 |
| 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 [23] |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

8.3.1.1.4.2 Test procedure

The test comprises of one E-UTRA carrier and one NR carrier. There are two cells and one cell on each carrier. Cell 1 is the E-UTRAN and Cell 2 is an inter-RAT NR neighbour cell. The general and cell specific test parameters for PCell and neighbour cell are given in Table 8.3.1.1.4.1-3, 8.3.1.1.5-1 and 8.3.1.1.5-2, respectively.

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 of TS 36.133 [23] 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.

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters of Cell 1 and Cell 2 according to T1 in Table 8.3.1.1.5-1 and Table 8.3.1.1.5-2 respectively, T1 starts.

3. The SS shall transmit an *RRCConnectionReconfiguration* message.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. When T1 expires, the SS shall switch the parameters setting from T1 to T2 as specified in Table 8.3.1.1.5-1 and Table 8.3.1.1.5-2 respectively. T2 Starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event B2.

7. SS shall transmit a *MobilityFromEUTRACommand* message implying handover to Cell 2.

8. The start of T3 is the instant when the last TTI containing the *MobilityFromEUTRACommand* message implying handover is sent to the UE, at that instant the SS shall switch the power setting from T2 to T3 as specified in Table 8.3.1.1.5-1 and Table 8.3.1.1.5-2.

9. The UE shall transmit an *RRCReconfigurationComplete* message on Cell 2.

10. If the UE transmits the uplink PRACH channel to Cell 2 less than 112 ms from the beginning of time period T3 then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.

11. After T3 expires,

- The SS could switch the parameters setting from T3 to T1 as specified in Table 8.3.1.1.5-1 and Table 8.3.1.1.5-2 respectively.

- If the UE handover back to E-UTRA Cell 1, then T1 starts, skip to step 3. Otherwise, switch off and on the UE. Then ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3. E-UTRA Cell 1 is the active cell.

- Or, switch off and on the UE Then ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3. E-UTRA Cell 1 is the active cell.

12. Set Cell 2 physical cell identity = ((current Cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

13. Repeat step 2-12 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved

8.3.1.1.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.3.1.1.4.3-1: Common Exception messages for E-UTRA -  
NR FR1 handover with known target cell

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.3-2;  Table H.3.4-1a  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B2 and gapUE  Table H.3.4-5 with Condition Pattern #0 |
| Specific message contents exceptions for Test Configuration 8.3.1.1-1, 8.3.1.1-2, 8.3.1.1-4 and 8.3.1.1-5 | Table H.3.4-6 with Condition SSB.1 FR1, SMTC.1 and Asynchronous cells |
| Specific message contents exceptions for Test Configuration 8.3.1.1-3 and 8.3.1.1-6 | Table H.3.4-6 with Condition SSB.2 FR1, SMTC.1 and Asynchronous cells |

8.3.1.1.5 Test requirement

Table 8.3.1.1.4.1-3, 8.3.1.1.5-1 and 8.3.1.1.5-2 define the primary level settings including test tolerances for E-UTRA - NR FR1 handover with known target cell.

Table 8.3.1.1.5-1: E-UTRAN PCell specific test parameters for E-UTRA -  
NR FR1 handover with known target cell

| Parameter | Unit | Configuration | Cell 1 | | |
| --- | --- | --- | --- | --- | --- |
| T1 | T2 | T3 |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 2 | | |
| Duplex mode |  | 1, 2, 3 | FDD | | |
| 4, 5, 6 | TDD | | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | | |
| PRACH ConfigurationNote2 |  | 1, 2, 3 | 4 | | |
| 4, 5, 6 | 53 | | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | | |
| 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | | |
| 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | | |
| OCNG PatternsNote3 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | | |
| 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote4 |
| OCNG\_RBNote4 |
| NocNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 | | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | 7 | 5.45 | 5.45 |
| Ês/IotNote6 | dB | 1, 2, 3, 4, 5, 6 | 7 | 5.45 | 5.45 |
| RSRPNote6 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -91 | -92.55 | -92.55 |
| SCH\_RPNote6 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -91 | -92.55 | -92.55 |
| IoNote6 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -62.43 | -63.68 | -63.68 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN | | |
| Antenna Configuration and Correlation Matrix Note7 |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | | |
| NOTE 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  NOTE 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].  NOTE 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  NOTE 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  NOTE 6: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [27]. | | | | | |

Table 8.3.1.1.5-2: NR neighbour cell specific test parameters for E-UTRA -  
NR FR1 handover with known target cell

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Configuration | Cell 2 | | |
|  | T1 | T2 | T3 |
| RF channel number | |  | 1, 2, 3, 4, 5, 6 | 1 | | |
| Duplex mode | |  | 1, 4 | FDD | | |
| 2, 3, 5, 6 | TDD | | |
| TDD Configuration | |  | 2, 5 | TDDConf.1.1 | | |
| 3, 6 | TDDConf.2.1 | | |
| BWchannel | | MHz | 1, 4 | 10: NRB,c = 52 (FDD) | | |
| 2, 5 | 10: NRB,c = 52 (TDD) | | |
| 3, 6 | 40: NRB,c = 106 (TDD) | | |
| PDSCH reference measurement channel | |  | 1, 4 | SR.1.1 FDD | | |
| 2, 5 | SR.1.1 TDD | | |
| 3, 6 | SR.2.1 TDD | | |
| CORSET reference channel | |  | 1, 4 | CR.1.1 FDD | | |
| 2, 5 | CR.1.1 TDD | | |
| 3, 6 | CR.2.1 TDD | | |
| OCNG patternNote1 | |  | 1, 2, 3, 4, 5, 6 | OP.1 | | |
| BWP | Initial DL BWP |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 | | |
| Dedicated DL BWP | DLBWP.1.1 | | |
| Initial UL BWP | ULBWP.0.1 | | |
| Dedicated UL BWP | ULBWP.1.1 | | |
| SMTC configuration | |  | 1, 2, 3, 4, 5, 6 | SMTC.1 | | |
| SSB configuration | |  | 1, 2, 4, 5 | SSB.1 FR1 | | |
| 3, 6 | SSB.2 FR1 | | |
| b2-Threshold2NR | | dBm | 1, 2, 4, 5 | -106 | | |
| 3, 6 | -103 | | |
| EPRE ratio of PSS to SSS | | dB | 1, 2, 3, 4, 5, 6 | 0 | | |
| EPRE ratio of PBCH\_DMRS to SSS | |
| EPRE ratio of PBCH to PBCH\_DMRS | |
| EPRE ratio of PDCCH\_DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |
| EPRE ratio of PDSCH\_DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |
| EPRE ratio of OCNG DMRS to SSS | |
| EPRE ratio of OCNG to OCNG DMRS | |
| *Noc*Note2 | | dBm/15 KHz | 1, 2, 3, 4, 5, 6 | -98 | | |
| *Noc*Note2 | | dBm/SCS | 1, 2, 4, 5 | -98 | | |
| 3, 6 | -95 | | |
| Ês/Noc | | dB | 1, 2, 3, 4, 5, 6 | -infinity | 1.55 | 1.55 |
| Ês/IotNote3 | | dB | 1, 2, 3, 4, 5, 6 | -infinity | 1.55 | 1.55 |
| SS-RSRPNote3 | | dBm/SCS | 1, 2, 4, 5 | -infinity | -96.45 | -96.45 |
|  | | 3, 6 | -infinity | -93.44 | -93.44 |
| IoNote3 | | dBm/9.36 MHz | 1, 2, 4, 5 | -70.05 | -66.19 | -66.19 |
| dBm/38.16 MHz | 3, 6 | -63.94 | -60.09 | -60.09 |
| Propagation condition | |  | 1, 2, 3, 4, 5, 6 | AWGN | | |
| Antenna Configuration and Correlation Matrix | |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | | |
| 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 *Noc* to be fulfilled.  NOTE 3: Ês/Iot, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

The UE shall start to transmit the PRACH to Cell 2 less than 112 ms from the beginning of time period T3.

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

- RRC procedure delay = 50 ms and is specified in TS 36.133 [23].

- Tinterrupt = 62 ms in the test; Tinterrupt is defined in TS 36.133 [23] clause 5.3.4.3.

This gives a total of 112 ms.

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

8.4 Measurement procedures

8.4.1 SFTD measurement delay

#### 8.4.1.0 Minimum conformance requirements

##### 8.4.1.0.1 Minimum conformance requirements for E-UTRA - NR FR1 SFTD measurement delay

[TS 36.133, clause 8.1.2.4.25.1]

The UE shall perform inter-RAT SFTD measurement and report SFTD result with/without SS-RSRP after the network requests with *reportSFTD-Meas* set to *neighborCells*. The overall delay includes RRC procedure delay to be defined in clause 11.2 in TS 36.331 and SFTD measurement reporting delay in TS 36.133 clause 8.1.2.4.25.3.

[TS 36.133, clause 8.1.2.4.25.2]

The requirements on SFTD measurement delay defined in this clause are applicable under the side condition SCH Ês/Iot ≥ -3 dB for the NR cell. Depending on configuration, the SFTD measurement may be carried out with or without the support of configured measurement gaps. In the current release, indication on whether to carry out the SFTD measurement with or without measurement gaps is implicit and depending on whether measurement gaps are configured.

The UE shall be able to detect, identify and measure SFTD of up to 3 of the strongest NR cells on the carrier frequency provided in the SFTD measurement configuration. Further depending on the SFTD measurement configuration, the UE shall additionally report SS-RSRP for the one or more NR cells. The UE may or may not be configured with *cellsForWhichToReportSFTD*. The UE does not expect *cellsForWhichToReportSFTD* to change during an ongoing SFTD measurement.

When no measurement gaps are provided, the UE shall be capable of finding the NR cell regardless of its SSB position in the SMTC period. The SFTD measurement shall be conducted with sustained connection to the E-UTRA PCell and activated SCell(s), however, the UE may be allowed to cause a certain amount of interruptions for reconfiguration of the radio receiver, as specified in TS 36.133 clause 7.35.

When measurement gaps are provided, the UE shall be capable of finding the NR cell under the additional condition that the SSB at least occasionally falls within the measurement gap.

When no MCG DRX is used, the UE shall be capable of determining SFTD within a physical layer measurement period of Tmeasure\_SFTD1 as follows:

- For SFTD measurements without measurement gaps, and without additional SS-RSRP reporting:

- For NR carrier in FR1: Tmeasure\_SFTD1 = [14] SMTC periods

- For SFTD measurements in measurement gaps, and without additional SS-RSRP reporting:

- For NR carrier in FR1: Tmeasure\_SFTD1 = [Nfreq × 8 × max(MGRP, SMTC period)]

- For SFTD measurements without measurement gaps, and with additional SS-RSRP reporting:

- For NR carrier in FR1: Tmeasure\_SFTD1 = [19] SMTC periods

- For SFTD measurements in measurement gaps, and with additional SS-RSRP reporting:

- For NR carrier in FR1: Tmeasure\_SFTD1 = [Nfreq × 13 × max(MGRP, SMTC period)]

Where Nfreq is the number of carriers monitored in measurement gaps.

When MCG DRX is used, the same Tmeasure\_SFTD1 as for non-DRX applies, but the reporting delay depends on the DRX cycle length in use.

In case an NR PSCell is added, the UE shall terminate the inter-RAT SFTD measurement.

In case PCell is changed due to handover, the UE shall terminate the inter-RAT SFTD measurement.

[TS 36.133, clause 8.1.2.4.25.3]

The SFTD measurement reporting delay is defined as the time between a command that will trigger an SFTD measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x TTIDCCH. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier-based switching, an additional delay can be expected.

The SFTD measurement reporting delay shall be less than Tmeasure\_SFTD1 defined in TS 36.133, clause 8.1.2.4.25.2.

#### 8.4.1.1 E-UTRA - NR FR1 SFTD measurement delay in non-DRX

8.4.1.1.1 Test purpose

The purpose of this test is to partly verify that measurement reporting delay for SFTD between E-UTRA PCell and inter-RAT NR neighbour cell in FR1 is within the requirements stated in clauses 8.1.2.4.25 and 8.1.2.4.26 of TS 36.133 [23] for E-UTRA FDD and TDD, respectively, when no measurement gaps are provided and no DRX is configured.

8.4.1.1.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards and capable of inter-RAT SFTD measurements.

8.4.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.4.1.0.

The normative reference for this requirement is TS 38.133 [6] clause A.8.4.1.1.

8.4.1.1.4 Test description

Two carriers are used in this test: one E-UTRA carrier with the PCell (Cell 1), and one NR carrier with the NR neighbour cell (Cell 2).

This test consists of a single time period of duration T1. Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only. The point in time at which the UE receives, at the UE antenna connector(s), a RRC message containing a measurement configuration for SFTD measurements on RF channel 1 defines the start of time duration T1. Following the start of T1 the UE shall detect Cell 2, determine the SFN and frame time difference of Cell 2 relative to Cell 1, and send a measurement report. No measurement gaps are provided and no DRX is configured in this test.

8.4.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.4.1.1.4.1-1.

Table 8.4.1.1.4.1-1: Supported test configurations for E-UTRA -  
NR FR1 SFTD measurement delay in non-DRX

|  |  |
| --- | --- |
| **Config** | **Description** |
| 8.4.1.1-1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.4.1.1-2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.4.1.1-3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 8.4.1.1-4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.4.1.1-5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.4.1.1-6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test requirement and the DUT according to the parameters in Table 8.4.1.1.4.1-2.

Table 8.4.1.1.4.1-2: Initial conditions for E-UTRA - NR FR1 SFTD measurement delay in non-DRX

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.4.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.4.1.1.4.1-3.

2. Message contents are defined in clause 8.4.1.1.4.3.

3. There are two carriers and two cells specified in the test, where Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR neighbour cell on the NR carrier. Cell 1 is the cell used for connection setup for this test. E-UTRA Cell 1 is configured according to TS 36.521-3 [26] clauses C.1.0 and C.1.1.

Table 8.4.1.1.4.1-3: General test parameters for E-UTRA -  
NR FR1 SFTD measurement delay in non-DRX

| **Parameter** | **Unit** | **Test configuration** | **Value** | | **Comment** |
| --- | --- | --- | --- | --- | --- |
| **Test 1** | **Test 2** |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | One E-UTRAN carrier frequencies is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | One NR FR1 carrier frequencies is used. |
| Active cell |  | Config 1,2,3,4,5,6 | Cell 1 | | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | Cell 2 | | Cell 2 is on NR RF channel number 1. |
| SSB configuration |  | Config 1,4 | SSB.1 FR1 | | As specified in TS 38.133 [6] clause A.3.10.1 |
|  | Config 2,5 | SSB.1 FR1 | | As specified in TS 38.133 [6] clause A.3.10.1 |
|  | Config 3,6 | SSB.2 FR1 | | As specified in TS 38.133 [6] clause A.3.10.1 |
| CP length |  | Config 1,2,3,4,5,6 | Normal | | Applicable to both cells. |
| DRX |  | Config 1,2,3,4,5,6 | OFF | | DRX is not used |
| Frame time offset between serving and neighbour cells | ms | Config 1,2,4,5 | 3 | 7 | Asynchronous cells.  The timing of Cell 2 relative to the timing of Cell 1. |
| μs | Config 3,6 | 3 | | Synchronous cells. |
| SFN offset between serving and neighbour cells |  | Config 1,2,3,4,5,6 | 0 | 1 | SFN of Cell 2 relative to SFN of Cell 1. |
| T1 | s | Config 1,2,3,4,5,6 | 1 | |  |

8.4.1.1.4.2 Test procedure

Two cells are deployed in the test, which are E-UTRA PCell (Cell 1) on the E-UTRA carrier and a FR1 NR neighbour cell (Cell 2) on NR carrier. The general test parameters are given in Table 8.4.1.1.4.1-3. The test has two subtests with different frame time offset and SFN offset. Cell specific test parameters for the E-UTRA PCell and neighbour cell are given in Table 8.4.1.1.5-1 and 8.4.1.1.5-2, respectively.

In the measurement control information, it is indicated to the UE that inter-RAT SFTD measurement on Cell 2 is used. This test consists of single time period with time duration of T1. Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only.

Configure the frame time offset and SFN offset according to Test 1 in Table 8.4.1.1.4.1-3.

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters of Cell 2 according to T1 in Table 8.4.1.1.5-2, T1 starts.

3. The SS shall transmit an *RRCConnectionReconfiguration* message.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. UE shall transmit a *MeasurementReport* message triggered by SFTD measurement reporting. If the overall delays measured from the beginning of time period T1 is less than 297 ms then the number of successful tests is increased by one. If the UE fails to report within the overall delays measured requirement then the number of failure tests is increased by one.

6. After the SS receive the *MeasurementReport* message in step 6) or when T1 expires, the SS shall transmit an *RRCConnectionRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.

7. Set Cell 2 physical cell identity = ((current Cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

8. After the RRC connection release, the SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 [25] clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3); or

- switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

9. Repeat step 2-8 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

10 Set the frame time offset and SFN offset for Test 2 according to Table 8.4.1.1.4.1-3 and repeat steps 1 to 9.

8.4.1.1.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.4.1.1.4.3-1: Common Exception messages for E-UTRA -  
NR FR1 SFTD measurement delay in non-DRX

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7 with Condition Inter-RAT and SFTD;  Table H.3.4-4 with Condition INTER-RAT NR, SFTD and GAPLESS |
| Specific message contents exceptions for Test Configuration 8.4.1.1-1 8.4.1.1-2, 8.4.1.1-4 and 8.4.1.1-5 | Table H.3.4-6 with Condition SSB.1 FR1 andSMTC.1 |
| Specific message contents exceptions for Test Configuration 8.4.1.1-3 and 8.4.1.1-6 | Table H.3.4-6 with Condition SSB.2 FR1 andSMTC.1 |

8.4.1.1.5 Test requirement

Table 8.4.1.1.4.1-3, 8.4.1.1.5-1 and 8.4.1.1.5-2 define the primary level settings including test tolerances for E-UTRA - NR FR1 SFTD measurement delay in non-DRX.

Table 8.4.1.1.5-1: E-UTRA Cell specific test parameters for E-UTRA -  
NR FR1 SFTD measurement delay in non-DRX

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | E-UTRAN Cell1 |
| E-UTRA RF Channel Number |  | 1 |
| Duplex mode |  | FDD or TDD |
| TDD special subframe configurationNote1 |  | 6 |
| TDD uplink-downlink configurationNote1 |  | 1 |
| BWchannel |  | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD  5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD  5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD |
| OCNG PatternsNote2 |  | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD  5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 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\_RANote3 | dB |
| OCNG\_RBNote3 | dB |
| NocNote4 | dBm/15 kHz | -104 |
| Ês/Noc | dB | 17 |
| Ês/Iot | dB | 17 |
| RSRP Note5 | dBm/15 kHz | -87 |
| SCH\_RP Note5 | dBm/15 kHz | -87 |
| Io Note5 | dBm/Ch BW | -59.13+10log(NRB,c /50) |
| Propagation Condition |  | AWGN |
| Antenna Configuration |  | 1x2 |
| NOTE 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [24].  NOTE 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [23] respectively.  NOTE 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  NOTE 5: Es/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | |

Table 8.4.1.1.5-2: NR Cell specific test parameters for E-UTRA -  
NR FR1 SFTD measurement delay in non-DRX

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 |
| Duplex mode |  | Config 1,4 | FDD |
| Config 2,3,5,6 | TDD |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 |
| Config 2,5 | 10: NRB,c = 52 |
| Config 3,6 | 40: NRB,c = 106 |
| TDD configuration |  | Config 2,5 | TDDConf.1.1 |
| Config 3,6 | TDDConf.2.1 |
| OCNG Pattern defined in A.3.2.1.1 |  | Config 1,2,3,4,5,6 | OP.1 |
| SMTC configuration |  | Config 1,2,3,4,5,6 | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2,4,5 | 15 |
| Config 3,6 | 30 |
| EPRE ratio of PSS to SSS | dB | Config 1,2,3,4,5,6 | 0 |
| EPRE ratio of PBCH DMRS to SSS | dB |
| EPRE ratio of PBCH to PBCH DMRS | dB |
| EPRE ratio of OCNG DMRS to SSS Note 1 | dB |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | dB |
| Noc Note2 | dBm/15kHz |  | -98 |
| Noc Note2 | dBm/SCS | Config 1,2,4,5 | -98 |
| Config 3,6 | -95 |
| SS-RSRP Note 3, 4 | dBm/SCS | Config 1,2,4,5 | -94 |
| Config 3,6 | -91 |
| Ês/Iot | dB | Config 1,2,3,4,5,6 | 4 |
| Ês/Noc | dB | Config 1,2,3,4,5,6 | 4 |
| Io Note 3 | dBm/9.36MHz | Config 1,2,4,5 | -64.59 |
| dBm/38.16MHz | Config 3,6 | -58.49 |
| Propagation Condition |  | Config 1,2,3,4,5,6 | 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 *Noc* to be fulfilled.  NOTE 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | |

The overall delays measured is defined as the time from the beginning of time period T1, to the moment the UE send one SFTD measurement triggered measurement report.

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

The overall delays measured test requirement is expressed as:

- Overall delays measured = measurement reporting delay + TTI insertion uncertainty

- Measurement reporting delay = TRRC\_procedure\_delay + Tmeasure\_SFTD1

TRRC\_procedure\_delay = 15 ms, is the RRC procedure delay for RRC reconfiguration, which is defined in TS 36.331 [2] Clause 11.2

Tmeasure\_SFTD1 = 280 ms, is the SFTD measurement report delay defined in TS 36.133 [23] clause 8.1.2.4.25 and 8.1.2.4.26 for FDD and TDD E-UTRA Cell 1, respectively.

- TTI insertion uncertainty = 2 ms

The overall delays measured shall be less than a total of 297 ms.

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

#### 8.4.1.2 E-UTRA - NR FR1 SFTD measurement delay in DRX

8.4.1.2.1 Test purpose

The purpose of this test is:

- To partly verify that measurement reporting delay for SFTD between E-UTRA PCell and inter-RAT NR neighbour cell in FR1 is within the requirements stated in clauses 8.1.2.4.25 and 8.1.2.4.26 of TS 36.133 [23] for E-UTRA FDD and TDD, respectively, when no measurement gaps are provided and DRX is configured.

8.4.1.2.2 Test applicability

This test applies to all types of E-UTRA UE Release 15 and forward supporting inter-RAT SFTD measurements and long DRX cycle.

8.4.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.4.1.0.

The normative reference for this requirement is TS 38.133 [6] clause A.8.4.1.2.

8.4.1.2.4 Test description

Two carriers are used in this test: one E-UTRA carrier with the PCell (Cell 1), and one NR carrier with the NR neighbour cell (Cell 2).

This test consists of a single time period of duration T1. Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only. The point in time at which the UE receives, at the UE antenna connector(s), a RRC message containing a measurement configuration for SFTD measurements on RF channel 1 defines the start of time duration T1. Following the start of T1 the UE shall detect Cell 2, determine the SFN and frame time difference of Cell 2 relative to Cell 1, and send a measurement report. No measurement gaps are provided and DRX is configured in this test.

8.4.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.4.1.2.4.1-1.

Table 8.4.1.2.4.1-1: Supported test configurations for E-UTRA -  
NR FR1 SFTD measurement delay in DRX

|  |  |
| --- | --- |
| **Config** | **Description** |
| 8.4.1.2-1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.4.1.2-2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.4.1.2-3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 8.4.1.2-4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.4.1.2-5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.4.1.2-6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test requirement and the DUT according to the parameters in Table 8.4.1.2.4.1-2.

Table 8.4.1.2.4.1-2: Initial conditions for E-UTRA - NR FR1 SFTD measurement delay in DRX

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.4.1.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.4.1.2.4.1-3.

2. Message contents are defined in clause 8.4.1.2.4.3.

3. There are two carriers and two cells specified in the test, where Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR neighbour cell on the NR carrier. Cell 1 is the cell used for connection setup for this test. E-UTRA Cell 1 is configured according to TS 36.521-3 [26] clauses C.1.0 and C.1.1.

Table 8.4.1.2.4.1-3: General test parameters for E-UTRA - NR FR1 SFTD measurement delay in DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | | **Comment** |
| **Test 1** | **Test 2** |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | One E-UTRAN carrier frequencies is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | One NR FR1 carrier frequencies is used. |
| Active cell |  | Config 1,2,3,4,5,6 | Cell 1 | | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | Cell 2 | | Cell 2 is on NR RF channel number 1. |
| SSB Configuration |  | Config 1,4 | SSB.1 FR1 | | As specified in TS 38.133 [6] clause A.3.10.1 |
|  | Config 2,5 | SSB.1 FR1 | | As specified in TS 38.133 [6] clause A.3.10.1 |
|  | Config 3,6 | SSB.2 FR1 | | As specified in TS 38.133 [6] clause A.3.10.1 |
| CP length |  | Config 1,2,3,4,5,6 | Normal | | Applicable to both cells. |
| DRX |  | Config 1,2,3,4,5,6 | DRX.4 | | DRX configuration as specified in TS 38.133 [6] clause A.3.3.4 |
| Frame time offset between serving and neighbour cells | ms | Config 1,2,4,5 | 3 | 7 | Asynchronous cells.  The timing of Cell 2 relative to the timing of Cell 1. |
| μs | Config 3,6 | 3 | | Synchronous cells. |
| SFN offset between serving and neighbour cells |  | Config 1,2,3,4,5,6 | 0 | 1 | SFN of Cell 2 relative to SFN of Cell 1. |
| T1 | s | Config 1,2,3,4,5,6 | 1 | |  |

8.4.1.2.4.2 Test procedure

Two cells are deployed in the test, which are E-UTRA PCell (Cell 1) on the E-UTRA carrier and a FR1 NR neighbour cell (Cell 2) on NR carrier. The general test parameters are given in Table 8.4.1.2.4.1-3. The test has two subtests with different frame time offset and SFN offset. Cell specific test parameters for the E-UTRA PCell and neighbour cell are given in Table 8.4.1.2.5-1 and 8.4.1.2.5-2, respectively.

In the measurement control information, it is indicated to the UE that inter-RAT SFTD measurement on Cell 2 is used. This test consists of single time period with time duration of T1. Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only.

Configure the frame time offset and SFN offset according to Test 1 in Table 8.4.1.2.4.1-3.

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters of Cell 2 according to T1 in Table 8.4.1.2.5-2, T1 starts.

3. The SS shall transmit an *RRCConnectionReconfiguration* message.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. UE shall transmit a *MeasurementReport* message triggered by SFTD measurement reporting. . If the overall delays measured from the beginning of time period T1 is less than 455 ms then the number of successful tests is increased by one, otherwise the number of failure tests is increased by one.

6. After the SS receive the *MeasurementReport* message in step 6) or when T1 expires, the SS shall transmit an *RRCConnectionRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.

7. Set Cell 2 physical cell identity = ((current Cell 2 physical cell identity + 1) mod1008) for next iteration of the test procedure loop.

8. After the RRC connection release, the SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 [25] clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3); or

- switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

9. Repeat step 2-8 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

10 Set the frame time offset and SFN offset for Test 2 according to Table 8.4.1.2.4.1-3 and repeat steps 1 to 9.

8.4.1.2.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions.

Table 8.4.1.2.4.3-1: Common Exception messages for E-UTRA -  
NR FR1 SFTD measurement delay in DRX

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7 with Condition Inter-RAT and SFTD;  Table H.3.4-4 with Condition INTER-RAT NR, SFTD and GAPLESS  Table H.3.7-2 with Condition DRX.4 |
| Specific message contents exceptions for Test Configuration 8.4.1.1-1, 8.4.1.1-2, 8.4.1.1-4 and 8.4.1.1-5 | Table H.3.4-6 with Condition SSB.1 FR1 and SMTC.1 and |
| Specific message contents exceptions for Test Configuration 8.4.1.1-3 and 8.4.1.1-6 | Table H.3.4-6 with Condition SSB.2 FR1 and SMTC.1 |

8.4.1.2.5 Test requirement

Table 8.4.1.2.4.1-3, 8.4.1.2.5-1 and 8.4.1.2.5-2 define the primary level settings including test tolerances for E-UTRA - NR FR1 SFTD measurement delay in DRX.

Table 8.4.1.2.5-1: E-UTRA Cell specific test parameters for E-UTRA -  
NR FR1 SFTD measurement delay in DRX

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | E-UTRAN Cell1 |
| E-UTRA RF Channel Number |  | 1 |
| Duplex mode |  | FDD or TDD |
| TDD special subframe configurationNote1 |  | 6 |
| TDD uplink-downlink configurationNote1 |  | 1 |
| BWchannel |  | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD  5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD  5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD |
| OCNG PatternsNote2 |  | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD  5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 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\_RANote3 | dB |
| OCNG\_RBNote3 | dB |
| NocNote4 | dBm/15 kHz | -104 |
| Ês/Noc | dB | 17 |
| Ês/Iot | dB | 17 |
| RSRP Note5 | dBm/15 kHz | -87 |
| SCH\_RP Note5 | dBm/15 kHz | -87 |
| Io Note5 | dBm/Ch BW | -59.13+10log(NRB,c /50) |
| Propagation Condition |  | AWGN |
| Antenna Configuration |  | 1x2 |
| NOTE 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [24].  NOTE 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [23] respectively.  NOTE 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  NOTE 5: Es/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | |

Table 8.4.1.2.5-2: NR Cell specific test parameters for E-UTRA -  
NR FR1 SFTD measurement delay in DRX

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 |
| Duplex mode |  | Config 1,4 | FDD |
| Config 2,3,5,6 | TDD |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 |
| Config 2,5 | 10: NRB,c = 52 |
| Config 3,6 | 40: NRB,c = 106 |
| TDD configuration |  | Config 2,5 | TDDConf.1.1 |
| Config 3,6 | TDDConf.2.1 |
| OCNG Pattern defined in A.3.2.1.1 |  | Config 1,2,3,4,5,6 | OP.1 |
| SMTC configuration |  | Config 1,2,3,4,5,6 | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2,4,5 | 15 |
| Config 3,6 | 30 |
| EPRE ratio of PSS to SSS | dB | Config 1,2,3,4,5,6 | 0 |
| EPRE ratio of PBCH DMRS to SSS | dB |
| EPRE ratio of PBCH to PBCH DMRS | dB |
| EPRE ratio of OCNG DMRS to SSS Note 1 | dB |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | dB |
| Noc Note2 | dBm/15kHz |  | -98 |
| Noc Note2 | dBm/SCS | Config 1,2,4,5 | -98 |
| Config 3,6 | -95 |
| SS-RSRP Note 3, 4 | dBm/SCS | Config 1,2,4,5 | -94 |
| Config 3,6 | -91 |
| Ês/Iot | dB | Config 1,2,3,4,5,6 | 4 |
| Ês/Noc | dB | Config 1,2,3,4,5,6 | 4 |
| Io Note 3 | dBm/9.36MHz | Config 1,2,4,5 | -64.59 |
| dBm/38.16MHz | Config 3,6 | -58.49 |
| Propagation Condition |  | Config 1,2,3,4,5,6 | 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 *Noc* to be fulfilled.  NOTE 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | |

The overall delays measured is defined as the time from the beginning of time period T1, to the moment the UE send one SFTD measurement triggered measurement report.

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

The overall delays measured test requirement is expressed as:

- Overall delays measured = measurement reporting delay + TTI insertion uncertainty

- Measurement reporting delay = TRRC\_procedure\_delay + Tmeasure\_SFTD1 + TDRX\_transmission

TRRC\_procedure\_delay = 15 ms, is the RRC procedure delay for RRC reconfiguration, which is defined in TS 36.331 [2] Clause 11.2

Tmeasure\_SFTD1 = 280 ms, is the SFTD measurement report delay defined in TS 36.133 [23] clause 8.1.2.4.25 and 8.1.2.4.26 for FDD and TDD E-UTRA Cell 1, respectively. When DRX is used, the same Tmeasure\_SFTD1 as for non-DRX applies.

TDRX\_transmission = 158 ms, it is the time until the next transmission in the worst case that the last PDDCH is missed at 280ms from the beginning of T1.

- TTI insertion uncertainty = 2 ms

The overall delays measured shall be less than a total of 455 ms.

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

8.4.2 Inter-RAT measurements

#### 8.4.2.0 Minimum conformance requirements

##### 8.4.2.0.1 Minimum conformance requirements for E-UTRA - NR event-triggered measurement

The UE shall be able to identify new inter-RAT E-UTRAN − NR cells and perform SS-RSRP, SS-RSRQ, and SS-SINR measurements of identified inter-RAT cells if carrier frequency information is provided by the PCell, even if no explicit neighbour list with physical layer cell identities is provided.

When measurement gaps are scheduled, the UE shall be able to identify a new detectable cell within Tidentify\_irat\_without\_index if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured). Otherwise, UE shall be able to identify a new detectable inter-RAT frequency cell within Tidentify\_irat\_with\_index. The UE shall be able to identify a new detectable inter-RAT SS block of an already detected cell within Tidentify\_irat\_without\_index.

Tidentify\_irat\_without\_index = (TPSS/SSS\_sync\_irat + T SSB\_measurement\_period\_irat) ms

Tidentify\_irat\_with\_index = (TPSS/SSS\_sync\_irat + T SSB\_measurement\_period\_irat + TSSB\_time\_index\_irat) ms

Where:

TPSS/SSS\_sync\_irat: it is the time period used in PSS/SSS detection given in table 8.4.2.0.1-1 and table 8.4.2.0.1-2.

TSSB\_time\_index\_irat: it is the time period used to acquire the index of the SSB being measured given in table 8.4.2.0.1-3 and table 8.4.2.0.1-4.

T SSB\_measurement\_period\_irat: equal to a measurement period of SSB based measurement given in table 8.4.2.0.1-5 and table 8.4.2.0.1-6.

Mpss/sss\_sync\_irat: For a UE supporting FR2 power class 1, Mpss/sss\_sync\_ira=64 samples. For a UE supporting FR2 power class 2 (vehicle mounted), Mpss/sss\_sync\_irat=40 samples. For a UE supporting FR2 power class 3 (handheld), Mpss/sss\_sync\_irat=40 samples. For a UE supporting FR2 power class 4, Mpss/sss\_syn\_iratc=40 samples.

MSSB\_index\_irat: For a UE supporting power class 1, MSSB\_index\_irat =40 samples. For a vehicle mounted UE supporting power class 2 (vehicle mounted), Mpss/sss\_sync\_irat=24 samples.For a UE supporting power class 3 (handheld), MSSB\_index\_irat =24 samples. For a UE supporting power class 4, Mmeas\_period\_irat =24 samples.

Mmeas\_period\_irat: For a UE supporting FR2 power class 1, Mmeas\_period\_irat =64 samples. For a vehicle mounted UE supporting FR2 power class 2 (vehicle mounted), Mpss/sss\_sync\_irat=40 samples.For a UE supporting FR2 power class 3 (handheld), Mmeas\_period\_irat =40 samples. For a UE supporting FR2 power class 4, Mmeas\_period\_irat =40 samples.

Nfreq is defined in TS 36.133 [23] clause 8.1.2.1.1.

For per-FR measurement gap capable UE, when serving cells are in E-UTRA and measurement objects are only in FR2:

- UE can perform such measurements without gap; and

- UE fulfils the requirements for FR2 measurement objects based on effective MGRP = 20 ms.

Table 8.4.2.0.1-1: Time period for PSS/SSS detection, (Frequency range FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | TPSS/SSS\_sync\_irat |
| No DRX | max[600ms, 8 x max(MGRP, SMTC period)] x Nfreq |
| DRX cycle ≤ 320ms | max[600ms, ceil(8x1.5) x max(MGRP, SMTC period, DRX cycle)] x Nfreq |
| DRX cycle > 320ms | 8 x DRX cycle x Nfreq |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in TS 36.133 [23] clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in TS 36.133 [23] clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

Table 8.4.2.0.1-1A: Time period for PSS/SSS detection for UE configured  
with *highSpeedInterRAT-r16* (Frequency range FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | TPSS/SSS\_sync\_irat |
| No DRX | Max(600ms, 8 × Max(MGRP, SMTC period)) × Nfreq |
| DRX cycle < 320ms | Max(600ms, ceil( 8 × M) × max(MGRP, SMTC period, DRX cycle)) ×Nfreq |
| DRX cycle ≥ 320ms | 8× DRX cycle ×Nfreq |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [3].  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 of TS 38.133 [3] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: M = 1 when SMTC < = 40ms, and M = 1.5 when SMTC > 40ms. | |

Table 8.4.2.0.1-2: Time period for PSS/SSS detection, (Frequency range FR2)

|  |  |
| --- | --- |
| **Condition NOTE1,2** | **TPSS/SSS\_sync\_irat** |
| No DRX | Max(600ms, Mpss/sss\_sync\_irat x max(MGRP, SMTC period)) x Nfreq |
| DRX cycle ≤ 320ms | Max(600ms, (1.5 x Mpss/sss\_sync\_irat) x max(MGRP, SMTC period, DRX cycle)) x Nfreq |
| DRX cycle > 320ms | Mpss/sss\_sync\_irat x DRX cycle x Nfreq |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in TS 36.133 [23] clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in TS 36.133 [23] clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

Table 8.4.2.0.1-3: Time period for time index detection (Frequency range FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | TSSB\_time\_index\_irat |
| No DRX | Max(120ms, 3 x max(MGRP, SMTC period)) x Nfreq |
| DRX cycle ≤ 320ms | Max(120ms, ceil(3 x 1.5) x max(MGRP, SMTC period,DRX cycle)) x Nfreq |
| DRX cycle > 320ms | 3 x DRX cycle x Nfreq |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in TS 36.133 [23] clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in TS 36.133 [23] clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

Table 8.4.2.0.1-3A: Time period for time index detection for UE configured  
with *highSpeedInterRAT-r16* (Frequency range FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | TSSB\_time\_index\_irat |
| No DRX | Max(120ms, 3 × Max(MGRP, SMTC period)) × Nfreq |
| DRX cycle < 320ms | Max(120ms, Ceil(3 × M) × Max(MGRP, SMTC period, DRX cycle)) × Nfreq |
| DRX cycle ≥ 320ms | 3 × DRX cycle × Nfreq |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [3].  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 of TS 38.133 [3] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: M = 1 when SMTC < = 40ms, and M = 1.5 when SMTC > 40ms. | |

Table 8.4.2.0.1-4: Time period for time index detection (Frequency range FR2)

|  |  |
| --- | --- |
| Condition NOTE1,2 | TSSB\_time\_index\_irat |
| No DRX | Max(200ms, MSSB\_index\_irat x max(MGRP, SMTC period)) x Nfreq |
| DRX cycle ≤ 320ms | Max(200ms, (1.5 x MSSB\_index\_irat) x max(MGRP, SMTC period, DRX cycle)) x Nfreq |
| DRX cycle > 320ms | MSSB\_index\_irat x DRX cycle x Nfreq |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in TS 36.133 [23] clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in TS 36.133 [23] clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

In the requirements, an NR cell is considered to be detectable when:

- NR SS-RSRP related conditions in the accuracy requirements in clause 9.11.1 are fulfilled for a corresponding Band, together with the corresponding side conditions in clause B.2.3 of TS 38.133 [6],

- NR SS-RSRQ related conditions in the accuracy requirements in clause 9.11.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in clause B.2.3 of TS 38.133 [6],

- NR SS-SINR related conditions in the accuracy requirements in clause 9.11.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in clause B.2.3 of TS 38.133 [6].

When measurement gaps are scheduled for NR measurements the UE physical layer shall be capable of reporting NR SS-RSRP, SS-RSRQ, and SS-SINR measurements to higher layers with measurement accuracy as specified in TS 36.133 [23] clause 9.11, with measurement period as shown in table 8.4.2.0.1-5 and table 8.4.2.0.1-6:

Table 8.4.2.0.1-5: Measurement period for inter-RAT frequency measurements (Frequency FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T SSB\_measurement\_period\_irat |
| No DRX | Max(200ms, 8 x max(MGRP, SMTC period)) x Nfreq |
| DRX cycle ≤ 320ms | Max(200ms, ceil(8 x 1.5) x max(MGRP, SMTC period, DRX cycle)) x Nfreq |
| DRX cycle > 320ms | 8 x DRX cycle x Nfreq |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in TS 36.133 [23] clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in TS 36.133 [23] clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

Table 8.4.2.0.1-5A: Measurement period for inter-RAT measurements for UE configured  
with *highSpeedInterRAT-r16* (Frequency range FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | TSSB\_measurement\_period\_irat |
| No DRX | Max(200ms, 8 × Max(MGRP, SMTC period)) × Nfreq |
| DRX cycle < 320ms | Max(200ms, ceil(8 × M) x max(MGRP, SMTC period, DRX cycle))×Nfreq |
| DRX cycle ≥ 320ms | 4× M × DRX cycle ×Nfreq |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50].  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: M = 1 when SMTC < = 40ms, and M = 1.5 when SMTC > 40ms. | |

Table 8.4.2.0.1-6: Measurement period for inter-RAT frequency measurements (Frequency FR2)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T SSB\_measurement\_period\_irat |
| No DRX | Max(400ms, Mmeas\_period\_irat x max(MGRP, SMTC period)) x Nfreq |
| DRX cycle ≤ 320ms | Max(400ms, (1.5 x Mmeas\_period\_irat) x max(MGRP, SMTC period, DRX cycle)) x Nfreq |
| DRX cycle > 320ms | Mmeas\_period\_irat x DRX cycle x Nfreq |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in TS 36.133 [23] clause 3.6.1.  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in TS 36.133 [23] clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

The UE shall be capable of performing NR SS-RSRP, SS-RSRQ, and SS-SINR for up to 7 NR carrier frequencies.

For each RAT E-UTRAN - NR layer on FR1 or FR2, the UE shall be capable of monitoring at least 4 cells.

For each RAT E-UTRAN - NR layer on FR1, during each layer 1 measurement period, the UE shall be capable of monitoring at least 7 SSBs with different SSB index and/or PCI on the RAT E-UTRA -NR.

For each RAT E-UTRA - NR layer on FR2, during each layer 1 measurement period, the UE shall be capable of monitoring at least 10 SSBs with different SSB index and/or PCI on the RAT E-UTRAN - NR layer. The UE shall be capable of monitoring at least one SSB per cell.

The NR SS-RSRP measurement accuracy for all measured cells shall be as specified in TS 36.133 [23] clause 9.11.1. The NR SS-RSRQ measurement accuracy for all measured cells shall be as specified in TS 36.133 [23] clause 9.11.2. The NR SS-SINR measurement accuracy for all measured cells shall be as specified in TS 36.133 [23] clause 9.11.3.

Reported measurements in event triggered measurement reports shall meet the requirements in TS 36.133 [23] clause 9.

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

The measurement reporting delay is defined as the time between any events that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than Tidentify\_irat\_without\_index or Tidentify\_irat\_with\_index for the minimum requirements.When L3 filtering is used or IDC autonomous denial or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period Tidentify\_irat\_without\_index or Tidentify\_irat\_with\_index for the minimum requirements and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than Tmeasurement\_NR\_FDD provided the timing to that cell has not changed more than ±3200 Tc while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

The normative reference for this requirement is TS 36.133 [23] clause 8.1.2.4.21 and 8.1.2.4.22.

##### 8.4.2.0.2 Void

#### 8.4.2.1 E-UTRA event-triggered reporting of a NR FR1 neighbour cell without SSB time index detection in non-DRX

8.4.2.1.1 Test purpose

The purpose of this test isto verify that the UE makes correct reporting of an event and to verify partly the NR inter‑RAT cell search requirements for E-UTRA FDD - NR FR1 measurements given in TS 36.133 [23] clause 8.1.2.4.21 and for E-UTRAN TDD - NR FR1 measurements given in TS 36.133 [23] clause 8.1.2.4.22.

8.4.2.1.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards and capable of NR measurements. Test 1 is applicable to UEs not supporting per-FR gap (IndependentGapConfig, as defined in TS 38.306 [11]) and Test 2 is applicable only to UEs supporting per-FR gap and Gap Pattern Id 4.

8.4.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.4.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.8.4.2.1.

8.4.2.1.4 Test description

The test consists of two sub-tests with two cells configured, the E-UTRA PCell and NR neighbour cell; the difference between the two sub-tests is whether per-FR measurement gap is configured or not. Each sub-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 NR neighbour cell. In all sub-tests the UE is not required to report SSB time index.

8.4.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.4.2.1.4.1-1.

Table 8.4.2.1.4.1-1: Supported test configurations for E-UTRA - NR FR1 event-triggered  
reporting without SSB time index detection in non-DRX

|  |  |
| --- | --- |
| Configuration | Description |
| 8.4.2.1-1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.4.2.1-2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.4.2.1-3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 8.4.2.1-4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.4.2.1-5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.4.2.1-6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test requirement and the DUT according to the parameters in Table 8.4.2.1.4.1-2.

Table 8.4.2.1.4.1-2: Initial conditions for E-UTRA - NR FR1 event-triggered reporting  
without SSB time index detection in non-DRX

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.4.2.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.4.2.1.4.1-3.

2. Message contents are defined in clause 8.4.2.1.4.3.

3. There are two carriers and two cells specified in the test, where Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR neighbour cell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to Table 8.4.2.1.5-1 for this test. Cell 1 is configured according to clauses C.1.1 and C.1.2.

Table 8.4.2.1.4.1-3: General test parameters for E-UTRA - NR FR1 event-triggered reporting  
without SSB time index detection in non-DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| E-UTRA RF Channel Numbers |  | 1, 2, 3, 4, 5, 6 | 1 | | One E-UTRA carrier frequency is used. |
| NR RF Chanel Number |  | 1, 2, 3, 4, 5, 6 | 1 | | One FR1 NR carrier frequency is used. |
| Active cell |  | 1, 2, 3, 4, 5, 6 | E-UTRA cell 1 (PCell) | | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | 1, 2, 3, 4, 5, 6 | NR cell 2 | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2, 3, 4, 5, 6 | 0 | 4 | As specified in clause Table 8.1.2.1-1 of TS 36.133 [23]. |
| Measurement gap offset |  | 1, 2, 3, 4, 5, 6 | 39 | 19 | As specified in TS 36.331 [29]. |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | Note 1 | | E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [29] |
| b2-Threshold2NR | dBm | 1, 2, 3, 4, 5, 6 | Note 2 | | SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [29] |
| Hysteresis | dB | 1, 2, 3, 4, 5, 6 | 0 | |  |
| CP length |  | 1, 2, 3, 4, 5, 6 | Normal | |  |
| TimeToTrigger | s | 1, 2, 3, 4, 5, 6 | 0 | |  |
| Filter coefficient |  | 1, 2, 3, 4, 5, 6 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2, 3, 4, 5, 6 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | 1, 4 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | 2, 3, 5, 6 | 3μs | | Synchronous cells. |
| T1 | s | 1, 2, 3, 4, 5, 6 | 5 | |  |
| T2 | s | 1, 2, 3, 4, 5, 6 | 1 | 1 |  |
| NOTE 1: The value of b2-Threshold1 is defined in Table 8.4.2.1.5-1.  NOTE 2: The value of b2-Threshold2NR is defined in Table 8.4.2.1.5-2. | | | | | |

8.4.2.1.4.2 Test procedure

Two cells are deployed in the test, which are E-UTRA PCell (Cell 1) on the E-UTRA carrier and a FR1 NR neighbour cell (Cell 2) on NR carrier. The general and cell specific test parameters for PCell and neighbour cell are given in Table 8.4.2.1.4.1-3, 8.4.2.1.5-1 and 8.4.2.1.5-2, respectively.

In sub-test 1 measurement gap pattern configuration #0 as defined in Table 8.4.2.1.4.1-3 is provided for UE that does not support per-FR gap and in sub-test 2 measurement gap pattern configuration #4 as defined in Table 8.4.2.1.4.1-3 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters of Cell 1 and Cell 2 according to T1 in Table 8.4.2.1.5-1 and Table 8.4.2.1.5-2 respectively, T1 starts.

3. The SS shall transmit an *RRCConnectionReconfiguration* message.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. When T1 expires, the SS shall switch the parameters setting from T1 to T2 as specified in Table 8.4.2.1.5-1 and Table 8.4.2.1.5-2 respectively. T2 Starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event B2. If the overall delays measured from the beginning of time period T2 is less than X ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one. Where X is,

- 922 for sub-test 1,

- 802 for sub-test 2.

7. After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall transmit an *RRCConnectionRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources, or

- switch off the UE.

8. Set Cell 2 physical cell identity = ((current Cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3); or

- switches on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

8.4.2.1.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions.

Table 8.4.2.1.4.3-1: Common Exception messages for E-UTRA - NR FR1 event-triggered  
reporting without SSB time index detection in non-DRX

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7 with Condition Inter-RAT and EVENT B2;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B2 for Test 1;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B2 for Test 2;  Table H.3.4-5 with Condition Pattern #0 for Test 1;  Table H.3.4-5 with Condition Pattern #4 for Test 2; |
| Specific message contents exceptions for Test Configuration 8.4.2.1-1 and 8.4.2.1-4 | Table H.3.4-6 with Conditions SMTC.2, SSB.1 FR1 and Asynchronous cells |
| Specific message contents exceptions for Test Configuration 8.4.2.1-2 and 8.4.2.1-5 | Table H.3.4-6 with Conditions SMTC.1, SSB.1 FR1 and Synchronous cells |
| Specific message contents exceptions for Test Configuration 8.4.2.1-3 and 8.4.2.1-6 | Table H.3.4-6 with Conditions SMTC.1, SSB.2 FR1 and Synchronous cells |

Table 8.4.2.1.4.3-2: SchedulingRequest-Config-DEFAULT

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [25] Table 4.6.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| SchedulingRequest-Config-DEFAULT ::= CHOICE { |  |  |  |
| setup SEQUENCE { |  |  |  |
| sr-ConfigIndex | 25 |  | Config 8.4.2.1-1/2/3 |
|  | 22 |  | Config 8.4.2.1-4/5/6 |
| } |  |  |  |
| } |  |  |  |

8.4.2.1.5 Test requirement

Table 8.4.2.1.4.1-3, 8.4.2.1.5-1 and 8.4.2.1.5-2 define the primary level settings including test tolerances for E-UTRA - NR FR1 event-triggered reporting without SSB time index detection in non-DRX.

Table 8.4.2.1.5-1: E-UTRAN PCell specific test parameters for E-UTRA - NR FR1  
event-triggered reporting without SSB time index detection in non-DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | |
| T1 | T2 |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
| 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
| 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
| 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
| 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | -77 | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote3 |
| OCNG\_RBNote3 |
| NocNote4 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -104 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| IoNote5 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -56.12 | -56.12 |
| Propagation Condition Note6 |  | 1, 2, 3, 4, 5, 6 | AWGN | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2, 3, 4, 5, 6 | 1x2 | |
| NOTE 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [24].  NOTE 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [23] respectively.  NOTE 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  NOTE 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [27]. | | | | |

Table 8.4.2.1.5-2: NR neighbour cell specific test parameters for E-UTRA - NR FR1  
event-triggered reporting without SSB time index detection in non-DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | |
| T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 4 | FDD | |
| 2, 3, 5, 6 | TDD | |
| TDD configuration |  | 2, 5 | TDDConf.1.1 | |
| 3, 6 | TDDConf.2.1 | |
| BWchannel | MHz | 1, 2, 4, 5 | 10: NRB,c = 52 | |
| 3, 6 | 40: NRB,c = 106 | |
| OCNG Patterns |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration |  | 1, 4 | SMTC.2 | |
| 2, 3, 5, 6 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2, 4, 5 | 15 | |
| 3, 6 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2, 4, 5 | -101 | |
| 3, 6 | -98 | |
| EPRE ratio of PSS to SSS |  | 1, 2, 3, 4, 5, 6 | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |
| EPRE ratio of PBCH to PBCH DMRS |  |
| EPRE ratio of PDCCH DMRS to SSS |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |
| EPRE ratio of PDSCH DMRS to SSS |  |
| EPRE ratio of PDSCH to PDSCH |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |
| Note2 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 | |
| Note2 | dBm/SCS | 1, 2, 4, 5 | -98 | |
| 3, 6 | -95 | |
| SS-RSRP Note 3 | dBm/SCS | 1, 2, 4, 5 | -Infinity | -91 |
| 3, 6 | -Infinity | -88 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | 1, 2, 4, 5 | -70.05 | -62.26 |
| dBm/38.16MHz | 3, 6 | -63.94 | -56.15 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 922 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 802 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index.

NOTE: The overall delay requirement is defined as the delay requirement in TS 38.133 plus 2 ms corresponding to the TTI insertion uncertainty of the measurement report in DCCH.

#### 8.4.2.2 E-UTRA event-triggered reporting of a NR FR1 neighbour cell without SSB time index detection in DRX

8.4.2.2.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event and to verify partly the NR inter-RAT cell search requirements given in clause 8.1.2.4.21 of TS 36.133 for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 for E-UTRAN TDD-NR measurements.

8.4.2.2.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards supporting long DRX cycle and capable of NR measurements. Test 1 and Test 2 are applicable to UEs not supporting per-FR gap (IndependentGapConfig, as defined in TS 38.306 [11]) and Test 3 and Test 4 are applicable only to UEs supporting per-FR gap and Gap Pattern Id 4.

8.4.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.4.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.8.4.2.2.

8.4.2.2.4 Test description

The test consists of four sub-tests with two cells configured, the E-UTRA PCell and NR neighbour cell; the difference between the four sub-tests is whether per-FR measurement gap is configured or not and the DRX configuration parameters. Each sub-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 NR neighbour cell. In all sub-tests the UE is not required to report SSB time index.

8.4.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.4.2.2.4.1-1.

Table 8.4.2.2.4.1-1: Supported test configurations for E-UTRA -  
NR FR1 event-triggered reporting without SSB time index detection in DRX

|  |  |
| --- | --- |
| Configuration | Description |
| 8.4.2.2-1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.4.2.2-2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.4.2.2-3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 8.4.2.2-4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.4.2.2-5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.4.2.2-6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test requirement and the DUT according to the parameters in Table 8.4.2.2.4.1-2.

Table 8.4.2.2.4.1-2: Initial conditions for E-UTRA - NR FR1 event-triggered reporting  
without SSB time index detection in DRX

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.4.2.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.4.2.2.4.1-3.

2. Message contents are defined in clause 8.4.2.2.4.3.

3. There are two carriers and two cells specified in the test, where Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR neighbour cell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to Table 8.4.2.2.5-1 for this test. Cell 1 is configured according to clauses C.1.1 and C.1.2.

Table 8.4.2.2.4.1-3: General test parameters for E-UTRA - NR FR1 event-triggered reporting  
without SSB time index detection in DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| Test 1 | Test 2 | Test 3 | Test 4 |
| E-UTRA RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | | | | One E-UTRA carrier frequency is used. |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | | | | One FR1 NR carrier frequency is used. |
| Active cell |  | 1, 2, 3, 4, 5, 6 | E-UTRA cell 1 (PCell) | | | | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | 1, 2, 3, 4, 5, 6 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2, 3, 4, 5, 6 | 0 | | 4 | | As specified in clause Table 8.1.2.1-1 of TS 36.133 [23]. |
| Measurement gap offset |  | 1, 2, 3, 4, 5, 6 | 39 | | 19 | | As specified in TS 36.331 [29]. |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | Note 1 | | | | E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [29] |
| b2-Threshold2NR | dBm | 1, 2, 3, 4, 5, 6 | Note 2 | | | | SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [29] |
| Hysteresis | dB | 1, 2, 3, 4, 5, 6 | 0 | | | |  |
| CP length |  | 1, 2, 3, 4, 5, 6 | Normal | | | |  |
| TimeToTrigger | s | 1, 2, 3, 4, 5, 6 | 0 | | | |  |
| Filter coefficient |  | 1, 2, 3, 4, 5, 6 | 0 | | | | L3 filtering is not used |
| DRX |  | 1, 2, 3, 4, 5, 6 | DRX.9 | DRX.12 | DRX.9 | DRX.12 | As specified in clause A.5 |
| Time offset between serving and neighbour cells |  | 1, 4 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | 2, 3, 5, 6 | 3μs | | | | Synchronous cells. |
| T1 | s | 1, 2, 3, 4, 5, 6 | 5 | | | |  |
| T2 | s | 1, 2, 3, 4, 5, 6 | 2 | 11 | 2 | 11 |  |
| NOTE 1: The value of b2-Threshold1 is defined in Table 8.4.2.2.5-1.  NOTE 2: The value of b2-Threshold2NR is defined in Table 8.4.2.2.5-2. | | | | | | | |

8.4.2.2.4.2 Test procedure

Two cells are deployed in the test, which are E-UTRA PCell (Cell 1) on the E-UTRA carrier and a FR1 NR neighbour cell (Cell 2) on NR carrier. The general and cell specific test parameters for PCell and neighbour cell are given in Table 8.4.2.2.4.1-3, 8.4.2.2.5-1 and 8.4.2.2.5-2, respectively.

In sub-test 1 and sub-test 2 measurement gap pattern configuration #0 as defined in Table 8.4.2.2.4.1-3 is provided for UE that does not support per-FR gap and in sub-test 3 and sub-test 4 measurement gap pattern configuration #4 as defined in Table 8.4.2.2.4.1-3 is provided for UE that supports per-FR gap.

DRX cycle = 40 ms is used in sub-test 1 and sub-test 3, DRX cycle = 640 ms is used in sub-test 2 and sub-test 4. The UE is allocated with PUSCH resource at every DRX cycle.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters of Cell 1 and Cell 2 according to T1 in Table 8.4.2.2.5-1 and Table 8.4.2.2.5-2 respectively, T1 starts.

3. The SS shall transmit an *RRCConnectionReconfiguration* message.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. When T1 expires, the SS shall switch the parameters setting from T1 to T2 as specified in Table 8.4.2.2.5-1 and Table 8.4.2.2.5-2 respectively. T2 Starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event B2. If the overall delays measured from the beginning of time period T2 is less than X ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one. Where X is,

- 1082 for sub-test 1 and sub-test 3,

- 10242 for sub-test 2 and sub-test 4.

7. .After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall:

- transmit an *RRCConnectionRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources, or

- switch off the UE.

8. Set Cell 2 physical cell identity = ((current Cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 [25] clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3); or

- switches on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

8.4.2.2.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.4.2.2.4.3-1: Common Exception messages for E-UTRA - NR FR1 event-triggered  
reporting without SSB time index detection in DRX

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7 with Condition Inter-RAT and EVENT B2;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B2 for Test 1 and Test 2;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B2 for Test 3 and Test 4;  Table H.3.4-5 with Condition Pattern #0 for Test 1 and Test 2;  Table H.3.4-5 with Condition Pattern #4 for Test 3 and Test 4;  Table H.3.7-2 with Condition DRX.9 and Gap for Test 1 and Test 3  Table H.3.7-2 with Condition DRX.12 and Gap for Test 2 and Test 4 |
| Specific message contents exceptions for Test Configuration 8.4.2.2-1 and 8.4.2.2-4 | Table H.3.4-6 with Conditions SMTC.2, SSB.1 FR1 and Asynchronous cells |
| Specific message contents exceptions for Test Configuration 8.4.2.2-2 and 8.4.2.2-5 | Table H.3.4-6 with Conditions SMTC.1, SSB.1 FR1 and Synchronous cells |
| Specific message contents exceptions for Test Configuration 8.4.2.2-3 and 8.4.2.2-6 | Table H.3.4-6 with Conditions SMTC.1, SSB.2 FR1 and Synchronous cells |

Table 8.4.2.2.4.3-2: SchedulingRequest-Config-DEFAULT

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [25] Table 4.6.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| SchedulingRequest-Config-DEFAULT ::= CHOICE { |  |  |  |
| setup SEQUENCE { |  |  |  |
| sr-ConfigIndex | 25 |  | Config 8.4.2.2-1/2/3 |
|  | 22 |  | Config 8.4.2.2-4/5/6 |
| } |  |  |  |
| } |  |  |  |

8.4.2.2.5 Test requirement

Table 8.4.2.2.4.1-3, 8.4.2.2.5-1 and 8.4.2.2.5-2 define the primary level settings including test tolerances for E-UTRA - NR FR1 event-triggered reporting without SSB time index detection in DRX.

Table 8.4.2.2.5-1: E-UTRAN PCell specific test parameters for E-UTRA - NR FR1 event-triggered  
reporting without SSB time index detection in DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | |
| T1 | T2 |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
| 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
| 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
| 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
| 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | -77 | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote3 |
| OCNG\_RBNote3 |
| NocNote4 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -104 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| IoNote5 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -56.12 | -56.12 |
| Propagation Condition Note6 |  | 1, 2, 3, 4, 5, 6 | AWGN | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2, 3, 4, 5, 6 | 1x2 | |
| NOTE 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [24].  NOTE 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [23] respectively.  NOTE 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  NOTE 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [27]. | | | | |

Table 8.4.2.2.5-2: NR neighbour cell specific test parameters for E-UTRA - NR FR1 event-triggered reporting without SSB time index detection in DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | |
| T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 4 | FDD | |
| 2, 3, 5, 6 | TDD | |
| TDD configuration |  | 2, 5 | TDDConf.1.1 | |
| 3, 6 | TDDConf.2.1 | |
| BWchannel | MHz | 1, 2, 4, 5 | 10: NRB,c = 52 | |
| 3, 6 | 40: NRB,c = 106 | |
| OCNG Patterns |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration |  | 1, 4 | SMTC.2 | |
| 2, 3, 5, 6 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2, 4, 5 | 15 | |
| 3, 6 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2, 4, 5 | -101 | |
| 3, 6 | -98 | |
| EPRE ratio of PSS to SSS |  | 1, 2, 3, 4, 5, 6 | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |
| EPRE ratio of PBCH to PBCH DMRS |  |
| EPRE ratio of PDCCH DMRS to SSS |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |
| EPRE ratio of PDSCH DMRS to SSS |  |
| EPRE ratio of PDSCH to PDSCH |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |
| Note2 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 | |
| Note2 | dBm/SCS | 1, 2, 4, 5 | -98 | |
| 3, 6 | -95 | |
| SS-RSRP Note 3 | dBm/SCS | 1, 2, 4, 5 | -Infinity | -91 |
| 3, 6 | -Infinity | -88 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | 1, 2, 4, 5 | -70.05 | -62.26 |
| dBm/38.16MHz | 3, 6 | -63.95 | -56.15 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1082 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 10242 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1082 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 10242 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

NOTE: The overall delay requirement is defined as the delay requirement in TS 38.133 plus 2 ms corresponding to the TTI insertion uncertainty of the measurement report in DCCH.

#### 8.4.2.3 E-UTRA event-triggered reporting of a NR FR1 neighbour cell with SSB time index detection in non-DRX

8.4.2.3.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event and to verify partly the NR inter-RAT cell search requirements for E-UTRA FDD - NR FR1 measurements given in TS 36.133 [23] clause 8.1.2.4.21 and for E-UTRAN TDD - NR FR1 measurements given in TS 36.133 [23] clause 8.1.2.4.22.

8.4.2.3.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards and capable of NR measurements. Test 1 is applicable to UEs not supporting per-FR gap (IndependentGapConfig, as defined in TS 38.306 [11]) and Test 2 is applicable only to UEs supporting per-FR gap and Gap Pattern Id 4.

8.4.2.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.4.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.8.4.2.3.

8.4.2.3.4 Test description

The test consists of two sub-tests with two cells configured, the E-UTRA PCell and NR neighbour cell; the difference between the two sub-tests is whether per-FR measurement gap is configured or not. Each sub-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 NR neighbour cell. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell.

8.4.2.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.4.2.3.4.1-1.

Table 8.4.2.3.4.1-1: Supported test configurations for E-UTRA - NR FR1 event-triggered  
reporting with SSB time index detection in non-DRX

|  |  |
| --- | --- |
| Configuration | Description |
| 8.4.2.3-1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.4.2.3-2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.4.2.3-3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 8.4.2.3-4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.4.2.3-5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.4.2.3-6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test requirement and the DUT according to the parameters in Table 8.4.2.3.4.1-2.

Table 8.4.2.3.4.1-2: Initial conditions for E-UTRA - NR FR1 event-triggered reporting  
with SSB time index detection in non-DRX

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.4.2.3.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.4.2.3.4.1-3.

2. Message contents are defined in clause 8.4.2.3.4.3.

3. There are two carriers and two cells specified in the test, where Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR neighbour cell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to Table 8.4.2.3.5-1 for this test. Cell 1 is configured according to clauses C.1.1 and C.1.2.

Table 8.4.2.3.4.1-3: General test parameters for E-UTRA - NR FR1 event-triggered reporting  
with SSB time index detection in non-DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| E-UTRA RF Channel Numbers |  | 1, 2, 3, 4, 5, 6 | 1 | | One E-UTRA carrier frequency is used. |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | | One FR1 NR carrier frequency is used. |
| Active cell |  | 1, 2, 3, 4, 5, 6 | E-UTRA cell 1 (PCell) | | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | 1, 2, 3, 4, 5, 6 | NR cell 2 | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2, 3, 4, 5, 6 | 0 | 4 | As specified in clause Table 8.1.2.1-1 of TS 36.133 [23]. |
| Measurement gap offset |  | 1, 2, 3, 4, 5, 6 | 39 | 19 | As specified in TS 36.331 [29]. |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | Note 1 | | E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [29] |
| b2-Threshold2NR | dBm | 1, 2, 3, 4, 5, 6 | Note 2 | | SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [29] |
| Hysteresis | dB | 1, 2, 3, 4, 5, 6 | 0 | |  |
| CP length |  | 1, 2, 3, 4, 5, 6 | Normal | |  |
| TimeToTrigger | s | 1, 2, 3, 4, 5, 6 | 0 | |  |
| Filter coefficient |  | 1, 2, 3, 4, 5, 6 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2, 3, 4, 5, 6 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | 1, 4 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3 ms later than the timing of Cell 1. |
|  | 2, 3, 5, 6 | 3μs | | Synchronous cells. |
| T1 | s | 1, 2, 3, 4, 5, 6 | 5 | |  |
| T2 | s | 1, 2, 3, 4, 5, 6 | 2 | 1 |  |
| NOTE 1: The value of b2-Threshold1 is defined in Table 8.4.2.3.5-1.  NOTE 2: The value of b2-Threshold2NR is defined in Table 8.4.2.3.5-2. | | | | | |

8.4.2.3.4.2 Test procedure

Two cells are deployed in the test, which are E-UTRA PCell (Cell 1) on the E-UTRA carrier and a FR1 NR neighbour cell (Cell 2) on NR carrier. The general and cell specific test parameters for PCell and neighbour cell are given in Table 8.4.2.3.4.1-3, 8.4.2.3.5-1 and 8.4.2.3.5-2, respectively.

In sub-test 1 measurement gap pattern configuration #0 as defined in Table 8.4.2.3.4.1-3 is provided for UE that does not support per-FR gap and in sub-test 2 measurement gap pattern configuration #4 as defined in Table 8.4.2.3.4.1-3 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters of Cell 1 and Cell 2 according to T1 in Table 8.4.2.3.5-1 and Table 8.4.2.3.5-2 respectively, T1 starts.

3. The SS shall transmit an *RRCConnectionReconfiguration* message.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. When T1 expires, the SS shall switch the parameters setting from T1 to T2 as specified in Table 8.4.2.3.5-1 and Table 8.4.2.3.5-2 respectively. T2 Starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event B2. If the overall delays measured from the beginning of time period T2 is less than X ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one. Where X is,

- 1042 for sub-test 1,

- 922 for sub-test 2.

7. . After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall:

- transmit an *RRCConnectionRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources, or

- switch off the UE.

8. Set Cell 2 physical cell identity = ((current Cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 [25] clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3); or

- switches on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

8.4.2.3.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions.

Table 8.4.2.3.4.3-1: Common Exception messages for E-UTRA - NR FR1 event-triggered  
reporting with SSB time index detection in non-DRX

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7 with Condition Inter-RAT and EVENT B2;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B2 for Test 1;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B2 for Test 2;  Table H.3.4-5 with Condition Pattern #0 for Test 1;  Table H.3.4-5 with Condition Pattern #4 for Test 2;  Table H.3.4-8 with Condition SSB-Index |
| Specific message contents exceptions for Test Configuration 8.4.2.3-1 and 8.4.2.3-4 | Table H.3.4-6 with Conditions SMTC.2, SSB.1 FR1 and Asynchronous cells |
| Specific message contents exceptions for Test Configuration 8.4.2.3-2 and 8.4.2.3-5 | Table H.3.4-6 with Conditions SMTC.1, SSB.1 FR1 and Synchronous cells |
| Specific message contents exceptions for Test Configuration 8.4.2.3-3 and 8.4.2.3-6 | Table H.3.4-6 with Conditions SMTC.1, SSB.2 FR1 and Synchronous cells |

Table 8.4.2.3.4.3-2: SchedulingRequest-Config-DEFAULT

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 [25] Table 4.6.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| SchedulingRequest-Config-DEFAULT ::= CHOICE { |  |  |  |
| setup SEQUENCE { |  |  |  |
| sr-ConfigIndex | 25 |  | Config 8.4.2.3-1/2/3 |
|  | 22 |  | Config 8.4.2.3-4/5/6 |
| } |  |  |  |
| } |  |  |  |

8.4.2.3.5 Test requirement

Table 8.4.2.3.4.1-3, 8.4.2.3.5-1 and 8.4.2.3.5-2 define the primary level settings including test tolerances for E-UTRA - NR FR1 event-triggered reporting with SSB time index detection in non-DRX.

Table 8.4.2.3.5-1: E-UTRAN PCell specific test parameters for E-UTRA - NR FR1 event-triggered reporting with SSB time index detection in non-DRX

| Parameter | Unit | Configuration | Cell 1 | |
| --- | --- | --- | --- | --- |
| T1 | T2 |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
| 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
| 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
| 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
| 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | -77 | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote3 |
| OCNG\_RBNote3 |
| NocNote4 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -104 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| IoNote5 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -56.12 | -56.12 |
| Propagation Condition Note6 |  | 1, 2, 3, 4, 5, 6 | AWGN | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2, 3, 4, 5, 6 | 1x2 | |
| NOTE 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [24].  NOTE 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [23] respectively.  NOTE 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  NOTE 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [27]. | | | | |

Table 8.4.2.3.5-2: NR neighbour cell specific test parameters for E-UTRA - NR FR1 event-triggered reporting with SSB time index detection in non-DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | |
| T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 4 | FDD | |
| 2, 3, 5, 6 | TDD | |
| TDD configuration |  | 2, 5 | TDDConf.1.1 | |
| 3, 6 | TDDConf.2.1 | |
| BWchannel | MHz | 1, 2, 4, 5 | 10: NRB,c = 52 | |
| 3, 6 | 40: NRB,c = 106 | |
| OCNG Patterns |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration |  | 1, 4 | SMTC.2 | |
| 2, 3, 5, 6 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2, 4, 5 | 15 | |
| 3, 6 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2, 4, 5 | -101 | |
| 3, 6 | -98 | |
| EPRE ratio of PSS to SSS |  | 1, 2, 3, 4, 5, 6 | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |
| EPRE ratio of PBCH to PBCH DMRS |  |
| EPRE ratio of PDCCH DMRS to SSS |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |
| EPRE ratio of PDSCH DMRS to SSS |  |
| EPRE ratio of PDSCH to PDSCH |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |
| Note2 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 | |
| Note2 | dBm/SCS | 1, 2, 4, 5 | -98 | |
| 3, 6 | -95 | |
| SS-RSRP Note 3 | dBm/SCS | 1, 2, 4, 5 | -Infinity | -91 |
| 3, 6 | -Infinity | -88 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | 1, 2, 4, 5 | -70.05 | -62.26 |
| dBm/38.16MHz | 3, 6 | -63.95 | -56.15 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1042 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 922 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

NOTE: The overall delay requirement is defined as the delay requirement in TS 38.133 plus 2 ms corresponding to the TTI insertion uncertainty of the measurement report in DCCH.

#### 8.4.2.4 E-UTRA event-triggered reporting of a NR FR1 neighbour cell with SSB time index detection in DRX

8.4.2.4.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event and to verify partly the NR inter‑RAT cell search requirements for E-UTRA FDD - NR FR1 measurements given in TS 36.133 [23] clause 8.1.2.4.21 and for E-UTRAN TDD - NR FR1 measurements given in TS 36.133 [23] clause 8.1.2.4.22.

8.4.2.4.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards supporting long DRX cycle and capable of NR measurements. Test 1 and Test 2 are applicable to UEs not supporting per-FR gap (IndependentGapConfig, as defined in TS 38.306 [11]) and Test 3 and Test 4 are applicable only to UEs supporting per-FR gap and Gap Pattern Id 4.

8.4.2.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.4.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.8.4.2.4.

8.4.2.4.4 Test description

The test consists of four sub-tests with two cells configured, the E-UTRA PCell and NR neighbour cell; the difference between the four sub-tests is whether per-FR measurement gap is configured or not and the DRX configuration. Each subtest 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 NR neighbour cell. In measurements configuration UE shall be indicated to report the SSB index of the identified NR cell.

8.4.2.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.4.2.4.4.1-1.

Table 8.4.2.4.4.1-1: Supported test configurations for E-UTRA -  
NR FR1 event-triggered reporting with SSB time index detection in DRX

|  |  |
| --- | --- |
| Configuration | Description |
| 8.4.2.4-1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.4.2.4-2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.4.2.4-3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 8.4.2.4-4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.4.2.4-5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.4.2.4-6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test requirement and the DUT according to the parameters in Table 8.4.2.4.4.1-2.

Table 8.4.2.4.4.1-2: Initial conditions for E-UTRA - NR FR1 event-triggered reporting  
with SSB time index detection in DRX

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.4.2.4.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.4.2.4.4.1-3.

2. Message contents are defined in clause 8.4.2.4.4.3.

3. There are two carriers and two cells specified in the test, where Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR neighbour cell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to Table 8.4.2.4.5-1 for this test. Cell 1 is configured according to clauses C.1.1 and C.1.2.

Table 8.4.2.4.4.1-3: General test parameters for E-UTRA -  
NR FR1 event-triggered reporting with SSB time index detection in DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| Test 1 | Test 2 | Test 3 | Test 4 |
| E-UTRA RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | | | | One E-UTRA carrier frequency is used. |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | | | | One FR1 NR carrier frequency is used. |
| Active cell |  | 1, 2, 3, 4, 5, 6 | E-UTRA cell 1 (PCell) | | | | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | 1, 2, 3, 4, 5, 6 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2, 3, 4, 5, 6 | 0 | | 4 | | As specified in clause Table 8.1.2.1-1 of TS 36.133 [23]. |
| Measurement gap offset |  | 1, 2, 3, 4, 5, 6 | 39 | | 19 | | As specified in TS 36.331 [29]. |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | Note 1 | | | | E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [29] |
| b2-Threshold2NR | dBm | 1, 2, 3, 4, 5, 6 | Note 2 | | | | SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [29] |
| Hysteresis | dB | 1, 2, 3, 4, 5, 6 | 0 | | | |  |
| CP length |  | 1, 2, 3, 4, 5, 6 | Normal | | | |  |
| TimeToTrigger | s | 1, 2, 3, 4, 5, 6 | 0 | | | |  |
| Filter coefficient |  | 1, 2, 3, 4, 5, 6 | 0 | | | | L3 filtering is not used |
| DRX |  | 1, 2, 3, 4, 5, 6 | DRX.9 | DRX.12 | DRX.9 | DRX.12 | As specified in clause A.5 |
| Time offset between serving and neighbour cells |  | 1, 4 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | 2, 3, 5, 6 | 3μs | | | | Synchronous cells. |
| T1 | s | 1, 2, 3, 4, 5, 6 | 5 | | | |  |
| T2 | s | 1, 2, 3, 4, 5, 6 | 2 | 13 | 2 | 13 |  |
| NOTE 1: The value of b2-Threshold1 is defined in Table 8.4.2.4.5-1.  NOTE 2: The value of b2-Threshold2NR is defined in Table 8.4.2.4.5-2. | | | | | | | |

8.4.2.4.4.2 Test procedure

Two cells are deployed in the test, which are E-UTRA PCell (Cell 1) on the E-UTRA carrier and a FR1 NR neighbour cell (Cell 2) on NR carrier. The general and cell specific test parameters for PCell and neighbour cell are given in Table 8.4.2.4.4.1-3, 8.4.2.4.5-1 and 8.4.2.4.5-2, respectively.

In sub-test 1 and sub-test 2 measurement gap pattern configuration #0 as defined in Table 8.4.2.4.4.1-3 is provided for UE that does not support per-FR gap and in sub-test 3 and sub-test 4 measurement gap pattern configuration #4 as defined in Table 8.4.2.4.4.1-3 is provided for UE that supports per-FR gap.

DRX cycle = 40 ms is used in sub-test 1 and sub-test 3, DRX cycle = 640 ms is used in sub-test 2 and sub-test 4. The UE is allocated with PUSCH resource at every DRX cycle.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

1. Ensure the UE is in State 3A-RF according to TS 36.508 clause 7.2A.3.

2. Set the parameters of Cell 1 and Cell 2 according to T1 in Table 8.4.2.4.5-1 and Table 8.4.2.4.5-2 respectively, T1 starts.

3. The SS shall transmit an *RRCConnectionReconfiguration* message.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message.

5. When T1 expires, the SS shall switch the parameters setting from T1 to T2 as specified in Table 8.4.2.4.5-1 and Table 8.4.2.4.5-2 respectively. T2 Starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event B2. If the overall delays measured from the beginning of time period T2 is less than X ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one. Where X is,

- 1282 for sub-test 1 and sub-test 3,

- 12162 for sub-test 2 and sub-test 4.

7. . After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall:

- transmit an *RRCConnectionRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources, or

- switch off the UE.

8. Set Cell 2 physical cell identity = ((current Cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 [25] clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3); or

- switches on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

8.4.2.4.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.4.2.4.4.3-1: Common Exception messages for E-UTRA -  
NR FR1 event-triggered reporting with SSB time index detection in DRX

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7 with Condition Inter-RAT and EVENT B2;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B2 for Test 1 and Test 2;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B2 for Test 3 and Test 4;  Table H.3.4-5 with Condition Pattern #0 for Test 1 and Test 2;  Table H.3.4-5 with Condition Pattern #4 for Test 3 and Test 4;  Table H.3.4-8 with Condition SSB-Index  Table H.3.7-2 with Condition DRX.9 and Gap for Test 1 and Test 3  Table H.3.7-2 with Condition DRX.12 and Gap for Test 2 and Test 4 |
| Specific message contents exceptions for Test Configuration 8.4.2.4-1 and 8.4.2.4-4 | Table H.3.4-6 with Conditions SMTC.2, SSB.1 FR1 and Asynchronous cells |
| Specific message contents exceptions for Test Configuration 8.4.2.4-2 and 8.4.2.4-5 | Table H.3.4-6 with Conditions SMTC.1, SSB.1 FR1 and Synchronous cells |
| Specific message contents exceptions for Test Configuration 8.4.2.4-3 and 8.4.2.4-6 | Table H.3.4-6 with Conditions SMTC.1, SSB.2 FR1 and Synchronous cells |

Table 8.4.2.4.4.3-2: SchedulingRequest-Config-DEFAULT

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 [25] Table 4.6.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| SchedulingRequest-Config-DEFAULT ::= CHOICE { |  |  |  |
| setup SEQUENCE { |  |  |  |
| sr-ConfigIndex | 25 |  | Config 8.4.2.4-1/2/3 |
|  | 22 |  | Config 8.4.2.4-4/5/6 |
| } |  |  |  |
| } |  |  |  |

8.4.2.4.5 Test requirement

Table 8.4.2.4.4.1-3, 8.4.2.4.5-1 and 8.4.2.4.5-2 define the primary level settings including test tolerances for E-UTRA - NR FR1 event-triggered reporting with SSB time index detection in DRX.

Table 8.4.2.4.5-1: E-UTRAN PCell specific test parameters for E-UTRA -  
NR FR1 event-triggered reporting with SSB time index detection in DRX

| **Parameter** | **Unit** | **Configuration** | **Cell 1** | |
| --- | --- | --- | --- | --- |
| **T1** | **T2** |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
| 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
| 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
| 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
| 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | -77 | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote3 |
| OCNG\_RBNote3 |
| NocNote4 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -104 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| IoNote5 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -56.12 | -56.12 |
| Propagation Condition Note6 |  | 1, 2, 3, 4, 5, 6 | AWGN | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2, 3, 4, 5, 6 | 1x2 | |
| NOTE 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [24].  NOTE 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [23] respectively.  NOTE 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  NOTE 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [27]. | | | | |

Table 8.4.2.4.5-2: NR neighbour cell specific test parameters for E-UTRA -  
NR FR1 event-triggered reporting with SSB time index detection in DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | |
| T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 4 | FDD | |
| 2, 3, 5, 6 | TDD | |
| TDD configuration |  | 2, 5 | TDDConf.1.1 | |
| 3, 6 | TDDConf.2.1 | |
| BWchannel | MHz | 1, 2, 4, 5 | 10: NRB,c = 52 | |
| 3, 6 | 40: NRB,c = 106 | |
| OCNG Patterns |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration |  | 1, 4 | SMTC.2 | |
| 2, 3, 5, 6 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2, 4, 5 | 15 | |
| 3, 6 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2, 4, 5 | -101 | |
| 3, 6 | -98 | |
| EPRE ratio of PSS to SSS |  | 1, 2, 3, 4, 5, 6 | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |
| EPRE ratio of PBCH to PBCH DMRS |  |
| EPRE ratio of PDCCH DMRS to SSS |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |
| EPRE ratio of PDSCH DMRS to SSS |  |
| EPRE ratio of PDSCH to PDSCH |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |
| Note2 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 | |
| Note2 | dBm/SCS | 1, 2, 4, 5 | -98 | |
| 3, 6 | -95 | |
| SS-RSRP Note 3 | dBm/SCS | 1, 2, 4, 5 | -Infinity | -91 |
| 3, 6 | -Infinity | -88 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | 1, 2, 4, 5 | -70.05 | -62.26 |
| dBm/38.16MHz | 3, 6 | -63.95 | -56.15 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1282 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 12162 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1282 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 12162 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

NOTE: The overall delay requirement is defined as the delay requirement in TS 38.133 plus 2 ms corresponding to the TTI insertion uncertainty of the measurement report in DCCH.

#### 8.4.2.5 E-UTRA event-triggered reporting of a NR FR2 neighbour cell without SSB time index detection in non-DRX

*Editor's Note: This test case is incomplete:*

*- EUTRA – NR FR2 testability issue is not cleared*

*- The TT analysis is complete for test frequency f ≤ 40.8 GHz*

*- The TT analysis is complete for UE PC3*

*- The test is incomplete for UE power classes other than PC3*

*- The test is incomplete for test frequencies > 40.8 GHz*

8.4.2.5.1 Test purpose

To verify the UE's ability to make a correct reporting of an event without SSB time index detection in non-DRX within E-UTRA - NR FR2 cell search requirements.

8.4.2.5.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards and capable of NR FR2 measurements. Test 1 is applicable to UEs not supporting per-FR gap (IndependentGapConfig, as defined in TS 38.306 [11]) and Test 2 is applicable only to UEs supporting Gap Pattern Id 4.

8.4.2.5.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.4.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.8.4.2.5.

8.4.2.5.4 Test description

8.4.2.5.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.4.2.5.4.1-1.

Table 8.4.2.5.4.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR2 in non-DRX

|  |  |
| --- | --- |
| Configuration | Description |
| 8.4.2.5-1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 8.4.2.5-2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test requirement and the DUT according to the parameters in Table 8.4.2.5.4.1-2.

Table 8.4.2.5.4.1-2: Initial conditions for E-UTRA - NR FR2 event-triggered reporting without SSB time index detection in non-DRX

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.4.2.5.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.3.3.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.4.1.1 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.4.2.5.4.1-3.

2. Message contents are defined in clause 8.4.2.5.4.3.

3. There are two carriers and two cells specified in the test, where Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR FR2 neighbour cell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to clause A.6.1.2 for this test.

Table 8.4.2.5.4.1-3: General test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| E-UTRA RF Channel Number |  | 1, 2 | 1 | | One E-UTRA carrier frequency is used. |
| NR RF Channel Number |  | 1, 2 | 1 | | One FR2 NR carrier frequency is used. |
| Active cell |  | 1, 2 | E-UTRA cell 1 (PCell) | | E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.6.1.2. |
| Neighbour cell |  | 1, 2 | NR cell 2 | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2 | 0 | 4 | As specified in clause Table 8.1.2.1-1 of TS 36.133 [23]. |
| Measurement gap offset |  | 1, 2 | 39 | 19 | As specified in TS 36.331 [29]. |
| b1-ThresholdNR | dBm | 1, 2 | Note 1 | | SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [29]. |
| Hysteresis | dB | 1, 2 | 0 | |  |
| CP length |  | 1, 2 | Normal | |  |
| TimeToTrigger | s | 1, 2 | 0 | |  |
| Filter coefficient |  | 1, 2 | 0 | | L3 filtering is not used. |
| DRX |  | 1, 2 | OFF | | DRX is not used. |
| Time offset between serving and neighbour cells |  | 1 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | 2 | 3μs | | Synchronous cells. |
| T1 | s | 1, 2 | 10 | |  |
| T2 | s | 1, 2 | 6 | 3 |  |
| NOTE 1: The value of b1-ThresholdNR is defined in Table 8.4.2.5.5-1. | | | | | |

8.4.2.5.4.2 Test procedure

In test 1 measurement gap pattern configuration # 0 as defined in Table 8.4.2.5.4.1-3 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table 8.4.2.5.4.1-3 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [29] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have timing information of NR cell 2.

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters of Cell 1 and Cell 2 according to Table A.6.1.2-1 and T1 in Table 8.4.2.5.5-1 respectively, T1 starts.

3. The SS shall transmit an *RRCConnectionReconfiguration* message.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. When T1 expires, the SS shall switch the parameters setting from T1 to T2 as specified in Table 8.4.2.5.5-1. T2 Starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event B1. If the overall delays measured from the beginning of time period T2 is less than X ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one. Where X is,

- 3202 for sub-test 1,

- 1602 for sub-test 2.

7. . After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall:

- transmit an *RRCConnectionRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources, or

- switch off the UE.

8. Set Cell 2 physical cell identity = ((current Cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3); or

- switches on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

8.4.2.5.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.4.2.5.4.3-1: Common Exception messages for E-UTRA - NR FR2 event-triggered reporting without SSB time index detection in non-DRX

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7 with condition INTER-RAT and EVENT B1;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B1 for Test 1;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B1 and GAPLESS for Test 2;  Table H.3.4-5 with Condition Pattern #0 for Test 1;  Table H.3.4-5 with Condition Pattern #4 for Test 2 |
| Specific message contents exceptions for Test Configuration 8.4.2.5-1 | Table H.3.4-6 with Conditions SMTC.2, SSB.3 FR2 and Asynchronous cells |
| Specific message contents exceptions for Test Configuration 8.4.2.5-2 | Table H.3.4-6 with Conditions SMTC.1, SSB.3 FR2 and Synchronous cells |

Table 8.4.2.5.4.3-2: SchedulingRequest-Config-DEFAULT

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 [25] Table 4.6.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| SchedulingRequest-Config-DEFAULT ::= CHOICE { |  |  |  |
| setup SEQUENCE { |  |  |  |
| sr-ConfigIndex | 25 |  | Config 8.4.2.5-1/2/3 |
|  | 22 |  | Config 8.4.2.5-4/5/6 |
| } |  |  |  |
| } |  |  |  |

8.4.2.5.5 Test requirement

Tables 8.4.2.5.4.1-3 and 8.4.2.5.5-1 define the primary level settings including test tolerances for E-UTRA - NR FR2 event-triggered reporting without SSB time index detection in non-DRX.

Table 8.4.2.5.5-1: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 2 | |
|  | |  |  | T1 | T2 |
| AoA setup defined in A.9.2.1 | |  | 1, 2 | Setup 2a | |
| Assumption for UE beamsNote 5 | |  | 1, 2 | Rough | |
| NR RF Channel Number | |  | 1, 2 | 1 | |
| Duplex mode | |  | 1, 2 | TDD | |
| TDD configuration | |  | 1, 2 | TDDConf.3.1 | |
| BWchannel | | MHz | 1, 2 | 100: NRB,c = 24 | |
| OCNG patterns defined in A.3.2.1.1 | |  | 1, 2 | OP. 3 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | 1 | SMTC.2 | |
|  | |  | 2 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 1, 2 | 120 | |
| b1-ThresholdNR | UE power class 3 | dBm/SCS | 1, 2 | -118 | |
| EPRE ratio of PSS to SSS | |  | 1, 2 | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS (Note 1) | |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |
| Ês | | dBm/SCS | 1, 2 | - Infinity | -80.6 |
| SS B\_RP Note 3 | | dBm/SCS | 1, 2 | -Infinity | -80.6 |
| BB Note 6 | | dB | 1, 2 | -Infinity | 8.3 |
| IoNote3 | | dBm/95.04MHz | 1, 2 | -Infinity | -56.0 |
| Propagation Condition | |  | 1, 2 | AWGN | |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: SS B\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 6: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | |

Table 8.4.2.5.5-2: Test requirements for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

|  |  |  |
| --- | --- | --- |
| Test case | Measurement reporting delay (ms) | |
| Test 1: D1 ms | Test 2: D2 ms |
| UE power class 3 | 3202 | 1602 |

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays specified in 36.133 [23] because of TTI insertion uncertainty of the measurement report in DCCH.

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index.

#### 8.4.2.6 E-UTRA event-triggered reporting of a NR FR2 neighbour cell without SSB time index detection in DRX

*Editor's Note: This test case is incomplete:*

*- EUTRA – NR FR2 testability issue is not cleared*

*- The TT analysis is complete for test frequency f ≤ 40.8 GHz*

*- The TT analysis is complete for UE PC3*

*- The test is incomplete for UE power classes other than PC3*

*- The test is incomplete for test frequencies > 40.8 GHz*

8.4.2.6.1 Test purpose

To verify the UE's ability to make a correct reporting of an event without SSB time index detection in DRX within E-UTRA - NR FR2 cell search requirements.

8.4.2.6.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards supporting long DRX cycle and capable of NR FR2 measurements. Test 1 and Test 2 is applicable to UEs not supporting per-FR gap (IndependentGapConfig, as defined in TS 38.306 [11]) and Test 3 and Test 4 are applicable only to UEs supporting Gap Pattern Id 4.

8.4.2.6.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.4.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.8.4.2.6.

8.4.2.6.4 Test description

8.4.2.6.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.4.2.6.4.1-1.

Table 8.4.2.6.4.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR2 in DRX

|  |  |
| --- | --- |
| Configuration | Description |
| 8.4.2.6-1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 8.4.2.6-2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test requirement and the DUT according to the parameters in Table 8.4.2.6.4.1-2.

Table 8.4.2.6.4.1-2: Initial conditions for E-UTRA - NR FR2 event-triggered reporting without SSB time index detection in DRX

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.4.2.6.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.3.3.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.4.1.1 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.4.2.6.4.1-3.

2. Message contents are defined in clause 8.4.2.6.4.3.

3. There are two carriers and two cells specified in the test, where Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR FR2 neighbour cell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to clause A.6.1.2 for this test.

Table 8.4.2.6.4.1-3: General test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | | | Comment |
| Test 1 | Test 2 | | Test 3 | Test 4 | |
| E-UTRA RF Channel Number |  | 1, 2 | 1 | | | | | | One E-UTRA carrier frequency is used. |
| NR RF Channel Number |  | 1, 2 | 1 | | | | | | One FR2 NR carrier frequency is used. |
| Active cell |  | 1, 2, 3, 4, 5, 6 | E-UTRA cell 1 (PCell) | | | | | | E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.6.1.2. |
| Neighbour cell |  | 1, 2, 3, 4, 5, 6 | NR cell 2 | | | | | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2, 3, 4, 5, 6 | 0 | | | 4 | | | As specified in clause Table 8.1.2.1-1 of TS 36.133 [23]. |
| Measurement gap offset |  | 1, 2, 3, 4, 5, 6 | 39 | | | 19 | | | As specified in TS 36.331 [29]. |
| b1-ThresholdNR | dBm | 1, 2 | Note 1 | | | | | | SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [29]. |
| Hysteresis | dB | 1, 2, 3, 4, 5, 6 | 0 | | | | | |  |
| CP length |  | 1, 2, 3, 4, 5, 6 | Normal | | | | | |  |
| TimeToTrigger | s | 1, 2, 3, 4, 5, 6 | 0 | | | | | |  |
| Filter coefficient |  | 1, 2, 3, 4, 5, 6 | 0 | | | | | | L3 filtering is not used. |
| DRX |  | 1, 2, 3, 4, 5, 6 | DRX.9 | DRX.12 | | DRX.9 | DRX.12 | | As specified in clause A.3.3. |
| Time offset between serving and neighbour cells |  | 1 | 3ms | | | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | 2 | 3μs | | | | | | Synchronous cells. |
| T1 | s | 1, 2, 3, 4, 5, 6 | 5 | | | | | |  |
| T2 | s | 1, 2, 3, 4, 5, 6 | 6 | | 83 | 6 | | 83 |  |
| NOTE: The value of b1-ThresholdNR is defined in Table 8.4.2.6.5-1. | | | | | | | | | |

8.4.2.6.4.2 Test procedure

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table 8.4.2.6.4.1-3 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table 8.4.2.6.4.1-3 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [29] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. 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 timing information of NR cell 2.

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters of Cell 1 and Cell 2 according to Table A.6.1.2-1 and T1 in Table 8.4.2.6.5-1 respectively, T1 starts.

3. The SS shall transmit an *RRCConnectionReconfiguration* message.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. When T1 expires, the SS shall switch the parameters setting from T1 to T2 as specified in Table 8.4.2.6.5-1. T2 Starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event B1. If the overall delays measured from the beginning of time period T2 is less than X ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one. Where X is,

- 4802 for sub-test 1 and sub-test 3,

- 51202 for sub-test 2 and sub-test 4.

7. After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall:

- transmit an *RRCConnectionRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources, or

- switch off the UE

8. Set Cell 2 physical cell identity = ((current Cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 [25] clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3); or

- switches on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

8.4.2.6.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.4.2.6.4.3-1: Common Exception messages for E-UTRA - NR FR2 event-triggered reporting without SSB time index detection in DRX

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7 with condition INTER-RAT and EVENT B1;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B1 for Test 1 and Test 2;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B1 and GAPLESS for Test 3 and Test 4;  Table H.3.4-5 with Condition Pattern #0 for Test 1 and Test 2;  Table H.3.4-5 with Condition Pattern #4 for Test 3 and Test 4;  Table H.3.7-2 with Condition DRX.9 for Test 1 and Test 3  Table H.3.7-2 with Condition DRX.12 for Test 2 and Test 4 |
| Specific message contents exceptions for Test Configuration 8.4.2.6-1 | Table H.3.4-6 with Conditions SMTC.2, SSB.3 FR2 and Asynchronous cells |
| Specific message contents exceptions for Test Configuration 8.4.2.6-2 | Table H.3.4-6 with Conditions SMTC.1, SSB.3 FR2 and Synchronous cells |

Table 8.4.2.6.4.3-2: SchedulingRequest-Config-DEFAULT

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 [25] Table 4.6.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| SchedulingRequest-Config-DEFAULT ::= CHOICE { |  |  |  |
| setup SEQUENCE { |  |  |  |
| sr-ConfigIndex | 25 |  | Config 8.4.2.6-1/2/3 |
|  | 22 |  | Config 8.4.2.6-4/5/6 |
| } |  |  |  |
| } |  |  |  |

8.4.2.6.5 Test requirement

Tables 8.4.2.6.4.1-3 and 8.4.2.6.5-1 define the primary level settings including test tolerances for E-UTRA - NR FR2 event-triggered reporting without SSB time index detection in DRX.

Table 8.4.2.6.5-1: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 2 | |
|  | |  |  | T1 | T2 |
| AoA setup defined in A.9.1 | |  | 1, 2 | Setup 1 | |
| Assumption for UE beamsNote 5 | |  | 1, 2 | Rough | |
| NR RF Channel Number | |  | 1, 2 | 1 | |
| Duplex mode | |  | 1, 2 | TDD | |
| TDD configuration | |  | 1, 2 | TDDConf.3.1 | |
| BWchannel | | MHz | 1, 2 | 100: NRB,c = 66 | |
| OCNG patterns defined in A.3.2.1.1 (OP.1) | |  | 1, 2 | OP.1 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | 1 | SMTC.2 | |
|  | |  | 2 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 1, 2 | 120 | |
| b1-ThresholdNR | UE power class 3 | dBm/SCS | 1, 2 | -106 | |
| EPRE ratio of PSS to SSS | |  | 1, 2 | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS (Note 1) | |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |
| Note2 | | dBm/15kHz | 1, 2 | -104.7 | |
| Note2 | | dBm/SCS | 1, 2 | -95.7 | |
| SS-RSRP Note 3 | | dBm/SCS | 1, 2 | -Infinity | -87.7 |
|  | | dB | 1, 2 | -Infinity | 8 |
|  | | dB | 1, 2 | -Infinity | 8 |
| IoNote3 | | dBm/95.04MHz | 1, 2 | -66.7 | -58.0 |
| Propagation Condition | |  | 1, 2 | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

Table 8.4.2.6.5-2: Test requirements for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test case | Measurement reporting delay (ms) | | | |
| Test 1: D1 ms | Test 2: D2 ms | Test 3: D3 ms | Test 4: D4 ms |
| UE power class 3 | 4802 | 51202 | 4802 | 51202 |

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays specified in 36.133 [23] because of TTI insertion uncertainty of the measurement report in DCCH.

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D3 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D4 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

#### 8.4.2.7 E-UTRA event-triggered reporting of a NR FR2 neighbour cell with SSB time index detection in non-DRX

*Editor's Note: This test case is incomplete:*

*- EUTRA – NR FR2 testability issue is not cleared*

*- The TT analysis is complete for test frequency f ≤ 40.8 GHz*

*- The TT analysis is complete for UE PC3*

*- The test is incomplete for UE power classes other than PC3*

*- The test is incomplete for test frequencies > 40.8 GHz*

8.4.2.7.1 Test purpose

To verify the UE's ability to make a correct reporting of an event with SSB time index detection in non-DRX within E-UTRA - NR FR2 cell search requirements.

8.4.2.7.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards and capable of NR FR2 measurements. Test 1 is applicable to UEs not supporting per-FR gap (IndependentGapConfig, as defined in TS 38.306 [11]) and Test 2 is applicable only to UEs supporting Gap Pattern Id 4.

8.4.2.7.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.4.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.8.4.2.7.

8.4.2.7.4 Test description

8.4.2.7.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.4.2.7.4.1-1.

Table 8.4.2.7.4.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR2 in non-DRX

|  |  |
| --- | --- |
| Configuration | Description |
| 8.4.2.7-1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 8.4.2.7-2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test requirement and the DUT according to the parameters in Table 8.4.2.7.4.1-2.

Table 8.4.2.7.4.1-2: Initial conditions for E-UTRA - NR FR2 event-triggered reporting with SSB time index detection in non-DRX

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.4.2.7.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.3.3.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.4.1.1 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.4.2.7.4.1-3.

2. Message contents are defined in clause 8.4.2.7.4.3.

3. There are two carriers and two cells specified in the test, where Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR FR2 neighbour cell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to clause A.6.1.2 for this test.

Table 8.4.2.7.4.1-3: General test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| E-UTRA RF Channel Numbers |  | 1, 2 | 1 | | One E-UTRA carrier frequency is used. |
| NR RF Channel Numbers |  | 1, 2 | 1 | | One FR2 NR carrier frequency is used. |
| Active cell |  | 1, 2 | E-UTRA cell 1 (PCell) | | E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.6.1.2. |
| Neighbour cell |  | 1, 2 | NR cell 2 | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2 | 0 | 4 | As specified in clause Table 8.1.2.1-1 of TS 36.133 [23]. |
| Measurement gap offset |  | 1, 2 | 39 | 19 | As specified in TS 36.331 [29]. |
| b1-ThresholdNR | dBm | 1, 2 | Note 1 | | SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [29] |
| Hysteresis | dB | 1, 2 | 0 | |  |
| CP length |  | 1, 2 | Normal | |  |
| TimeToTrigger | s | 1, 2 | 0 | |  |
| Filter coefficient |  | 1, 2 | 0 | | L3 filtering is not used. |
| DRX |  | 1, 2 | OFF | | DRX is not used. |
| Time offset between serving and neighbour cells |  | 1 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | 2 | 3μs | | Synchronous cells. |
| T1 | s | 1, 2 | 5 | |  |
| T2 | s | 1, 2 | 5 | 3 |  |
| NOTE: The value of b1-ThresholdNR is defined in Table A.8.4.2.7.5-1. | | | | | |

8.4.2.7.4.2 Test procedure

In test 1 measurement gap pattern configuration # 0 as defined in Table 8.4.2.7.4.1-3 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table 8.4.2.7.4.1-3 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [29] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. 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 NR cell 2.

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters of Cell 1 and Cell 2 according to Table A.6.1.2-1 and T1 in Table 8.4.2.7.5-1 respectively, T1 starts.

3. The SS shall transmit an *RRCConnectionReconfiguration* message.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. When T1 expires, the SS shall switch the parameters setting from T1 to T2 as specified in Table 8.4.2.7.5-1. T2 Starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event B1. If the overall delays measured from the beginning of time period T2 is less than X ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one. Where X is,

- 4162 for sub-test 1,

- 2082 for sub-test 2.

7. After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall:

- transmit an *RRCConnectionRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources, or

- switch off the UE.

8. Set Cell 2 physical cell identity = ((current Cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3); or

- switches on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

8.4.2.7.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.4.2.7.4.3-1: Common Exception messages for E-UTRA - NR FR2 event-triggered reporting with SSB time index detection in non-DRX

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7 with condition INTER-RAT and EVENT B1;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B1 for Test 1;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B1 and GAPLESS for Test 2;  Table H.3.4-5 with Condition Pattern #0 for Test 1;  Table H.3.4-5 with Condition Pattern #4 for Test 2 |
| Specific message contents exceptions for Test Configuration 8.4.2.7-1 | Table H.3.4-6 with Conditions SMTC.2, SSB.3 FR2 and Asynchronous cells |
| Specific message contents exceptions for Test Configuration 8.4.2.7-2 | Table H.3.4-6 with Conditions SMTC.1, SSB.3 FR2 and Synchronous cells |

Table 8.4.2.7.4.3-2: SchedulingRequest-Config-DEFAULT

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 [25] Table 4.6.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| SchedulingRequest-Config-DEFAULT ::= CHOICE { |  |  |  |
| setup SEQUENCE { |  |  |  |
| sr-ConfigIndex | 25 |  | Config 8.4.2.7-1/2/3 |
|  | 22 |  | Config 8.4.2.7-4/5/6 |
| } |  |  |  |
| } |  |  |  |

Table 8.4.2.7.4.3-3: ReportConfigInterRAT

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 [25] Table 4.6.6-7BA | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigInterRAT::= SEQUENCE { |  |  |  |
| triggerType CHOICE { |  |  |  |
| event SEQUENCE { |  |  |  |
| eventId CHOICE { |  |  |  |
| eventB1-NR-r15 SEQUENCE{ |  |  |  |
| b1-Threshold2NR-r15 CHOICE{ |  |  |  |
| nr-RSRP-r15 | 50 | Actual value = 50 -156 = -106dBm |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| maxReportRS-Index-r15 | 2 |  |  |
| reportQuantityRS-IndexNR-r15 SEQUENCE { |  |  |  |
| ss-rsrp | TRUE |  |  |
| ss-rsrq | FALSE |  |  |
| ss-sinr | FALSE |  |  |
| } |  |  |  |
| } |  |  |  |

8.4.2.7.5 Test requirement

Tables 8.4.2.7.4.1-3 and 8.4.2.7.5-1 define the primary level settings including test tolerances for E-UTRA - NR FR2 event-triggered reporting with SSB time index detection in non-DRX.

Table 8.4.2.7.5-1: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 2 | |
|  | |  |  | T1 | T2 |
| AoA setup defined in A.9.1 | |  | 1, 2 | Setup 1 | |
| Assumption for UE beamsNote 5 | |  | 1, 2 | Rough | |
| NR RF Channel Number | |  | 1, 2 | 1 | |
| Duplex mode | |  | 1, 2 | TDD | |
| TDD configuration | |  | 1, 2 | TDDConf.3.1 | |
| BWchannel | | MHz | 1, 2 | 100: NRB,c = 66 | |
| OCNG patterns defined in A.3.2.1.1 | |  | 1, 2 | OP.1 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | 1 | SMTC.2 | |
|  | |  | 2 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 1, 2 | 120 | |
| b1-ThresholdNR | UE power class 3 | dBm/SCS | 1, 2 | -106 | |
| EPRE ratio of PSS to SSS | |  | 1, 2 | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS (Note 1) | |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |
| Note2 | | dBm/15kHz | 1, 2 | -104.7 | |
| Note2 | | dBm/SCS | 1, 2 | -95.7 | |
| SS-RSRP Note 3 | | dBm/SCS | 1, 2 | -Infinity | -87.7 |
|  | | dB | 1, 2 | -Infinity | 8 |
|  | | dB | 1, 2 | -Infinity | 8 |
| IoNote3 | | dBm/95.04MHz | 1, 2 | -66.7 | -58.0 |
| Propagation Condition | |  | 1, 2 | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

Table 8.4.2.7.5-2: Test requirements for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

|  |  |  |
| --- | --- | --- |
| Test case | Measurement reporting delay (ms) | |
| Test 1: D1 ms | Test 2: D2 ms |
| UE power class 3 | 4162 | 2082 |

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays specified in 36.133 [23] because of TTI insertion uncertainty of the measurement report in DCCH.

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

#### 8.4.2.8 E-UTRA event-triggered reporting of a NR FR2 neighbour cell with SSB time index detection in DRX

*Editor's Note: This test case is incomplete:*

*- EUTRA – NR FR2 testability issue is not cleared*

*- The TT analysis is complete for test frequency f ≤ 40.8 GHz*

*- The TT analysis is complete for UE PC3*

*- The test is incomplete for UE power classes other than PC3*

*- The test is incomplete for test frequencies > 40.8 GHz*

8.4.2.8.1 Test purpose

To verify the UE's ability to make a correct reporting of an event with SSB time index detection in DRX within E-UTRA - NR FR2 cell search requirements.

8.4.2.8.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards supporting long DRX cycle and capable of NR FR2 measurements. Test 1 and Test 2 is applicable to UEs not supporting per-FR gap (IndependentGapConfig, as defined in TS 38.306 [11]) and Test 3 and Test 4 are applicable only to UEs supporting Gap Pattern Id 4.

8.4.2.8.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.4.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.8.4.2.8.

8.4.2.8.4 Test description

8.4.2.8.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.4.2.8.4.1-1.

Table 8.4.2.8.4.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR2 in DRX

|  |  |
| --- | --- |
| Configuration | Description |
| 8.4.2.8-1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 8.4.2.8-2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test requirement and the DUT according to the parameters in Table 8.4.2.8.4.1-2.

Table 8.4.2.8.4.1-2: Initial conditions for E-UTRA - NR FR2 event-triggered reporting with SSB time index detection in DRX

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.4.2.8.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.3.3.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.4.1.1 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.4.2.8.4.1-3.

2. Message contents are defined in clause 8.4.2.8.4.3.

3. There are two carriers and two cells specified in the test, where Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR FR2 neighbour cell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to clause A.6.1.2 for this test.

Table 8.4.2.8.4.1-3: General test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| Test 1 | Test 2 | Test 3 | Test 4 |
| E-UTRA RF Channel Numbers |  | 1, 2 | 1 | | | | One E-UTRA carrier frequency is used. |
| NR RF Channel Numbers |  | 1, 2 | 1 | | | | One FR2 NR carrier frequency is used. |
| Active cell |  | 1, 2 | E-UTRA cell 1 (PCell) | | | | E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.6.1.2. |
| Neighbour cell |  | 1, 2 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2 | 0 | | 4 | | As specified in clause Table 8.1.2.1-1 of TS 36.133 [23]. |
| Measurement gap offset |  | 1, 2 | 39 | | 19 | | As specified in TS 36.331 [29]. |
| b1-ThresholdNR | dBm | 1, 2 | Note 1 | | | | SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [29]. |
| Hysteresis | dB | 1, 2 | 0 | | | |  |
| CP length |  | 1, 2 | Normal | | | |  |
| TimeToTrigger | s | 1, 2 | 0 | | | |  |
| Filter coefficient |  | 1, 2 | 0 | | | | L3 filtering is not used. |
| DRX |  |  | DRX.9 | DRX.12 | DRX.9 | DRX.12 | As specified in clause A.3.3. |
| Time offset between serving and neighbour cells |  | 1 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | 2 | 3μs | | | | Synchronous cells. |
| T1 | s | 1, 2 | 5 | | | |  |
| T2 | s | 1, 2 | 7 | 70 | 7 | 70 |  |
| NOTE: The value of b1-ThresholdNR is defined in Table 8.4.2.8.5-1 | | | | | | | |

8.4.2.8.4.2 Test procedure

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table 8.4.2.8.4.1-3 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table 8.4.2.8.4.1-3 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [29] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. 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 NR cell 2.

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters of Cell 1 and Cell 2 according to Table A.6.1.2-1 and T1 in Table 8.4.2.8.5-1 respectively, T1 starts.

3. The SS shall transmit an *RRCConnectionReconfiguration* message.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. When T1 expires, the SS shall switch the parameters setting from T1 to T2 as specified in Table 8.4.2.8.5-1. T2 Starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event B1. If the overall delays measured from the beginning of time period T2 is less than X ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one. Where X is,

- 4802 for sub-test 1 and sub-test 3,

- 51202 for sub-test 2 and sub-test 4.

7. . After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall:

- transmit an *RRCConnectionRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources, or

- switch off the UE.

8. Set Cell 2 physical cell identity = ((current Cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3); or

- switches on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

8.4.2.8.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.4.2.8.4.3-1: Common Exception messages for E-UTRA - NR FR2 event-triggered reporting with SSB time index detection in DRX

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7 with condition INTER-RAT and EVENT B1;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B1 for Test 1 and Test 2;  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B1 and GAPLESS for Test 3 and Test 4;  Table H.3.4-5 with Condition Pattern #0 for Test 1 and Test 2;  Table H.3.4-5 with Condition Pattern #4 for Test 3 and Test 4;  Table H.3.7-2 with Condition DRX.9 for Test 1 and Test 3;  Table H.3.7-2 with Condition DRX.12 for Test 2 and Test 4 |
| Specific message contents exceptions for Test Configuration 8.4.2.8-1 | Table H.3.4-6 with Conditions SMTC.2, SSB.3 FR2 and Asynchronous cells |
| Specific message contents exceptions for Test Configuration 8.4.2.8-2 | Table H.3.4-6 with Conditions SMTC.1, SSB.3 FR2 and Synchronous cells |

Table 8.4.2.8.4.3-2: SchedulingRequest-Config-DEFAULT

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 [25] Table 4.6.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| SchedulingRequest-Config-DEFAULT ::= CHOICE { |  |  |  |
| setup SEQUENCE { |  |  |  |
| sr-ConfigIndex | 25 |  | Config 8.4.2.8-1/2/3 |
|  | 22 |  | Config 8.4.2.8-4/5/6 |
| } |  |  |  |
| } |  |  |  |

Table 8.4.2.8.4.3-3: ReportConfigInterRAT

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 [25] Table 4.6.6-7BA | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigInterRAT::= SEQUENCE { |  |  |  |
| triggerType CHOICE { |  |  |  |
| event SEQUENCE { |  |  |  |
| eventId CHOICE { |  |  |  |
| eventB1-NR-r15 SEQUENCE{ |  |  |  |
| b1-Threshold2NR-r15 CHOICE{ |  |  |  |
| nr-RSRP-r15 | 50 | Actual value = 50 -156 = -106dBm |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| maxReportRS-Index-r15 | 2 |  |  |
| reportQuantityRS-IndexNR-r15 SEQUENCE { |  |  |  |
| ss-rsrp | TRUE |  |  |
| ss-rsrq | FALSE |  |  |
| ss-sinr | FALSE |  |  |
| } |  |  |  |
| } |  |  |  |

8.4.2.8.5 Test requirement

Tables 8.4.2.8.4.1-3 and 8.4.2.8.5-1 define the primary level settings including test tolerances for E-UTRA - NR FR2 event-triggered reporting with SSB time index detection in DRX.

Table 8.4.2.8.5-1: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 2 | |
|  | |  |  | T1 | T2 |
| AoA setup defined in A.9.1 | |  | 1, 2 | Setup 1 | |
| Assumption for UE beamsNote 5 | |  | 1, 2 | Rough | |
| NR RF Channel Number | |  | 1, 2 | 1 | |
| Duplex mode | |  | 1, 2 | TDD | |
| TDD configuration | |  | 1, 2 | TDDConf.3.1 | |
| BWchannel | | MHz | 1, 2 | 100: NRB,c = 66 | |
| OCNG patterns defined in A.3.2.1.1 | |  | 1, 2 | OP.1 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | 1 | SMTC.2 | |
|  | |  | 2 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 1, 2 | 120 | |
| b1-ThresholdNR | UE power class 3 | dBm/SCS | 1, 2 | -106 | |
| EPRE ratio of PSS to SSS | |  | 1, 2 | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS (Note 1) | |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |
| Note2 | | dBm/15kHz | 1, 2 | -104.7 | |
| Note2 | | dBm/SCS | 1, 2 | -95.7 | |
| SS-RSRP Note 3 | | dBm/SCS | 1, 2 | -Infinity | -87.7 |
|  | | dB | 1, 2 | -Infinity | 8 |
|  | | dB | 1, 2 | -Infinity | 8 |
| IoNote3 | | dBm/95.04MHz | 1, 2 | -66.7 | -58.0 |
| Propagation Condition | |  | 1, 2 | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

Table 8.4.2.8.5-2: Test requirements for NR inter-RAT event triggered reporting  
for FR2 with SSB time index detection in DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test case | Measurement reporting delay (ms) | | | |
| Test 1: D1 ms | Test 2: D2 ms | Test 3: D3 ms | Test 4: D4 ms |
| UE power class 3 | 6242 | 66562 | 6242 | 66562 |

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D3 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D4 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays specified in 36.133 [23] because of TTI insertion uncertainty of the measurement report in DCCH.

#### 8.4.2.9 E-UTRA event triggered reporting of a NR FR1 neighbour cell with SSB time index detection in DRX for UE configured with highSpeedInterRAT-NR-r16

8.4.2.9.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event and to verify partly the NR inter-RAT cell search requirements for E-UTRA FDD - NR FR1 measurements given in TS 36.133 [23] clause 8.1.2.4.21 and for E-UTRAN TDD - NR FR1 measurements given in TS 36.133 [23] clause 8.1.2.4.22 when UE is configured with *highSpeedInterRAT-NR-r16*.

8.4.2.9.2 Test applicability

This test applies to all E-UTRA UEs capable of NR measurements and configured with highSpeedInterRAT-NR-r16 from release 15 onwards.

8.4.2.9.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.4.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.8.4.2.9.

8.4.2.9.4 Test description

8.4.2.9.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.4.2.9.4.1-1.

Table 8.4.2.9.4.1-1: Supported test configurations for NR inter-RAT event triggered reporting  
for FR1 with SSB time index detection for UE configured with highSpeedInterRAT-NR-r16

|  |  |
| --- | --- |
| Configuration | Description |
| 8.4.2.9-1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.4.2.9-2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.4.2.9-3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 8.4.2.9-4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 8.4.2.9-5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 8.4.2.9-6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test requirement and the DUT according to the parameters in Table 8.4.2.9.4.1-2.

Table 8.4.2.9.4.1-2: Initial conditions for NR inter-RAT event triggered reporting  
for FR1 with SSB time index detection for UE configured with highSpeedInterRAT-NR-r16

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.4.2.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | N/A | |  |

Table 8.4.2.9.4.1-3: General test parameters for NR inter-RAT event triggered reporting  
for FR1 with SSB time index detection for UE configured with highSpeedInterRAT-NR-r16

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| E-UTRA RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | One E-UTRA carrier frequency is used. |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | One FR1 NR carrier frequency is used. |
| Active cell |  | 1, 2, 3, 4, 5, 6 | E-UTRA cell 1 (PCell) | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | 1, 2, 3, 4, 5, 6 | NR cell 2 | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2, 3, 4, 5, 6 | 0 | As specified in clause Table 8.1.2.1-1 of TS 36.133 [15]. |
| Measurement gap offset |  | 1, 2, 3, 4, 5, 6 | 39 | As specified in TS 36.331 [16]. |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | Note 1 | E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16] |
| b2-Threshold2NR | dBm | 1, 2, 3, 4, 5, 6 | Note 2 | SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16] |
| Hysteresis | dB | 1, 2, 3, 4, 5, 6 | 0 |  |
| CP length |  | 1, 2, 3, 4, 5, 6 | Normal |  |
| TimeToTrigger | s | 1, 2, 3, 4, 5, 6 | 0 |  |
| Filter coefficient |  | 1, 2, 3, 4, 5, 6 | 0 | L3 filtering is not used |
| DRX |  | 1, 2, 3, 4, 5, 6 | DRX.5 | As specified in clause A.5 |
| Time offset between serving and neighbour cells |  | 1, 4 | 3ms | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | 2, 3, 5, 6 | 3μs | Synchronous cells. |
| T1 | s | 1, 2, 3, 4, 5, 6 | 5 |  |
| T2 | s | 1, 2, 3, 4, 5, 6 | 5 |  |
| NOTE 1: The value of b2-Threshold1 is defined in Table A.8.4.2.9.1-3.  NOTE 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.9.1-4. | | | | |

8.4.2.9.4.2 Test procedure

Two cells are deployed in the test, which are E-UTRA PCell (Cell 1) on the E-UTRA carrier and a FR1 NR neighbour cell (Cell 2) on NR carrier. The general and cell specific test parameters for PCell and neighbour cell are given in Table 8.4.2.9.4.1-3, 8.4.2.9.5-1 and 8.4.2.9.5-2, respectively.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2. UE is configured with *highSpeedInterRAT-NR-r16*.

1. Ensure the UE is in State 3A-RF according to TS 36.508 clause 7.2A.3.

2. Set the parameters of Cell 1 and Cell 2 according to T1 in Table 8.4.2.9.5-1 and Table 8.4.2.9.5-2 respectively, T1 starts.

3. The SS shall transmit an *RRCConnectionReconfiguration* message.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message.

5. When T1 expires, the SS shall switch the parameters setting from T1 to T2 as specified in Table 8.4.2.9.5-1 and Table 8.4.2.9.5-2 respectively. T2 Starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event B2. If the overall delays measured from the beginning of time period T2 is less than 4.8s ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.

7. After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall transmit an *RRCConnectionRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.

8. Set Cell 2 physical cell identity = ((current Cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. After the RRC connection release, the SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 [25] clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3),

or

- switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

8.4.2.9.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.4.2.9.4.3-1: Common Exception messages

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks on condition of HighSpeedMeas with exceptions | Table H.2.1-3 with Condition HighSpeedMeas |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7 with Condition Inter-RAT and EVENT B2;  Table H.3.4-4 with Condition INTER-RAT NR and EVENT B2  Table H.3.4-5 with Condition Pattern #0  Table H.3.4-8 with Condition SSB-Index  Table H.3.7-2 with Condition DRX.5 and Gap |

Table 8.4.2.9.4.3-2: highSpeedCarrierNR-r16 in SystemInformationBlockType24

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508, Table 4.4.3.3-20 with Condition FR1 | | | |
| Information Element | Value/remark | Comment | Condition |
| SystemInformationBlockType24-r15 ::= SEQUENCE { |  |  |  |
| CarrierFreqNR-v1610 ::= SEQUENCE {(SIZE (1..maxFreq)) OF SEQUENCE { | 1 entry |  |  |
| highSpeedCarrierNR-r16 | TRUE |  |  |
| } |  |  |  |

Table 8.4.2.9.4.3-3: highSpeedInterRAT-NR-r16 configuration

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 Table 4.6.3-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| RadioResourceConfigCommonSIB::= SEQUENCE { |  |  |  |
| highSpeedInterRAT-NR-r16 | TRUE |  |  |
| } |  |  |  |

8.4.2.9.5 Test requirement

Tables 8.4.2.9.4.1-3, 8.4.2.9.5-1 and 8.4.2.9.5-2 define the primary level settings including test tolerances for E-UTRA - NR FR2 event-triggered reporting with SSB time index detection in DRX for UE configured with highSpeedInterRAT-NR-r16.

Table 8.4.2.9.5-1: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered  
reporting with NR neighbour cell in FR1 with SSB time index detection for UE configured  
with highSpeedInterRAT-NR-r16

| **Parameter** | **Unit** | **Configuration** | **Cell 1** | |
| --- | --- | --- | --- | --- |
| **T1** | **T2** |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
|  |  | 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  | 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  | 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  | 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | -77 | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -104 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| IoNote5 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -59.13+10log (NRB,c /50) | -59.13+10log (NRB,c /50) |
| Propagation Condition Note6 |  | 1, 2, 3, 4, 5, 6 | AWGN | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| NOTE 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  NOTE 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  NOTE 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  NOTE 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | |

Table 8.4.2.9.5-2: NR neighbour cell specific test parameters for NR inter-RAT event triggered  
reporting for FR1 with SSB time index detection for UE configured with highSpeedInterRAT-NR-r16

| Parameter | Unit | Test configuration | Cell 2 | |
| --- | --- | --- | --- | --- |
|  |  |  | T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 4 | FDD | |
|  |  | 2, 3, 5, 6 | TDD | |
| TDD configuration |  | 2, 5 | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | |
| BWchannel | MHz | 1, 2, 4, 5 | 10: NRB,c = 52 | |
|  |  | 3, 6 | 40: NRB,c = 106 | |
| OCNG Patterns |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration |  | 1, 4 | SMTC.2 | |
| 2, 3, 5, 6 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2, 4, 5 | 15 | |
| 3, 6 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2, 4, 5 | -101 | |
| 3, 6 | -98 | |
| EPRE ratio of PSS to SSS |  | 1, 2, 3, 4, 5, 6 | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |
| Note2 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 | |
| Note2 | dBm/SCS | 1, 2, 4, 5 | -98 | |
|  |  | 3, 6 | -95 | |
| SS-RSRP Note 3 | dBm/SCS | 1, 2, 4, 5 | -Infinity | -91 |
|  |  | 3, 6 | -Infinity | -88 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | 1, 2, 4, 5 | -70.05 | -62.26 |
|  | dBm/38.16MHz | 3, 6 | -63.95 | -56.16 |
| Propagation Condition |  | 1, 2, 4, 5 | AWGN1944 | |
|  |  | 3,6 | AWGN3334 | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

The UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 4.8s from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

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

8.5 Measurement performance requirements

### 8.5.1 SFTD measurement accuracy

#### 8.5.1.0 Minimum conformance requirements

##### 8.5.1.0.1 Intra-frequency absolute SS-RSRP measurement accuracy requirements

The SFN and frame timing difference (SFTD) is measured between PCell and NR cell for inter-RAT SFTD. The inter‑RAT SFTD measurement can only be configured for E-UTRA - NR band combinations that are supported by the UE.

The accuracy requirements in Table 8.5.1.0.1-3 are applicable under the following conditions:

For PCell SFN and frame timing measurement:

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

- Conditions defined in TS 36.101 clause 7.3 for reference sensitivity are fulfilled.

- No changes to the uplink transmission timing are applied during the measurement period.

- RSRP|dBm according to TS 36.133 Annex B.3.5 for a corresponding Band.

- Io range defined in Table 8.5.1.0.1-1.

Table 8.5.1.0.1-1: PCell Io range conditions for SFTD measurement accuracy

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Io Note 1 range | | |
| E-UTRA operating band groups Note 4, 5 | Minimum Io | Maximum Io |
|  | dBm/15kHz Note 2, 3 | dBm/BWChannel |
| Conditions | FDD\_A, TDD\_A | -121 | -50 |
| FDD\_C, TDD\_C | -120 | -50 |
| FDD\_D | -119.5 | -50 |
| FDD\_E, TDD\_E | -119 | -50 |
| FDD\_F | -118.5 | -50 |
| FDD\_G | -118 | -50 |
| FDD\_H | -117.5 | -50 |
| FDD\_N | -114.5 | -50 |
| NOTE 1: When in dBm/15kHz, the minimum Io condition is expressed as the average Io per RE over all REs in that symbol. Io may be different in different symbols within a subframe.  NOTE 2: The condition level is increased by ∆>0, when applicable, as described in clause B.4.2 and B.4.3.  NOTE 3: The condition level is increased by MSD as defined in clause 7.3B in TS 38.101-3 [54], if applicable depending on E-UTRA - NR band combination.  NOTE 4: E-UTRA operating band groups are as defined in clause 3.5.  NOTE 5: Only E-UTRA bands within EN-DC band combinations as specified in clause 5.5B in TS 38.101-3 [54] are applicable. | | | |

For NR PSCell, or NR cell SFN and frame timing measurement in FR1:

- Conditions defined in TS 38.101-1 clause 7.3 for reference sensitivity are fulfilled.

- Io range defined in Table 8.5.1.0.1-2.

Table 8.5.1.0.1-2: NR PSCell, or NR cell Io range conditions for SFTD measurement accuracy in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Io Note 1 range | | | |
| NR operating band groups Note 4, 5 | Minimum Io Note 2, 3 | | Maximum Io |
|  | dBm/ SCSSSB | | dBm/BWChannel |
| SCSSSB = 15 kHz | SCSSSB = 30 kHz |
| Conditions | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | -121 | -118 | -50 |
| NR\_FDD\_FR1\_B | -120.5 | -117.5 | -50 |
| NR\_TDD\_FR1\_C | -120 | -117 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -50 |
| NR\_FDD\_FR1\_G | -118 | -115 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -114.5 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The condition level is increased by ΔRIB,c as defined in clause 7.3B in TS 38.101-3 [54], depending on E-UTRA - NR band combination.  NOTE 3: The condition level is increased by MSD as defined in clause 7.3B in TS 38.101-3 [54], if applicable depending on E-UTRA - NR band combination.  NOTE 4: NR operating band groups are as defined in clause 3.5.  NOTE 5: Only NR bands within EN-DC band combinations as specified in clause 5.5B in TS 38.101-3 [54] are applicable. | | | | |

Table 8.5.1.0.1-3: SFTD measurement accuracy

|  |  |  |
| --- | --- | --- |
| Accuracy | Conditions | |
| Ês/Iot | Frequency range |
| Ts Note 1 | dB |  |
| 40 | ≥ -3 dB | FR1 |
| NOTE 1: Ts is the basic timing unit defined in TS 36.211 [16].  NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies. | | |

#### 8.5.1.1 E-UTRA - NR FR1 SFTD measurement accuracy

8.5.1.1.1 Test purpose

The purpose of this test is to verify that the SFTD measurement accuracy is within the specified limits and to verify the requirements as specified in clause 9.1.27 in TS 36.133 [23] for inter-RAT FR1 SFTD measurements.

8.5.1.1.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards and support inter-RAT NR SFTD measurements.

8.5.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.5.1.0.

The normative reference for this requirement is TS 38.133 [6] clause A.8.5.1.1.

8.5.1.1.4 Test description

Two cells are configured in this test: E-UTRA Cell 1 is the E-UTRAN PCell and Cell 2 is the inter-RAT NR FR1 neighbour cell.

8.5.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.5.1.1.4.1-1.

Table 8.5.1.1.4.1-1: Supported test configurations for E-UTRA - NR FR1 SFTD measurement accuracy

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 8.5.1.1-1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD |
| 8.5.1.1-2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD |
| 8.5.1.1-3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD |
| 8.5.1.1-4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD |
| 8.5.1.1-5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD |
| 8.5.1.1-6 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test equipment and the DUT according to the parameters in Table 8.5.1.1.4.1-2.

Table 8.5.1.1.4.1-2: Initial conditions for E-UTRA - NR FR1 SFTD measurement accuracy

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 8.4.2.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.5.1.1.4.1-3.

2. Message contents are defined in clause 8.5.1.1.4.3.

3. There are two carriers and two cells specified in the test, where E-UTRA Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR neighbour cell on the NR carrier. E-UTRA Cell 1 is configured according to TS 36.521-3 [26] clause C.1.0 and C.1.1.

4. The SFTD between PCell and NR neighbour cell shall be set to one of the conditions in Table 8.5.1.1.5-3. For negative Frame boundary offset, it can be achieved delaying NR neighbour cell in regards to PCell OR advancing PCell in regards to NR neighbour cell. For positive Frame boundary offset, it can be achieved delaying PCell in regards to NR neighbour cell OR advancing NR neighbour cell in regards to PCell.

8.5.1.1.4.2 Test procedure

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters according to Table 8.5.1.1.5-1 and Table 8.5.1.1.5-3 as appropriate. (Condition = 3)

3. The SS shall transmit an *RRCConnectionReconfiguration* message on Cell 1.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. The UE shall transmit a *MeasurementReport* message triggered by SFTD measurement.

6. The SS shall check the reported values of SFN offset and frame boundary offset in the *MeasurementReport*. The SFN offset value and frame boundary offset value between E-UTRA Cell 1 and Cell 2 reported by the UE is compared to the expected SFN offset value and frame boundary offset, respectively. The number of failed iterations is increased by one, if

- The value of *sfn-OffsetResult* is different with the expected SFN offset value, or

- The value of *frameBoundaryOffsetResult*is outside the range given in Table 8.5.1.1.5-5, or

- The UE fails to report the measurement value for Cell 2.

Otherwise the number of successful iterations is increased by one.

7. After the RRC connection release, the SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 [25] clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3); or

- switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

8. Repeat steps 1-7 until the confidence level according to Table G.2.3-1 in Annex G is achieved.

8.5.1.1.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.5.1.1.4.3-1: Common Exception messages for E-UTRA -  
NR FR1 SFTD measurement accuracy

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7 with Condition Inter-RAT and SFTDTable H.3.4-4 with Condition INTER-RAT NR, SFTD and GAPLESS |
| Specific message contents exceptions for Test Configuration 8.5.1.1-1 and 8.5.1.1-4 | Table H.3.4-6 with Condition SSB.1 FR1 and SMTC.1 |
| Specific message contents exceptions for Test Configuration 8.5.1.1-2 and 8.5.1.1-5 | Table H.3.4-6 with Condition SSB.1 FR1 and SMTC.1 |
| Specific message contents exceptions for Test Configuration 8.5.1.1-3 and 8.5.1.1-6 | Table H.3.4-6 with Condition SSB.2 FR1 and SMTC.1 |

8.5.1.1.5 Test requirement

Table 8.5.1.1.5-1 and 8.5.1.1.5-2 defines the primary level settings including test tolerances for E-UTRA - NR FR1 SFTD measurement accuracy.

The SFN offset and frame boundary offset between E-UTRA PCell and the inter-RAT neighbour cell shall be set to one of the configurations in Table 8.5.1.1.5-3. The reported SFTD accuracy shall fulfil the accuracy requirements in Table 8.5.1.1.5-4. The SFN offset in reported SFTD shall match the values in Table 8.5.1.1.5-3 and the frame boundary offset in reported SFTD shall be within the range given in Table 8.5.1.1.5-5.

Table 8.5.1.1.5-1: E-UTRA cell specific test parameters for E-UTRA -  
NR FR1 SFTD measurement accuracy

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Test 1 |
| E-UTRA RF Channel Number |  | 1 |
| Duplex mode |  | FDD or TDD |
| TDD special subframe configurationNote1 |  | 6 |
| TDD uplink-downlink configurationNote1 |  | 1 |
| BWchannel |  | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD  5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD  5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD |
| OCNG PatternsNote2 |  | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD  5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 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\_RANote3 | dB |
| OCNG\_RBNote3 | dB |
| NocNote4 | dBm/15 kHz | -104 |
| Ês/Noc | dB | -2.2 |
| Ês/Iot | dB | -2.2 |
| RSRP Note5 | dBm/15 kHz | -106.2 |
| SCH\_RP Note5 | dBm/15 kHz | -106.2 |
| Io Note5 | dBm/Ch BW | -74.17  +10log  (NRB,c /50) |
| Propagation Condition |  | AWGN |
| Antenna Configuration |  | 1x2 |
| NOTE 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [24].  NOTE 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [23] respectively.  NOTE 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  NOTE 5: Es/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | |

Table 8.5.1.1.5-2: NR cell specific test parameters for E-UTRA - NR FR1 SFTD measurement accuracy

| **Parameter** | | **Config** | **Unit** | **Test 1** |
| --- | --- | --- | --- | --- |
| SSB GSCN | | 1~6 |  | freq1 |
| Duplex mode | | 1,4 |  | FDD |
| 2,5 | TDD |
| 3,6 | TDD |
| TDD Configuration | | 1,4 |  | N/A |
| 2,5 | TDDConf.1.1 |
| 3,6 | TDDConf.2.1 |
| BWchannel | | 1,4 | MHz | 10: NRB,c = 52 |
| 2,5 | 10: NRB,c = 52 |
| 3,6 | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | | 1,4 |  | SR.1.1 FDD |
| 2,5 | SR.1.1 TDD |
| 3,6 | SR.2.1 TDD |
| RMSI CORESET Reference Channel | | 1,4 |  | CR.1.1 FDD |
| 2,5 | CR.1.1 TDD |
| 3,6 | CR.2.1 TDD |
| RMC CORESET Reference Channel | | 1,4 |  | CCR.1.1 FDD |
| 2,5 | CCR.1.1 TDD |
| 3,6 | CCR.2.1 TDD |
| SSB configuration | | 1,4 |  | SSB.1 FR1 |
| 2,5 | SSB.1 FR1 |
| 3,6 | SSB.2 FR1 |
| SMTC configuration | | 1~6 |  | SMTC.1 |
| DL BWP configuration | | 1~6 |  | DLBWP.1.1 |
| UL BWP configuration | | 1~6 |  | ULBWP.1.1 |
| OCNG Patterns | | 1~6 |  | OP.1 |
| EPRE ratio of PSS to SSS | | 1~6 | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH DMRS | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
| Note2 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | 1~6 | dBm/15kHz | -104 |
| NR\_FDD\_FR1\_B |
| NR\_TDD\_FR1\_C |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |
| NR\_FDD\_FR1\_G |
| NR\_FDD\_FR1\_H |
| Note2 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | 1,2,4,5 | dBm/SSB SCS | -104 |
| NR\_FDD\_FR1\_B |
| NR\_TDD\_FR1\_C |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |
| NR\_FDD\_FR1\_G |
| NR\_FDD\_FR1\_H |
| NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | 3,6 | -101 |
| NR\_FDD\_FR1\_B |
| NR\_TDD\_FR1\_C |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |
| NR\_FDD\_FR1\_G |
| NR\_FDD\_FR1\_H |
|  | | 1~6 | dB | -2.7 |
|  | | 1~6 | dB | -2.7 |
| SS-RSRP Note3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | 1,2,4,5 | dBm/SCS | -106.7 |
| NR\_FDD\_FR1\_B |
| NR\_TDD\_FR1\_C |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |
| NR\_FDD\_FR1\_G |
| NR\_FDD\_FR1\_H |
| NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | 3,6 | -103.7 |
| NR\_FDD\_FR1\_B |
| NR\_TDD\_FR1\_C |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |
| NR\_FDD\_FR1\_G |
| NR\_FDD\_FR1\_H |
| Io Note3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | 1,2,4,5 | dBm/9.36 MHz | -74.18 |
| NR\_FDD\_FR1\_B |
| NR\_TDD\_FR1\_C |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |
| NR\_FDD\_FR1\_G |
| NR\_FDD\_FR1\_H |
| NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | 3,6 | dBm/38.16 MHz | -68.08 |
| NR\_FDD\_FR1\_B |
| NR\_TDD\_FR1\_C |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |
| NR\_FDD\_FR1\_G |
| NR\_FDD\_FR1\_H |
| Propagation condition | | 1~6 |  | AWGN |
| Antenna configuration | | 1~6 |  | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

Table 8.5.1.1.5-3: Timing offsets for E-UTRA - NR FR1 SFTD measurement accuracy

|  |  |  |
| --- | --- | --- |
| **Condition** | **SFN offset between PCell and PSCell** | **Frame boundary offset between PCell and PSCell (Ts)** |
| 1 | 100 | -122000 |
| 2 | 300 | -60540 |
| 3 | 500 | 1000 |
| 4 | 700 | 62540 |
| 5 | 900 | 124000 |

Table 8.5.1.1.5-4: SFTD measurement accuracy

|  |  |  |
| --- | --- | --- |
| Accuracy | Conditions | |
| Ês/Iot | Frequency range |
| Ts Note 1 | dB |  |
| 40 | ≥ -3 dB | FR1 |
| NOTE 1: Ts is the basic timing unit defined in TS 36.211 [24].  NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies. | | |

Table 8.5.1.1.5-5: E-UTRA - NR FR1 SFTD measurement accuracy requirements for the value of frameBoundaryOffsetResult in reported SFTD

| Normal and Extreme Conditions | frameBoundaryOffsetResult | | | | |
| --- | --- | --- | --- | --- | --- |
| Condition 1 | Condition 2 | Condition 3 | Condition 4 | Condition 5 |
| Lowest reported value | -24408 | -12116 | 192 | 12500 | 24792 |
| Highest reported value | -24392 | -12100 | 208 | 12516 | 24808 |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

### 8.5.2 Inter-RAT measurement accuracy

#### 8.5.2.1 SS-RSRP

##### 8.5.2.1.0 Minimum conformance requirements

The measurement period of NR SS-RSRP measurements in RRC\_CONNECTED state is specified in TS 36.133 [23] Clause 8.1.2.4.21 for UE with FDD PCell not configured with E-UTRA-NR Dual Connectivity operation. The measurement period of NR SS-RSRP measurements in RRC\_CONNECTED state is specified in TS 36.133 [23] Clause 8.1.2.4.22 for UE with TDD PCell not configured with E-UTRA-NR Dual Connectivity operation.

The reporting range for SS-RSRP is defined from -156dBm to -31dBm with 1dB resolution. The mapping of the measured quantity to the reported value is defined by Table 4.7.1.0.1-2.

The normative reference for this requirement is TS 36.133 [23] clause 9.11.1.

8.5.2.1.0.1 Inter-RAT E-UTRA - NR FR1 SS-RSRP measurement accuracy requirements

The accuracy requirements of NR SS-RSRP measurements in FR1 and the corresponding side conditions shall be the same as the inter-frequency SS-RSRP absolute accuracy requirements in clause 4.7.1.0.3.

8.5.2.1.0.2 Inter-RAT E-UTRA - NR FR2 SS-RSRP minimum conformance requirements

The accuracy requirements of NR SS-RSRP measurements in FR2 and the corresponding side conditions shall be the same as the inter-frequency SS-RSRP absolute accuracy requirements in clause 5.7.1.0.2.

##### 8.5.2.1.1 SS-RSRP with NR FR1 target cell

8.5.2.1.1.1 E-UTRA SS-RSRP absolute measurement accuracy of a NR FR1 neighbour cell

8.5.2.1.1.1.1 Test purpose

The purpose of this test is to verify that the inter-RAT SS-RSRP absolute measurement accuracy is within the specified limits for all bands, when the serving cell is E-UTRA and the target cell is NR FR1.

8.5.2.1.1.1.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards and capable of NR measurements.

8.5.2.1.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.5.2.1.0.

The normative reference for this requirement is TS 38.133 [6] clause A.8.5.2.1.1.1.

8.5.2.1.1.1.4 Test description

Two cells are configured in this test: E-UTRA Cell 1 is the E-UTRAN PCell and Cell 2 is the inter-RAT NR FR1 neighbour cell.

8.5.2.1.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.5.2.1.1.1.4.1-1.

Table 8.5.2.1.1.1.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 8.5.2.1.1.1-1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD |
| 8.5.2.1.1.1-2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD |
| 8.5.2.1.1.1-3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD |
| 8.5.2.1.1.1-4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD |
| 8.5.2.1.1.1-5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD |
| 8.5.2.1.1.1-6 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test equipment and the DUT according to the parameters in Table 8.5.2.1.1.1.4.1-2.

Table 8.5.2.1.1.1.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the selected test configuration. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part 2Rx | A.3.1.7.2 | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.7.3 |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | Without faders | |  |

1. The general test parameter settings are set up according to Table 8.5.2.1.1.1.4.1-3.

2. Message contents are defined in clause 8.5.2.1.1.1.4.3.

3. There are two carriers and two cells specified in the test, where E-UTRA Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR neighbour cell on the NR carrier. E-UTRA Cell 1 is configured according to TS 36.521-3 [26] clause C.1.0 and C.1.1.

8.5.2.1.1.1.4.2 Test procedure

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters according to Table 8.5.2.1.1.1.5-1 as appropriate.

3. The SS shall transmit an *RRCConnectionReconfiguration* message on Cell 1.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. The UE shall transmit periodically MeasurementReport messages.

6. After 10s wait from Step 3, the SS shall check the SS-RSRP reported values in the periodic MeasurementReport. The SS-RSRP value of Cell 2 reported by the UE is compared to the expected SS-RSRP. If the value is outside the limits in clause 8.5.2.1.1.1.5 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the MeasurementReport messages transmitted by the UE until the confidence level according to Table G.2.3-1 in Annex G is achieved.

8. Set the parameters according to each sub-test in Table 8.5.2.1.1.1.5-1 as appropriate and repeat steps 5-7.

8.5.2.1.1.1.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.5.2.1.1.1.4.3-1: Common Exception messages

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7  Table 4.6.6-2B in TS 36.508 [25] |

Table 8.5.2.1.1.1.4.3-2: ReportConfigInterRAT-DEFAULT(Periodical)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 [25] Table 4.6.6-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  |  |
| ReportQuantityNR-r15 SEQUENCE { | PRESENT |  |  |
| ss-rsrp | true |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

8.5.2.1.1.1.5 Test requirement

Table 8.5.2.1.1.1.5-1 defines the primary level settings including test tolerances for all tests.

Each SS-RSRP measurement report for each of the tests in Table 8.5.2.1.1.1.5-1 shall meet the corresponding absolute accuracy requirements in Table 8.5.2.1.1.1.5-2 for test configurations 1, 2, 4 and 5, and the corresponding absolute accuracy requirements in Table 8.5.2.1.1.1.5-3 for test configurations 3 and 6.

Table 8.5.2.1.1.1.5-1: SS-RSRP inter-RAT test parameters

| Parameter | | | Unit | Test 1 | | Test 2 | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Cell 2 | | Cell 2 | |
| SSB ARFCN | | |  | freq1 | | freq1 | |
| Duplex mode | | Config 1,4 |  | FDD | | | |
| Config 2,3,5,6 | TDD | | | |
| TDD configuration | | Config 1,4 |  | Not Applicable | | | |
| Config 2,5 | TDDConf.1.1 | | | |
| Config 3,6 | TDDConf.2.1 | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | |
| DRX Cycle configuration | | | ms | Not Applicable | | | |
| PDSCH Reference measurement channel | | Config 1,4 |  | - | | - | |
| Config 2,5 |
| Config 3,6 |
| RMSI CORESET Reference Channel | | Config 1,4 |  | - | | - | |
| Config 2,5 |
| Config 3,6 |
| Dedicated CORESET Reference Channel | | Config 1,4 |  | - | | - | |
| Config 2,5 |
| Config 3,6 |
| OCNG Patterns | | |  | OP.1 | | | |
| SS-RSSI-Measurement | | |  | Not Applicable | | | |
| SMTC configuration | | |  | SMTC.1 | | | |
| SSB configuration | | Config 1,2,4,5 |  | SSB.1 FR1 | | | |
| Config 3,6 | SSB.2 FR1 | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2,4,5 | kHz | 15 | | | |
| Config 3,6 | 30 | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH DMRS | | |
| EPRE ratio of PDCCH DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |
| EPRE ratio of PDSCH DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |
| Note2 | Config 1,2,4,5 | Depending on band group | dBm/15kHz | -94.65 | | -117 + ΔBG\_offset | |
| Config 3,6 | Depending on band group | dBm/15kHz | -96.00 | | -117 + ΔBG\_offset | |
| Note2 | Config 1,2,4,5 | | dBm/SCS | -94.65 | | Same as Noc for 15kHz | |
| Config 3,6 | Depending on band group | -93.00 | | -114 + ΔBG\_offset | |
|  | | | dB | 10 | | -3.2 | |
|  | | | dB | 10 | | -3.2 | |
| SS-RSRPNote3 | Config 1,2,4,5 | Depending on band group | dBm/SCS | -84.65 | | -120.2 + ΔBG\_offset | |
| Config 3,6 | Depending on band group | -83.00 | | -117.2 + ΔBG\_offset | |
| IoNote3 | Config 1,2,4,5 | Depending on band group | dBm/  9.36MHz | -56.28 | | -87.35 + ΔBG\_offset | |
| Config 3,6 | Depending on band group | dBm/  38.16MHz | -51.53 | | -81.25 + ΔBG\_offset | |
| 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: SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: NR operating band groups are as defined in clause 3.5.2.  NOTE 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification. | | | | | | | |

Table 8.5.2.1.1.1.5-2: SS-RSRP Inter RAT absolute accuracy requirements  
for the reported values for test configurations 1, 2, 4 and 5

|  |  |  |  |
| --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2 | |
| Lowest reported value (Cell 2) | 62 | Bands NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | 30 |
| Bands NR\_FDD\_FR1\_B | 31 |
| Bands NR\_TDD\_FR1\_C | 31 |
| Bands NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | 32 |
| Bands NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | 32 |
| Bands NR\_FDD\_FR1\_F | 33 |
| Bands NR\_FDD\_FR1\_G | 33 |
| Bands NR\_FDD\_FR1\_H | 34 |
| Highest reported value (Cell 2) | 82 | Bands NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | 43 |
| Bands NR\_FDD\_FR1\_B | 43 |
| Bands NR\_TDD\_FR1\_C | 44 |
| Bands NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | 44 |
| Bands NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | 45 |
| Bands NR\_FDD\_FR1\_F | 45 |
| Bands NR\_FDD\_FR1\_G | 46 |
| Bands NR\_FDD\_FR1\_H | 46 |
| Extreme Conditions | Test 1  All bands | Test 2 | |
| Lowest reported value (Cell 2) | 59 | Bands NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | 26 |
| Bands NR\_FDD\_FR1\_B | 26 |
| Bands NR\_TDD\_FR1\_C | 27 |
| Bands NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | 27 |
| Bands NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | 28 |
| Bands NR\_FDD\_FR1\_F | 28 |
| Bands NR\_FDD\_FR1\_G | 29 |
| Bands NR\_FDD\_FR1\_H | 29 |
| Highest reported value (Cell 2) | 85 | Bands NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | 47 |
| Bands NR\_FDD\_FR1\_B | 48 |
| Bands NR\_TDD\_FR1\_C | 48 |
| Bands NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | 49 |
| Bands NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | 49 |
| Bands NR\_FDD\_FR1\_F | 50 |
| Bands NR\_FDD\_FR1\_G | 50 |
| Bands NR\_FDD\_FR1\_H | 51 |
| NOTE: NR operating band groups are defined in clause 3A.4, Table 3A.4.1-2. | | | |

Table 8.5.2.1.1.1.5-3: SS-RSRP Inter RAT absolute accuracy requirements  
for the reported values for test configurations 3 and 6

| Normal Conditions | Test 1  All bands | Test 2 | |
| --- | --- | --- | --- |
| Lowest reported value (Cell 2) | 64 | Bands NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | 33 |
| Bands NR\_FDD\_FR1\_B | 34 |
| Bands NR\_TDD\_FR1\_C | 34 |
| Bands NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | 35 |
| Bands NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | 35 |
| Bands NR\_FDD\_FR1\_F | 36 |
| Bands NR\_FDD\_FR1\_G | 36 |
| Bands NR\_FDD\_FR1\_H | 37 |
| Highest reported value (Cell 2) | 83 | Bands NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | 46 |
| Bands NR\_FDD\_FR1\_B | 46 |
| Bands NR\_TDD\_FR1\_C | 47 |
| Bands NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | 47 |
| Bands NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | 48 |
| Bands NR\_FDD\_FR1\_F | 48 |
| Bands NR\_FDD\_FR1\_G | 49 |
| Bands NR\_FDD\_FR1\_H | 49 |
| Extreme Conditions | Test 1  All bands | Test 2 | |
| Lowest reported value (Cell 2) | 61 | Bands NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | 29 |
| Bands NR\_FDD\_FR1\_B | 29 |
| Bands NR\_TDD\_FR1\_C | 30 |
| Bands NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | 30 |
| Bands NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | 31 |
| Bands NR\_FDD\_FR1\_F | 31 |
| Bands NR\_FDD\_FR1\_G | 32 |
| Bands NR\_FDD\_FR1\_H | 32 |
| Highest reported value (Cell 2) | 86 | Bands NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | 50 |
| Bands NR\_FDD\_FR1\_B | 51 |
| Bands NR\_TDD\_FR1\_C | 51 |
| Bands NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | 52 |
| Bands NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | 52 |
| Bands NR\_FDD\_FR1\_F | 53 |
| Bands NR\_FDD\_FR1\_G | 53 |
| Bands NR\_FDD\_FR1\_H | 54 |
| NOTE: NR operating band groups are defined in clause 3A.4, Table 3A.4.1-2. | | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

8.5.2.1.1.2 Void

##### 8.5.2.1.2 E-UTRA SS-RSRP absolute measurement accuracy of a NR FR2 neighbour cell

Editor's Note: This test case has been completed for the following configurations:

- Test frequency f ≤ 40.8 GHz

- UE PC3

- Normal conditions

- The test is incomplete for UE power classes other than PC3

- The test is incomplete for test frequencies > 40.8 GHz

- The test is incomplete for extreme conditions

8.5.2.1.2.1 Test purpose

The purpose of this test is to verify that the inter-RAT SS-RSRP measurement accuracy is within the specified limits for all bands, when the serving cell is E-UTRA and the target cell is NR FR2.

8.5.2.1.2.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards and capable of NR FR2 measurements.

8.5.2.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.5.2.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.8.5.2.1.2.

8.5.2.1.2.4 Test description

Two cells are configured in this test: E-UTRA Cell 1 is the E-UTRAN PCell and Cell 2 is the inter-RAT NR FR2 neighbour cell.

8.5.2.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.5.2.1.2.4.1-1.

Table 8.5.2.1.2.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 8.5.2.1.2-1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode, LTE FDD |
| 8.5.2.1.2-2 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode, LTE TDD |
| NOTE: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 8.5.2.1.2.4.1-2.

Table 8.5.2.1.2.4.1-2: Initial conditions

|  |  |  |
| --- | --- | --- |
| Parameter | Value | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-2 and TS 38.508-1 [14] clause 4.3.1. | |
| Channel bandwidth | As specified by the selected test configuration. | |
| Propagation conditions | AWGN | As specified in clause C.2.1 |
| Connection Diagram | TE Part: A.3.3.3.1 | As specified in TS 38.508-1 [14] Annex A. |
| UE Part: A.3.4.1.1 |
| Exceptions to connection diagram | N/A |  |

1. The general test parameter settings are set up according to Table 8.5.2.1.2.4.1-3.

2. Message contents are defined in clause 8.5.2.1.2.4.3.

3. There are two carriers and two cells specified in the test, where E-UTRA Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR neighbour cell on the NR carrier. E-UTRA Cell 1 is configured according to TS 36.521-3 [26] clause C.1.0 and C.1.1.

4. The UE Rx beam peak direction has been obtained previously using one of the Rx beam peak search procedures as described in Annex I.

8.5.2.1.2.4.2 Test procedure

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters according to Table 8.5.2.1.2.5-1 and Table 8.5.2.1.2.5-2 as appropriate. The TE shall ensure that the NR FR2 cell will be received by the UE from the Rx beam peak direction.

3. The SS shall transmit an *RRCConnectionReconfiguration* message on Cell 1 to configure inter-RAT NR neighbour cell periodical measurements.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. The UE shall transmit periodically MeasurementReport messages.

6. After 10s wait from Step 3, the SS shall check the SS-RSRP reported values in the periodic MeasurementReport. The SS-RSRP value of Cell 2 reported by the UE is compared to the expected SS-RSRP. If the value is outside the limits in clause 8.5.2.1.2.5 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the MeasurementReport messages transmitted by the UE until the confidence level according to Table G.2.3-1 in Annex G is achieved.

8. Set the parameters according to each sub-test in Tables 8.5.2.1.2.5-1 and 8.5.2.1.2.5-2 as appropriate and repeat steps 5-7.

8.5.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.5.2.1.2.4.3-1: Common Exception messages

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7  Table 4.6.6-2B in TS 36.508 [25] |

Table 8.5.2.1.2.4.3-2: ReportConfigInterRAT-DEFAULT(Periodical)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 [25] Table 4.6.6-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  |  |
| ReportQuantityNR-r15 SEQUENCE { | PRESENT |  |  |
| rsrp | true |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

8.5.2.1.2.5 Test requirement

Table 8.5.2.1.2.5-1 defines the general test parameters and Table 8.5.2.1.2.5-2 defines the primary level OTA settings including test tolerances for all tests.

Each SS-RSRP measurement report for each of the tests in Table 8.5.2.1.2.5-2 shall meet the corresponding absolute accuracy requirements in Table 8.5.2.1.2.5-3

Table 8.5.2.1.2.5-1: SS-RSRP Inter-RAT general test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | Test 2 |
| Cell 2 | Cell 2 |
| SSB ARFCN |  | Freq1 | freq1 |
| Duplex mode |  | TDD | TDD |
| TDD configuration |  | TDDConf.3.1 | TDDConf.3.1 |
| BWchannel | MHz | 100: NRB,c = 66 | 100: NRB,c = 66 |
| Downlink initial BWP configuration |  | DLBWP.0.1 | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | |
| DRX cycle configuration | ms | Not applicable | |
| PDSCH Reference measurement channel |  | - | - |
| RMSI CORESET Reference Channel |  | - | - |
| OCNG Patterns |  | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 | SMTC.1 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
|  |
| 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: Void.  NOTE 3: Void.  NOTE 4: Void. | | | |

Table 8.5.2.1.2.5-2: SS-RSRP Inter-RAT OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | Test 2 |
| Cell 2 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to A.9.1 | Setup 1 according to A.9.1 |
| Assumption for UE beamsNote 9 |  | Rough | Rough |
| Note1 | dBm/15kHz Note4 | -105.1 | N/A |
| Note1 | dBm/SCS Note4 | -96.07 | N/A |
|  | dB | 11 | N/A |
| Es | dBm/SCS Note 4 |  | (Table B.2.3-2 of TS 38.133 [6] Rx Beam Peak +6.65dB) |
| SSB\_RPNote2 | dBm/SCS Note4 | -85.07 | (Table B.2.3-2 of TS 38.133 [6] Rx Beam Peak +6.65dB) |
| BB Note 7 | dB | 9.95 | 1.84 |
| IoNote2 | dBm/95.04 MHz Note4 | -55.75 | (Table B.2.3-2 of TS 38.133 [6] Rx Beam Peak +35.65dB) |
| NOTE 1: Where used, 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 2: SSB\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 3: Void  NOTE 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  NOTE 5: Void  NOTE 6: Void  NOTE 7: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [3], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [3] Table 6.2.1.3-4.  NOTE 8: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | |

Table 8.5.2.1.2.5-3: evaluation limits for the reported values

|  |  |  |  |
| --- | --- | --- | --- |
| UE power class 3 | | | |
| Normal Conditions | Test 1  All bands | Test 2 | |
| Lowest reported value (Cell 2) | 48 | n257, n258, n261 | 29 |
| n260 | 32 |
| n259 | 33 |
| Highest reported value (Cell 2) | 105 | n257, n258, n261 | 87 |
| n260 | 89 |
| n259 | 90 |
| Extreme Conditions | Test 1  All bands | Test 2 | |
| Lowest reported value (Cell 2) | 45 | n257, n258, n261 | 26 |
| n260 | 29 |
| n259 | 30 |
| Highest reported value (Cell 2) | 108 | n257, n258, n261 | 90 |
| n260 | 92 |
| n259 | 93 |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 8.5.2.2 SS-RSRQ

##### 8.5.2.2.0 Minimum conformance requirements

The measurement period of NR SS-RSRQ measurements is the same as the measurement period of NR SS-RSRP measurements defined in clause 8.5.2.1.0.

The reporting range of SS-RSRQ is defined from -43 dB to 20 dB with 0.5 dB resolution. The mapping of measured quantity is defined in Table 4.7.2.0.1-2. The range in the signalling may be larger than the guaranteed accuracy range.

The normative reference for this requirement is TS 36.133 [23] clause 9.11.2.

8.5.2.2.0.1 Inter-RAT E-UTRA - NR FR1 SS-RSRQ minimum conformance requirements

The accuracy requirements of NR SS-RSRQ measurements in FR1 and the corresponding side conditions shall be the same as the inter-frequency SS-RSRQ absolute accuracy requirements in clause 4.7.2.0.2.

8.5.2.2.0.2 Inter-RAT E-UTRA - NR FR2 SS-RSRQ minimum conformance requirements

The accuracy requirements of NR SS-RSRP measurements in FR2 and the corresponding side conditions shall be the same as the inter-frequency SS-RSRP absolute accuracy requirements in clause 5.7.2.0.2.

##### 8.5.2.2.1 E-UTRA SS-RSRQ absolute measurement accuracy of a NR FR1 neighbour cell

8.5.2.2.1.1 Test purpose

The purpose of this test is to verify that the inter-RAT SS-RSRQ measurement accuracy is within the specified limits for all bands, when the serving cell is E-UTRA and the target cell is NR FR1.

8.5.2.2.1.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards and capable of NR measurements.

8.5.2.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.5.2.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.8.5.2.2.1.

8.5.2.2.1.4 Test description

Two cells are configured in this test: E-UTRA Cell 1 is the E-UTRAN PCell and Cell 2 is the inter-RAT NR FR1 neighbour cell.

8.5.2.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.5.2.2.1.4.1-1.

Table 8.5.2.2.1.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 8.5.2.2.1-1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD |
| 8.5.2.2.1-2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD |
| 8.5.2.2.1-3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD |
| 8.5.2.2.1-4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD |
| 8.5.2.2.1-5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD |
| 8.5.2.2.1-6 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test equipment and the DUT according to the parameters in Table 8.5.2.2.1.4.1-2.

Table 8.5.2.2.1.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the selected test configuration. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part 2Rx | A.3.1.7.2 | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.7.3 |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.5.2.2.1.4.1-3.

2. Message contents are defined in clause 8.5.2.2.1.4.3.

3. There are two carriers and two cells specified in the test, where E-UTRA Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR neighbour cell on the NR carrier. E-UTRA Cell 1 is configured according to TS 36.521-3 [26] clause C.1.0 and C.1.1.

8.5.2.2.1.4.2 Test procedure

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters according to Table 8.5.2.2.1.5-1 as appropriate.

3. The SS shall transmit an *RRCConnectionReconfiguration* message on Cell 1.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. The UE shall transmit periodically MeasurementReport messages.

6. After 10s wait from Step 3, the SS shall check the SS-RSRQ reported values in the periodic MeasurementReport. The SS-RSRQ value of Cell 2 reported by the UE is compared to the expected SS-RSRQ. If the value is outside the limits in clause 8.5.2.2.1.5 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the MeasurementReport messages transmitted by the UE until the confidence level according to Table G.2.3-1 in Annex G is achieved.

8. Set the parameters according to each sub-test in Table 8.5.2.2.1.5-1 as appropriate and repeat steps 5-7.

8.5.2.2.1.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.5.2.2.1.4.3-1: Common Exception messages

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7  Table 4.6.6-2B in TS 36.508 [25] |

Table 8.5.2.2.1.4.3-2: ReportConfigInterRAT-DEFAULT(Periodical)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 [25] Table 4.6.6-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  |  |
| ReportQuantityNR-r15 SEQUENCE { | PRESENT |  |  |
| ss-rsrq | true |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

8.5.2.2.1.5 Test requirement

Table 8.5.2.2.1.5-1 defines the primary level settings including test tolerances for all tests.

Each SS-RSRQ measurement report for each of the tests in Table 8.5.2.2.1.5-1 shall meet the corresponding absolute accuracy requirements in Table 8.5.2.2.1.5-2.

Table 8.5.2.2.1.5-1: SS-RSRQ inter-RAT test parameters

| Parameter | | | Unit | Test 1 | | Test 2 | | Test 3 | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cell 2 | | Cell 2 | | Cell 2 | |
| SSB ARFCN | | |  | freq1 | | freq1 | | freq1 | |
| Duplex mode | | Config 1,4 |  | FDD | | | | | |
| Config 2,3,5,6 | TDD | | | | | |
| TDD configuration | | Config 1,4 |  | Not Applicable | | | | | |
| Config 2,5 | TDDConf.1.1 | | | | | |
| Config 3,6 | TDDConf.2.1 | | | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | | | |
| DRX Cycle configuration | | | ms | Not Applicable | | | | | |
| PDSCH Reference measurement channel | | Config 1,4 |  | - | | - | | - | |
| Config 2,5 |
| Config 3,6 |
| RMSI CORESET Reference Channel | | Config 1,4 |  | - | | - | | - | |
| Config 2,5 |
| Config 3,6 |
| Dedicated CORESET Reference Channel | | Config 1,4 |  | - | | - | | - | |
| Config 2,5 |
| Config 3,6 |
| OCNG Patterns | | |  | OP.1 | | | | | |
| SS-RSSI-Measurement | | |  | Not Applicable | | | | | |
| SMTC configuration | | |  | SMTC.1 | | | | | |
| SSB configuration | | Config 1,2,4,5 |  | SSB.1 FR1 | | | | | |
| Config 3,6 | SSB.2 FR1 | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2,4,5 | kHz | 15 | | | | | |
| Config 3,6 | 30 | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH DMRS | | |
| EPRE ratio of PDCCH DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |
| EPRE ratio of PDSCH DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |
| Note2 | Config 1,2,4,5 | Depending on band group | dBm/15kHz | -81.68 | | -106 | | -116 + ΔBG\_offset | |
| Config 3,6 | | -87.80 | | -113 | | Same as Noc for 15kHz for Config 1,2,4,5 | |
| Note2 | Config 1,2,4,5 | | dBm/SCS | -81.68 | | -106 | | Same as Noc for 15kHz | |
| Config 3,6 | Depending on band group | -84.80 | | -110 | | -113 + ΔBG\_offset | |
|  | | | dB | -1.75 | | -1.75 | | -1.75 | |
|  | | | dB | -1.75 | | -1.75 | | -1.75 | |
| SS-RSRPNote3 | Config 1,2,4,5 | Depending on band group | dBm/SCS | -83.43 | | -107.75 | | -117.75 + ΔBG\_offset | |
| Config 3,6 | Depending on band group | -86.55 | | -111.75 | | -114.75 + ΔBG\_offset | |
| SS-RSRQ Note3 | |  | dB | -14.77 | | -14.76 | | -14.76 | |
| IoNote3 | Config 1,2,4,5 | Depending on band group | dBm/  9.36MHz | -50 | | -75.83 | | -85.83 + ΔBG\_offset | |
| Config 3,6 | Depending on band group | dBm/  38.16MHz | -50 | | -76.73 | | -79.73 + ΔBG\_offset | |
| 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: SS-RSRQ, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: NR operating band groups are as defined in clause 3.5.2.  NOTE 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification. | | | | | | | | | |

Table 8.5.2.2.1.5-2: SS-RSRQ accuracy requirements for the reported values

|  |  |  |  |
| --- | --- | --- | --- |
|  | Test 1 | Test 2 | Test 3 |
|  | All bands | All bands | All bands |
| Normal Conditions | | | |
| Lowest reported value (Cell 2) | SS-RSRQ\_51 | SS-RSRQ\_51 | SS-RSRQ\_51 |
| Highest reported value (Cell 2) | SS-RSRQ\_63 | SS-RSRQ\_63 | SS-RSRQ\_63 |
| Extreme Conditions | | | |
| Lowest reported value (Cell 2) | SS-RSRQ\_48 | SS-RSRQ\_48 | SS-RSRQ\_48 |
| Highest reported value (Cell 2) | SS-RSRQ\_66 | SS-RSRQ\_66 | SS-RSRQ\_66 |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

##### 8.5.2.2.2 E-UTRA SS-RSRQ absolute measurement accuracy of a NR FR2 neighbour cell

Editor's Note: This test case has been completed for the following configurations:

- Test frequency f ≤ 40.8 GHz

- UE PC3

- Normal conditions

- The test is incomplete for UE power classes other than PC3

- The test is incomplete for test frequencies > 40.8 GHz

- The test is incomplete for extreme conditions

8.5.2.2.2.1 Test purpose

The purpose of this test is to verify that the inter-RAT SS-RSRQ measurement accuracy is within the specified limits for all bands, when the serving cell is E-UTRA and the target cell is NR FR2.

8.5.2.2.2.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards and capable of NR FR2 measurements.

8.5.2.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.5.2.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.8.5.2.2.2.

8.5.2.2.2.4 Test description

Two cells are configured in this test: E-UTRA Cell 1 is the E-UTRAN PCell and Cell 2 is the inter-RAT NR FR2 neighbour cell.

8.5.2.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.5.2.2.2.4.1-1.

Table 8.5.2.2.2.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 8.5.2.2.2-1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode, LTE FDD |
| 8.5.2.2.2-2 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode, LTE TDD |
| NOTE: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 8.5.2.2.2.4.1-2.

Table 8.5.2.2.2.4.1-2: Initial conditions

|  |  |  |
| --- | --- | --- |
| Parameter | Value | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-2 and TS 38.508-1 [14] clause 4.3.1. | |
| Channel bandwidth | As specified by the selected test configuration. | |
| Propagation conditions | AWGN | As specified in clause C.2.1 |
| Connection Diagram | TE Part: A.3.3.3.1 | As specified in TS 38.508-1 [14] Annex A. |
| UE Part: A.3.4.1.1 |
| Exceptions to connection diagram | N/A |  |

1. The general test parameter settings are set up according to Table 8.5.2.2.2.4.1-3.

2. Message contents are defined in clause 8.5.2.2.2.4.3.

3. There are two carriers and two cells specified in the test, where E-UTRA Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR neighbour cell on the NR carrier. E-UTRA Cell 1 is configured according to TS 36.521-3 [26] clause C.1.0 and C.1.1.

4. The UE Rx beam peak direction has been obtained previously using one of the Rx beam peak search procedures as described in Annex I.

8.5.2.2.2.4.2 Test procedure

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters according to Table 8.5.2.2.2.5-1 and Table 8.5.2.2.2.5-2 as appropriate. The TE shall ensure that the NR FR2 cell will be received by the UE from the Rx beam peak direction.

3. The SS shall transmit an *RRCConnectionReconfiguration* message on Cell 1 to configure inter-RAT NR neighbour cell periodical measurements.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. The UE shall transmit periodically MeasurementReport messages.

6. After 10s wait from Step 3, the SS shall check the SS-RSRQ reported values in the periodic MeasurementReport. The SS-RSRQ value of Cell 2 reported by the UE is compared to the expected SS-RSRQ. If the value is outside the limits in clause 8.5.2.2.2.5 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the MeasurementReport messages transmitted by the UE until the confidence level according to Table G.2.3-1 in Annex G is achieved.

8. Set the parameters according to each sub-test in Tables 8.5.2.2.2.5-1 and 8.5.2.2.2.5-2 as appropriate and repeat steps 5-7.

8.5.2.2.2.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.5.2.2.2.4.3-1: Common Exception messages

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7  Table 4.6.6-2B in TS 36.508 [25] |

Table 8.5.2.2.2.4.3-2: ReportConfigInterRAT-DEFAULT(Periodical)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 [25] Table 4.6.6-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  |  |
| ReportQuantityNR-r15 SEQUENCE { | PRESENT |  |  |
| rsrq | true |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

8.5.2.2.2.5 Test requirement

Table 8.5.2.2.2.5-1 defines the general test parameters and Table 8.5.2.2.2.5-2 defines the primary level OTA settings including test tolerances for all tests.

Each SS-RSRQ measurement report for each of the tests in Table 8.5.2.2.2.5-2 shall meet the corresponding absolute accuracy requirements in Table 8.5.2.2.2.5-3

Table 8.5.2.2.2.5-1: SS-RSRQ Inter-RAT general test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | Test 2 |
| Cell 2 | Cell 2 |
| SSB ARFCN |  | Freq1 | freq1 |
| Duplex mode |  | TDD | TDD |
| TDD configuration |  | TDDConf.3.1 | TDDConf.3.1 |
| BWchannel | MHz | 100: NRB,c = 66 | 100: NRB,c = 66 |
| Downlink initial BWP configuration |  | DLBWP.0.1 | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | |
| DRX cycle configuration | ms | Not applicable | |
| PDSCH Reference measurement channel |  | - | - |
| RMSI CORESET Reference Channel |  | - | - |
| OCNG Patterns |  | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 | SMTC.1 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
|  |
| 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: SS-SINR, SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | |

Table 8.5.2.2.2.5-2: SS-RSRQ Inter-RAT OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | Test 2 |
| Cell 2 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 | Setup 1 |
| Assumption for UE beamsNote 10 |  | Rough | Rough |
| Note1 | dBm/15kHz Note4 | -105 | (Table B.2.3-2 of TS 38.133 [6] Rx Beam Peak -5dB)  (Note 7) |
| Note1 | dBm/SCS Note4 | -95.97 | (Table B.2.3-2 of TS 38.133 [6] Rx Beam Peak +4dB)  (Note 7) |
|  | dB | -0.5 | 3.55 |
| SSB\_RPNote2 | dBm/SCS Note4 | -96.47 | (Table B.2.3-2 of TS 38.133 [6] Rx Beam Peak +7.55dB)  (Note 8) |
| SS-RSRQNote2 | dB | -14.06 | -12.38 |
| Note2 | dB | -0.5 | 3.55 |
| IoNote2 | dBm/95.04 MHz Note4 | -64.21 | (Table B.2.3-2 of TS 38.133 [6] Rx Beam Peak +43.16dB)  (Note 9) |
| NOTE 1: 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 2: SSB\_RP, SS-RSRQ, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 3: Void  NOTE 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.  NOTE 5: Void  NOTE 6: Void  NOTE 7: Noc for SCS 15kHz is applied at -10log10(8)+4dB above the minimum level specified in Table B.2.3-2 of TS 38.133 [6] for beam peak. Noc for SCS 120kHz is applied at 4dB above the minimum level specified in Table B.2.3-2 for beam peak.  NOTE 8: SSB\_RP is applied at 2.25dB above the minimum level specified in Table B.2.3-2 of TS 38.133 [6] for beam peak.  NOTE 9: Io is applied at 10log10(792)+6.22dB above the minimum level specified in Table B.2.3-2 of TS 38.133 [6] for beam peak.  NOTE 10: Information about types of UE beam is given in B.2.1.3 of TS 38.133 [6], and does not limit UE implementation or test system implementation. | | | |

Table 8.5.2.2.2.5-3: evaluation limits for the reported values

|  |  |  |
| --- | --- | --- |
| Normal Conditions | Test 1 | Test 2 |
| Lowest reported value (Cell 2) | 23 | 26 |
| Highest reported value (Cell 2) | 95 | 98 |
| Extreme Conditions | Test 1 | Test 2 |
| Lowest reported value (Cell 2) | 20 | 23 |
| Highest reported value (Cell 2) | 98 | 101 |

#### 8.5.2.3 SS-SINR

##### 8.5.2.3.0 Minimum conformance requirements

The measurement period of NR SS-SINR measurements is the same as the measurement period of NR SS-RSRP measurements defined in clause 8.5.2.1.0.

The reporting range of SS-SINR and CSI-SINR is defined from -23 dB to 40 dB with 0.5 dB resolution. The mapping of measured quantity is defined in Table 4.7.3.0.1-2. The range in the signalling may be larger than the guaranteed accuracy range.

The normative reference for this requirement is TS 36.133 [23] clause 9.11.3.

8.5.2.3.0.1 Inter-RAT E-UTRA - NR FR1 SS-SINR minimum conformance requirements

The accuracy requirements of NR SS-SINR measurements in FR1 and the corresponding side conditions shall be the same as the inter-frequency SS-SINR absolute accuracy requirements in clause 4.7.3.0.2.

8.5.2.3.0.2 Inter-RAT E-UTRA - NR FR2 SS-SINR minimum conformance requirements

The accuracy requirements of NR SS-SINR measurements in FR2 and the corresponding side conditions shall be the same as the inter-frequency SS-SINR absolute accuracy requirements in clause 5.7.3.0.2.

##### 8.5.2.3.1 E-UTRA SS-SINR absolute measurement accuracy of a NR FR1 neighbour cell

8.5.2.3.1.1 Test purpose

The purpose of this test is to verify that the inter-RAT SS-SINR measurement accuracy is within the specified limits for all bands, when the serving cell is E-UTRA and the target cell is NR FR1.

8.5.2.3.1.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards supporting ss-SINR-Meas and capable of NR measurements.

8.5.2.3.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.5.2.3.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.8.5.2.3.1.

8.5.2.3.1.4 Test description

Two cells are configured in this test: E-UTRA Cell 1 is the E-UTRAN PCell and Cell 2 is the inter-RAT NR FR1 neighbour cell.

8.5.2.3.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.5.2.3.1.4.1-1.

Table 8.5.2.3.1.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 8.5.2.3.1-1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD |
| 8.5.2.3.1-2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD |
| 8.5.2.3.1-3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD |
| 8.5.2.3.1-4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD |
| 8.5.2.3.1-5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD |
| 8.5.2.3.1-6 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test equipment and the DUT according to the parameters in Table 8.5.2.3.1.4.1-2.

Table 8.5.2.3.1.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the selected test configuration. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.1 |
| Connection Diagram | TE Part 2Rx | A.3.1.7.2 | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.7.3 |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 8.5.2.3.1.4.1-3.

2. Message contents are defined in clause 8.5.2.3.1.4.3.

3. There are two carriers and two cells specified in the test, where E-UTRA Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR neighbour cell on the NR carrier. E-UTRA Cell 1 is configured according to TS 36.521-3 [26] clause C.1.0 and C.1.1.

8.5.2.3.1.4.2 Test procedure

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters according to Table 8.5.2.3.1.5-1 as appropriate.

3. The SS shall transmit an *RRCConnectionReconfiguration* message on Cell 1.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. The UE shall transmit periodically MeasurementReport messages.

6. After 10s wait from Step 3, the SS shall check the SS-SINR reported values in the periodic MeasurementReport. The SS- SINR value of Cell 2 reported by the UE is compared to the expected SS- SINR. If the value is outside the limits in clause 8.5.2.3.1.5 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the MeasurementReport messages transmitted by the UE until the confidence level according to Table G.2.3-1 in Annex G is achieved.

8. Set the parameters according to each sub-test in Table 8.5.2.3.1.5-1 as appropriate and repeat steps 5-7.

8.5.2.3.1.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.5.2.3.1.4.3-1: Common Exception messages

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7  Table 4.6.6-2B in TS 36.508 [25] |

Table 8.5.2.3.1.4.3-2: ReportConfigInterRAT-DEFAULT(Periodical)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 [25] Table 4.6.6-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  |  |
| ReportQuantityNR-r15 SEQUENCE { | PRESENT |  |  |
| ss-sinr | true |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

8.5.2.3.1.5 Test requirement

Table 8.5.2.3.1.5-1 defines the primary level settings including test tolerances for all tests.

Each SS-RSRQ measurement report for each of the tests in Table 8.5.2.3.1.5-1 shall meet the corresponding absolute accuracy requirements in Table 8.5.2.3.1.5-2.

Table 8.5.2.3.1.5-1: SS-SINR inter-RAT test parameters

| Parameter | | | Unit | Test 1 | | Test 2 | | Test 3 | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cell 2 | | Cell 2 | | Cell 2 | |
| SSB ARFCN | | |  | freq1 | | freq1 | | freq1 | |
| Duplex mode | | Config 1,4 |  | FDD | | | | | |
| Config 2,3,5,6 | TDD | | | | | |
| TDD configuration | | Config 1,4 |  | Not Applicable | | | | | |
| Config 2,5 | TDDConf.1.1 | | | | | |
| Config 3,6 | TDDConf.2.1 | | | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | | | |
| DRX Cycle configuration | | | ms | Not Applicable | | | | | |
| PDSCH Reference measurement channel | | Config 1,4 |  | - | | - | | - | |
| Config 2,5 |
| Config 3,6 |
| RMSI CORESET Reference Channel | | Config 1,4 |  | - | | - | | - | |
| Config 2,5 |
| Config 3,6 |
| Dedicated CORESET Reference Channel | | Config 1,4 |  | - | | - | | - | |
| Config 2,5 |
| Config 3,6 |
| OCNG Patterns | | |  | OP.1 | | | | | |
| SS-RSSI-Measurement | | |  | Not Applicable | | | | | |
| SMTC configuration | | |  | SMTC.1 | | | | | |
| SSB configuration | | Config 1,2,4,5 |  | SSB.1 FR1 | | | | | |
| Config 3,6 | SSB.2 FR1 | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2,4,5 | kHz | 15 | | | | | |
| Config 3,6 | 30 | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH DMRS | | |
| EPRE ratio of PDCCH DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |
| EPRE ratio of PDSCH DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |
| Note2 | Config 1,2,4,5 | Depending on band group | dBm/15kHz | -88 | | -108.5 | | -119.5 + ΔBG\_offset | |
| Note2 | Config 1,2,4,5 | | dBm/SCS | -88 | | -108.5 | | Same as Noc for 15kHz | |
| Config 3,6 | Depending on band group | -85 | | -105.5 | | -116.5 + ΔBG\_offset | |
|  | | | dB | -1.75 | | 20 | | -3.2 | |
|  | | | dB | -1.75 | | 20 | | -3.2 | |
| SS-RSRPNote3 | Config 1,2,4,5 | Depending on band group | dBm/SCS | -89.75 | | -88.5 | | -122.7 + ΔBG\_offset | |
| Config 3,6 | Depending on band group | -86.75 | | -85.5 | | -119.7 + ΔBG\_offset | |
| SS-SINR Note3 | |  | dB | -1.75 | | 20 | | -4.0 | |
| IoNote3 | Config 1,2,4,5 | Depending on band group | dBm/  9.36MHz | -57.83 | | -60.5 | | -89.85 + ΔBG\_offset | |
| Config 3,6 | Depending on band group | dBm/  38.16MHz | -51.73 | | -54.41 | | -83.75 + ΔBG\_offset | |
| 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: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: NR operating band groups are as defined in clause 3.5.2.  NOTE 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification. | | | | | | | | | |

Table 8.5.2.3.1.5-2: SS-SINR accuracy requirements for the reported values

|  |  |  |  |
| --- | --- | --- | --- |
|  | Test 1 | Test 2 | Test 3 |
|  | All bands | All bands | All bands |
| Normal Conditions | | | |
| Lowest reported value (Cell 2) | SS-SINR\_35 | SS-SINR\_79 | SS-SINR\_32 |
| Highest reported value (Cell 2) | SS-SINR\_51 | SS-SINR\_94 | SS-SINR\_49 |
| Extreme Conditions | | | |
| Lowest reported value (Cell 2) | SS-SINR\_33 | SS-SINR\_77 | SS-SINR\_31 |
| Highest reported value (Cell 2) | SS-SINR\_53 | SS-SINR\_96 | SS-SINR\_50 |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

##### 8.5.2.3.2 E-UTRA SS-SINR absolute measurement accuracy of a NR FR2 neighbour cell

Editor's Note: This test case has been completed for the following configurations:

- Test frequency f ≤ 40.8 GHz

- UE PC3

- Normal conditions

- The test is incomplete for UE power classes other than PC3

- The test is incomplete for test frequencies > 40.8 GHz

- The test is incomplete for extreme conditions

8.5.2.3.2.1 Test purpose

The purpose of this test is to verify that the inter-RAT SS-SINR measurement accuracy is within the specified limits for all bands, when the serving cell is E-UTRA and the target cell is NR FR2.

8.5.2.3.2.2 Test applicability

This test applies to all E-UTRA UE release 15 onwards supporting ss-SINR-Meas and capable of NR FR2 measurements.

8.5.2.3.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 8.5.2.3.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.8.5.2.3.2.

8.5.2.3.2.4 Test description

Two cells are configured in this test: E-UTRA Cell 1 is the E-UTRAN PCell and Cell 2 is the inter-RAT NR FR2 neighbour cell.

8.5.2.3.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 8.5.2.3.2.4.1-1.

Table 8.5.2.3.2.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 8.5.2.3.2-1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode, LTE FDD |
| 8.5.2.3.2-2 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode, LTE TDD |
| NOTE: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 8.5.2.3.2.4.1-2.

Table 8.5.2.3.2.4.1-2: Initial conditions

|  |  |  |
| --- | --- | --- |
| Parameter | Value | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | As specified in TS 36.508 [25] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.6-2 and TS 38.508-1 [14] clause 4.3.1. | |
| Channel bandwidth | As specified by the selected test configuration. | |
| Propagation conditions | AWGN | As specified in clause C.2.1 |
| Connection Diagram | TE Part: A.3.3.3.1 | As specified in TS 38.508-1 [14] Annex A. |
| UE Part: A.3.4.1.1 |
| Exceptions to connection diagram | N/A |  |

1. The general test parameter settings are set up according to Table 8.5.2.3.2.4.1-3.

2. Message contents are defined in clause 8.5.2.3.2.4.3.

3. There are two carriers and two cells specified in the test, where E-UTRA Cell 1 is the E-UTRA PCell on the E-UTRA carrier and Cell 2 is the NR neighbour cell on the NR carrier. E-UTRA Cell 1 is configured according to TS 36.521-3 [26] clause C.1.0 and C.1.1.

4. The UE Rx beam peak direction has been obtained previously using one of the Rx beam peak search procedures as described in Annex I.

8.5.2.3.2.4.2 Test procedure

1. Ensure the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

2. Set the parameters according to Table 8.5.2.3.2.5-1 and Table 8.5.2.3.2.5-2 as appropriate. The TE shall ensure that the NR FR2 cell will be received by the UE from the Rx beam peak direction.

3. The SS shall transmit an *RRCConnectionReconfiguration* message on Cell 1 to configure inter-RAT NR neighbour cell periodical measurements.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

5. The UE shall transmit periodically MeasurementReport messages.

6. After 10s wait from Step 3, the SS shall check the SS-SINR reported values in the periodic MeasurementReport. The SS- SINR value of Cell 2 reported by the UE is compared to the expected SS- SINR. If the value is outside the limits in clause 8.5.2.3.2.5 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the MeasurementReport messages transmitted by the UE until the confidence level according to Table G.2.3-1 in Annex G is achieved.

8. Set the parameters according to each sub-test in Tables 8.5.2.3.2.5-1 and 8.5.2.3.2.5-2 as appropriate and repeat steps 5-7.

8.5.2.3.2.4.3 Message contents

Message contents are according to TS 36.508 [25] clause 7.3 with the following exceptions:

Table 8.5.2.3.2.4.3-1: Common Exception messages

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-7  Table 4.6.6-2B in TS 36.508 [25] |

Table 8.5.2.3.2.4.3-2: ReportConfigInterRAT-DEFAULT(Periodical)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 [25] Table 4.6.6-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  |  |
| ReportQuantityNR-r15 SEQUENCE { | PRESENT |  |  |
| sinr | true |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

8.5.2.3.2.5 Test requirement

Table 8.5.2.3.2.5-1 defines the general test parameters and Table 8.5.2.3.2.5-2 defines the primary level OTA settings including test tolerances for all tests.

Each SS-RSRQ measurement report for each of the tests in Table 8.5.2.3.2.5-2 shall meet the corresponding absolute accuracy requirements in Table 8.5.2.3.2.5-3.

Table 8.5.2.3.2.5-1: SS-SINR Inter-RAT general test parameters

| Parameter | Unit | Test 1 | Test 2 | Test 3 |
| --- | --- | --- | --- | --- |
| Cell 2 | Cell 2 | Cell 2 |
| SSB ARFCN |  | Freq1 | freq1 | freq1 |
| Duplex mode |  | TDD | TDD | TDD |
| TDD configuration |  | TDDConf.3.1 | TDDConf.3.1 | TDDConf.3.1 |
| BWchannel | MHz | 100: NRB,c = 66 | 100: NRB,c = 66 | 100: NRB,c = 66 |
| Downlink initial BWP configuration |  | DLBWP.0.1 | | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | |
| DRX cycle configuration | ms | Not applicable | | |
| PDSCH Reference measurement channel |  | - | - | - |
| RMSI CORESET Reference Channel |  | - | - | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
|  |
| 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: SS-SINR, SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

Table 8.5.2.3.2.5-2: SS-SINR Inter-RAT OTA related test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | Test 2 | Test 3 |
| Cell 2 | Cell 2 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 | Setup 1 | Setup 1 |
| Assumption for UE beamsNote 10 |  | Rough | Rough | Rough |
| Note1 | dBm/15kHz Note4 | -105 | -105.1 | (Table B.2.3-2 of TS 38.133 [6] Rx Beam Peak -5dB)  (Note 7) |
| Note1 | dBm/SCS Note4 | -95.97 | -96.07 | (Table B.2.3-2 of TS 38.133 [6] Rx Beam Peak +4dB)  (Note 7) |
|  | dB | -0.5 | 11 | 3.7 |
| SSB\_RPNote2 | dBm/SCS Note4 | -96.47 | -85.07 | (Table B.2.3-2 of TS 38.133 [6] Rx Beam Peak +7.6dB)  (Note 8) |
| SS-SINRNote2 | dB | -0.5 | 11 | 3.6 |
| Note2 | dB | -0.5 | 11 | 3.6 |
| IoNote2 | dBm/95.04 MHz Note4 | -64.21 | -55.75 | (Table B.2.3-2 of TS 38.133 [6] Rx Beam Peak +43.19dB)  (Note 9) |
| NOTE 1: 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 2: SSB\_RP, SS-SINR, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 3: Void  NOTE 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 5: Void  NOTE 6: Void  NOTE 7: Noc for SCS 15kHz is applied at -10log10(8)+4dB above the minimum level specified in Table B.2.3-2 of TS 38.133 [6] for beam peak. Noc for SCS 120kHz is applied at 4dB above the minimum level specified in Table B.2.3-2 of TS 38.133 [6] for beam peak.  Note 8: SSB\_RP is applied at 3dB above the minimum level specified in Table B.2.3-2 of TS 38.133 [6] for beam peak.  Note 9: Io is applied at level 10log10(792)+6.54dB above the minimum level specified in Table B.2.3-2 of TS 38.133 [6] for beam peak.  Note 10: Information about types of UE beam is given in B.2.1.3 of TS 38.133 [6], and does not limit UE implementation or test system implementation. | | | | |

Table 8.5.2.3.2.5-3: evaluation limits for the reported values

|  |  |  |  |
| --- | --- | --- | --- |
| Normal Conditions | Test 1 | Test 2 | Test 3 |
| Lowest reported value (Cell 2) | 9 | 32 | 17 |
| Highest reported value (Cell 2) | 82 | 105 | 90 |
| Extreme Conditions | Test 1 | Test 2 | Test 3 |
| Lowest reported value (Cell 2) | 7 | 30 | 15 |
| Highest reported value (Cell 2) | 84 | 107 | 92 |

# 9 NR sidelink

## 9.1 NR sidelink in FR1

### 9.1.1 UE transmit timing

#### 9.1.1.0 Minimum conformance requirements

##### 9.1.1.0.1 Minimum conformance requirements for GNSS as synchronization reference source

The requirements in this subclause are applicable when the reference timing used by the UE for NR sidelink communication is derived from GNSS.

The sidelink transmissions takes place before the subframe starting boundary as defined in TS 38.331 [13], where and .

The transmission timing error for sidelink transmissions shall be less than or equal to ±Te where the timing error limit value Te is defined in Table 9.1.1.0.1-1.

Table 9.1.1.0.1-1: Te Timing Error Limit

|  |  |
| --- | --- |
| Frequency Range of sidelink | Te\_ |
| FR1 | 12\*64\*Tc |
| Note 1: Tc is the basic timing unit defined in TS 38.211 [7]. | |

The normative reference for this requirement is TS 38.133 [6] clause 12.2.2.

##### 9.1.1.0.2 Minimum conformance requirements for SyncRef UE as synchronization reference source

The requirements in this subclause are applicable when the reference timing used for deriving sidelink transmission is from SyncRef UE transmitting sidelink synchronization signals.

The sidelink transmissions takes place before the reception of the first detected path (in time) of the corresponding timing reference frame from the SyncRef UE, where and .

The transmission timing error for sidelink transmissions shall be less than or equal to ±Te where the timing error limit value Te is defined in Table 9.1.1.0.2-1.

Table 9.1.1.0.2-1: Te Timing Error Limit

|  |  |  |
| --- | --- | --- |
| Frequency Range of sidelink | SCS of sidelink signals (kHz) | Te |
| FR1 | 15 | 12\*64\*Tc |
| 30 | 8\*64\*Tc |
| 60 | 5\*64\*Tc |
| Note 1: Tc is the basic timing unit defined in TS 38.211 [7]. | | |

The normative reference for this requirement is TS 38.133 [6] clause 12.2.5.

##### 9.1.1.0.3 Minimum conformance requirements for FR1 NR Cell as synchronization reference source

The requirements in this subclause are applicable when the reference timing used for sidelink transmissions is a NR serving cell on a non-NR sidelink carrier.

The sidelink transmissions takes place before the reception of the first detected path (in time) of the corresponding downlink frame from the reference cell, where and .

The transmission timing error for sidelink transmissions shall be less than or equal to ±Te where the timing error limit value Te is defined in Table 9.1.1.0.3-1.

Table 9.1.1.0.3-1: Te Timing Error Limit

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range of sidelink | SCS of SSB signals ( kHz) | SCS of sidelink signals (kHz) | Te |
| FR1 | 15 | 15 | 14\*64\*Tc |
| 30 | 12\*64\*Tc |
| 60 | 12\*64\*Tc |
| 30 | 15 | 10\*64\*Tc |
| 30 | 10\*64\*Tc |
| 60 | 9\*64\*Tc |
| Note 1: Tc is the basic timing unit defined in TS 38.211 [7]. | | | |

The normative reference for this requirement is TS 38.133 [6] clause 12.2.3.

#### 9.1.1.1 NR SA FR1 UE transmit timing accuracy for GNSS as synchronization reference source

9.1.1.1.1 Test purpose

The purpose of this test is to verify the UE timing requirements as specified in TS 38.133 [6] clause 12.2.2, when the GNSS is used as timing reference.

9.1.1.1.2 Test applicability

This test applies to all types of NR UEs from release 16 onwards and supporting NR sidelink communication.

9.1.1.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 9.1.1.0.1

The normative reference for this requirement is TS 38.133 [6] clause A.9.1.1.1.

9.1.1.1.4 Test description

9.1.1.1.4.1 Initial conditions

Configure the test equipment and the DUT according to the parameters in Table 9.1.1.1.4.1-1.

Table 9.1.1.1.4.1-1: Initial conditions for NR SA FR1 UE transmit timing accuracy for GNSS as synchronization reference source

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | PC5: As specified in TS 38.508-1 [14] clause 4.3.1.8. 1 | | |
| Channel bandwidth | PC5: As specified by the test configuration selected from Table 9.1.1.1.4.1-2. | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.9.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.7.1 |
| Exceptions to connection diagram | N/A | |  |

1. The parameter settings for the NR sidelink communication are pre-configured according to TS 38.508-1 [14] clause 4.10.1.

2. Message content exceptions are given in clause 9.1.1.1.4.3

3. The GNSS simulator is configured for Scenario #1: static in Geographical area #1, as defined in TS 38.508-1 [14] Table 4.11.2-2.

Table 9.1.1.1.4.1-2: NR sidelink test parameters for NR SA FR1 UE transmit timing accuracy for GNSS as synchronization reference source

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1 | HD carrier in Band n47 or n38 |
| Channel Bandwidth (BWchannel) Note 1 | MHz | 20 (NRB,c = 50) or  40 (NRB,c = 100) |  |
| SCS | kHz | 30 |  |
| Active cell |  | None |  |
| Active SyncRef UE |  | None |  |
| NR sidelink communication pre-configuration |  | As specified in section A.11.2 | IE values unless specified otherwise in this test. |
| PSCCH Reference Measurement Channel |  | CC.1A HD | As specified in Table A.11.3-1 |
| PSSCH Reference Measurement Channel |  | CD.1A HD | As specified in Table A.11.3-2 |
| Propagation condition |  | AWGN |  |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | | | |

9.1.1.1.4.2 Test procedure

For this test, the UE is triggered by the test loop function to transmit for NR sidelink communication. There is one GNSS based synchronization source during the test. The test system can emulate and send the GNSS signal to the test UE.

1. Ensure the UE is in state 4-A with generic procedure parameters Test Mode = *On* and GNSS Sync = *On* according to TS 38.508-1 [14] clause 4.4A.2.

2. The GNSS simulator is triggered to start step 1 of Scenario #1 to simulate a location in the centre of Geographicalarea #1.

3. Wait at least 20 seconds for the UE to acquire the GNSS signal.

4. The SS sends AT command +CCUTLE to close test loop function and trigger UE to transmit.

5. The UE starts to transmit NR sidelink communication data over the PC5 interface in accordance of pre-configuration and to schedule PSSCH.

6. After the UE is synchronized to the GNSS synchronization source, the SS shall monitor all PSSCH transmissions and verify that, for each received PSSCH, the timing is within before the subframe starting boundary determined by the GNSS reference time in the GNSS simulator, where and , and is given in Table 9.1.1.1.5-1.

7. The SS sends AT command +CCUTLE to open test loop function.

9.1.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 9.1.1.1.4.3-1: +CCUTLE (Test procedure, step 4)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Close and Transmit |

Table 9.1.1.1.4.3-2: +CCUTLE (Test procedure, step 7)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Open |

9.1.1.1.5 Test requirement

The sidelink transmissions takes place before the subframe starting boundary as defined in TS 38.331 [13] clause 5.8.12, where and .

The transmission timing error for sidelink transmissions shall be less than or equal to ±Te where the timing error limit value Te is defined in Table 9.1.1.1.5-1.

Table 9.1.1.1.5-1: Te Timing Error Limit

|  |  |
| --- | --- |
| Frequency Range of sidelink | Te Note 2 |
| FR1 | 15\*64\*Tc |
| Note 1: Tc is the basic timing unit defined in TS 38.211 [7].  Note 2: Including the test tolerance given in annex F. | |

#### 9.1.1.2 NR SA FR1 UE transmit timing accuracy for SyncRef UE as synchronization reference source

9.1.1.2.1 Test purpose

The purpose of this test is to verify the UE timing requirements as specified in TS 38.133 [6] clause 12.2.5, when SyncRef UE is used as timing reference.

9.1.1.2.2 Test applicability

This test applies to all types of NR UEs from release 16 onwards and supporting NR sidelink communication.

9.1.1.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 9.1.1.0.2

The normative reference for this requirement is TS 38.133 [6] clause A.9.1.1.2.

9.1.1.2.4 Test description

9.1.1.2.4.1 Initial conditions

Configure the test equipment and the DUT according to the parameters in Table 9.1.1.2.4.1-1.

Table 9.1.1.2.4.1-1: Initial conditions for NR SA FR1 UE transmit timing accuracy for SyncRef UE as synchronization reference source

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | PC5: As specified in TS 38.508-1 [14] clause 4.3.1.8. 1 | | |
| Channel bandwidth | PC5: As specified by the test configuration selected from Table 9.1.1.2.4.1-2. | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.9.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.7.1 |
| Exceptions to connection diagram | GNSS System Simulator is not used. | |  |

1. The parameter settings for the NR sidelink communication are pre-configured according to TS 38.508-1 [14] clause 4.10.1.

2. Message content exceptions are given in clause 9.1.1.2.4.3

3. There is one NR-SS-UE (SyncRef UE 1) specified in this test. SyncRef UE 1 is configured according to the parameters in Table 9.1.1.2.4.1-1.

Table 9.1.1.2.4.1-2: NR sidelink test parameters for NR SA FR1 UE transmit timing accuracy for SyncRef UE as synchronization reference source

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | |  | 1 | HD carrier in Band n47 or n38 |
| Channel Bandwidth (BWchannel) Note 3 | | MHz | 20 (NRB,c = 50) or  40 (NRB,c = 100) |  |
| Active cell | |  | None |  |
| Active SyncRef UE | |  | SyncRef UE 1 | Transmitting S-SSB on RF channel number 1 |
| NR sidelink communication preconfiguration | |  | As specified in section A.11.2 | IE values unless specified otherwise in this test. |
| PSCCH Reference Measurement Channel | |  | CC.1A HD | As specified in Table A.11.3-1 |
| PSSCH Reference Measurement Channel | |  | CD.1A HD | As specified in Table A.11.3-2 |
| Noc Note1,2 | | dBm/30kHz | -95 |  |
| SyncRef UE 1 | sl-SSB-TimeAllocation |  | sl-SSB-TimeAllocation1 |  |
| slssid |  | 30 |  |
| inCoverage |  | TRUE | In MIB-SL |
| networkControlledSyncTx |  | ON |  |
| NR sidelink communication configuration |  | As specified in section A.11.2 | IE values unless specified otherwise in this test. |
| Ês/Noc |  | 3 |  |
| PSBCH-RSRP Note1, Note 2 | dBm/30kHz | -92 |  |
| Propagation condition | |  | AWGN |  |
| Note 1: PSBCH-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: S-PSS Ês/Noc and S-PSS Ês/Noc are set the same as PSBCH Ês/Noc.  Note 3: The UE is only required to be tested in one of the supported test configurations. | | | | |

9.1.1.2.4.2 Test procedure

In this test there is one active NR-SS-UE (SyncRef UE 1) and no serving cell nor GNSS signals. The UE is triggered by the test loop function to transmit for NR sidelink communication.

1. Ensure the UE is in state 4-A with generic procedure parameters Test Mode = *On* according to TS 38.508-1 [14] clause 4.4A.2.

2. The SS sends AT command +CCUTLE to close test loop function and trigger UE to transmit.

3. The UE starts to transmit NR sidelink communication data over the PC5 interface in accordance of pre-configuration and to schedule PSSCH.

4. Power on SyncRef UE 1 and wait at least 8 seconds for the UE to be synchronized to SyncRef UE 1.

5. After the UE is synchronized to SyncRef UE 1, the SS shall monitor all PSSCH transmissions and verify that, for each received PSSCH, the timing is within before the subframe starting boundary determined by the reception of the first detected path (in time) of corresponding timing reference frame from SyncRef UE 1, where and , and is given in Table 9.1.1.2.5-1.

6. The SS sends AT command +CCUTLE to open test loop function.

9.1.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 9.1.1.2.4.3-1: +CCUTLE (Test procedure, step 2)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Close and Transmit |

Table 9.1.1.2.4.3-2: MasterInformationBlockSidelink (SyncRef UE 1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1A-1 with condition NB\_SYNC and RX |

Table 9.1.1.2.4.3-3: SL-ConfigDedicatedNR (SyncRef UE 1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.6-7 with condition SELECTED | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ConfigDedicatedNR-r16 ::= SEQUENCE { |  |  |  |
| sl-PHY-MAC-RLC-Config-r16 SEQUENCE { |  |  |  |
| sl-FreqInfoToAddModList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfig-r16 { | 1 entry |  |  |
| SL-FreqConfig-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-SyncConfigList-r16 SEQUENCE (SIZE (1..maxSL-SyncConfig-r16)) OF SL-SyncConfig-r16 { | 1 entry |  |  |
| SL-SyncConfig-r16[1] | SL-SyncConfig | entry 1  Table 9.1.1.2.4.3-4 |  |
| } |  |  |  |
| sl-SyncPriority-r16 | gnbEnb |  |  |
| } |  |  |  |
| } |  |  |  |
| networkControlledSyncTx-r16 | on |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.1.2.4.3-4: SL-SyncConfig (Table 9.1.1.2.4.3-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.6-31 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-SyncConfig-r16 ::= SEQUENCE { |  |  |  |
| sl-SSID-r16 | 30 |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.1.2.4.3-5: +CCUTLE (Test procedure, step 6)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Open |

9.1.1.2.5 Test requirement

The sidelink transmissions takes place before the reception of the first detected path (in time) of the corresponding timing reference frame from SyncRef UE 1, where and .

The transmission timing error for sidelink transmissions shall be less than or equal to ±Te where the timing error limit value Te is defined in Table 9.1.1.2.5-1.

Table 9.1.1.2.5-1: Te Timing Error Limit

|  |  |  |
| --- | --- | --- |
| Frequency Range of sidelink | SCS of sidelink signals (kHz) | Te Note 2 |
| FR1 | 30 | 10\*64\*Tc |
| Note 1: Tc is the basic timing unit defined in TS 38.211 [7].  Note 2: Including the test tolerance given in annex F. | | |

#### 9.1.1.3 NR SA FR1 UE transmit timing accuracy for FR1 NR cell as synchronization reference source

9.1.1.3.1 Test purpose

The purpose of this test is to verify the UE timing requirements as specified in TS 38.133 [6] clause 12.2.5, when the downlink timing of the serving cell (RRC\_IDLE) or PCell (RRC\_CONNECTED) on a non-sidelink NR carrier is used as timing reference.

9.1.1.3.2 Test applicability

This test applies to all types of NR UEs from release 16 onwards and supporting NR Uu and sidelink communication.

9.1.1.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 9.1.1.0.3

The normative reference for this requirement is TS 38.133 [6] clause A.9.1.1.3.

9.1.1.3.4 Test description

9.1.1.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 9.1.1.3.4.1-1.

Table 9.1.1.3.4.1-1: Supported test configurations for FR1 NR Cell

|  |  |
| --- | --- |
| Configuration | Description |
| 9.1.1.3-1 | NR Uu: FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 9.1.1.3-2 | NR Uu: TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 9.1.1.3-3 | NR Uu: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Configure the test equipment and the DUT according to the parameters in Table 9.1.1.3.4.1-2.

Table 9.1.1.3.4.1-2: Initial conditions for NR SA FR1 UE transmit timing accuracy for FR1 NR cell as synchronization reference source

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | Uu & PC5: As specified in TS 38.508-1 [14] clause 4.3.1.8.2.1 | | |
| Channel bandwidth | Uu: As specified by the test configuration selected from Table 9.1.1.3.4.1-1  PC5: As specified by the test configuration selected from Table 9.1.1.3.4.1-3. | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.9.3 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.7.3 |
| Exceptions to connection diagram | N/A | |  |

1. The parameter settings for the NR sidelink communication are pre-configured according to TS 38.508-1 [14] clause 4.10.1.

2. Message content exceptions are defined in clause 9.1.1.3.4.3

3. There is one NR Uu carrier and one NR Cell (Cell 1) specified in this test. Cell 1 is configured according to Annex C.1.1 and C.1.2.

4. Test parameters for Cell 1 are given in Table 9.1.1.3.4.1-3.

Table 9.1.1.3.4.1-3: NR sidelink test parameters for NR SA FR1 UE transmit timing accuracy for FR1 NR cell as synchronization reference source

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1 | HD carrier in Band n47 or n38 |
| Channel Bandwidth (BWchannel) Note 1 | MHz | 20 (NRB,c = 50) or  40 (NRB,c = 100) |  |
| SCS | kHz | 30 |  |
| Active cell |  | Cell 1 |  |
| Active SyncRef UE |  | None |  |
| V2X sidelink communication configuration |  | As specified in section A.11.2 | IE values unless specified otherwise in this test. |
| PSCCH Reference Measurement Channel |  | CC.1A HD | As specified in Table A.11.3-1 |
| PSSCH Reference Measurement Channel |  | CD.1A HD | As specified in Table A.11.3-2 |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | | | |

Table 9.1.1.3.4.1-3: Cell Test Parameters for NR SA FR1 UE transmit timing accuracy for FR1 NR cell as synchronization reference source

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 |
| RF Channel Number | |  | 2 |
| Duplex Mode | Config 1 |  | FDD |
| Config 2,3 |  | TDD |
| TDD configuration | Config 1 |  | Not Applicable |
| Config 2 |  | TDDConf.1.1 |
| Config 3 |  | TDDConf.2.1 |
| Channel Bandwidth (BWchannel) | Config 1,2 | MHz | 10: NRB,c = 52 |
| Config 3 | 40: NRB,c = 106 |
| Initial BWP Configuration | |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP Configuration | |  | DLBWP.1.1  ULBWP.1.1 |
| DRX Cycle | |  | N/A |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD |
| Config 2 |  | SR.1.1 TDD |
| Config 3 |  | SR.2.1 TDD |
| CORESET Reference Channel | Config 1 |  | CR.1.1 FDD |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.1.1 FDD |
| Config 2 |  | CCR.1.1 TDD |
| Config 3 |  | CCR.2.1 TDD |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 |
| Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | |  | SMTC.2 |
| OCNG Patterns | |  | OP.1 |
| EPRE ratio of PSS to SSS | | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Noc Note2 | Config 1,2,3 | dBm/15 kHz | -98 |
| Noc Note2 | Config 1,2 | dBm/SCS | -98 |
| Config 3 | -95 |
| Ês/Noc | | dB | 3 |
| SS-RSRP Note3 | Config 1,2 | dBm/SCS | -95 |
| Config 3 | -92 |
| Io Note 3 | Config 1,2 | dBm/9.36 MHz | -65.2 |
| Config 3 | dBm/38.1 MHz | -59.2 |
| 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: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

9.1.1.3.4.2 Test procedure

In this test there is one active cell (Cell 1). For this test, the UE is triggered by the test loop function or the upper layers to transmit for NR sidelink communication.

1. Ensure the UE is in state 1N-B with generic procedure parameters Test Mode = *On* according to TS 38.508-1 [14] clause 4.4A.2.

2. The SS sends AT command +CCUTLE to close test loop function and trigger UE to transmit.

3. The UE starts to transmit NR sidelink communication data over the PC5 interface in according to Pre-configuration and to schedule PSSCH.

4. The SS shall monitor all PSSCH transmissions and verify that, for each received PSSCH, the timing is within before the subframe starting boundary determined by the reception of the first detected path (in time) of the corresponding downlink frame from the Cell 1, where and , and is given in Table 9.1.1.3.5-1.

5. The SS sends AT command +CCUTLE to open test loop function.

6. Ensure the UE is in state 3N-B with generic procedure parameters Test Mode = *On* according to TS 38.508-1 [14] clause 4.4A.2.

7. The SS sends an *RRCReconfiguration* message with *sl-ConfigDedicatedNR* to provide sidelink configuration.

8. The UE sends an *RRCReconfigurationComplete* message.

9. The SS sends a CLOSE UE TEST LOOP message to close test loop function and trigger UE to transmit.

10. The UE sends a CLOSE UE TEST LOOP COMPLETE message.

11. The SS shall monitor all PSSCH transmissions and verify that, for each received PSSCH, the timing is within before the subframe starting boundary determined by the reception of the first detected path (in time) of the corresponding downlink frame from the Cell 1, where and , and is given in Table 9.1.1.3.5-1.

12. The SS sends an OPEN UE TEST LOOP message to open test loop function.

13. The UE sends an OPEN UE TEST LOOP COMPLETE message.

9.1.1.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions: Table 9.1.1.3.4.3-1: Common Exception messages for NR SA FR1 UE transmit timing accuracy for FR1 NR cell as synchronization reference source

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO and Synchronous cells, where smtc1 field is set to SSB-MTC specified in 38.508-1 [14] Table 7.3.1-3: with condition SMTC.2. |

Table 9.1.1.3.4.3-2: SIB12-IEs-r16(Preamble and test procedure, Cell 1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.2-14A | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB12-IEs-r16 ::= SEQUENCE { |  |  |  |
| sl-ConfigCommonNR-r16 SEQUENCE { |  |  |  |
| sl-FreqInfoList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfigCommon-r16 { | 1 entry |  |  |
| SL-FreqConfigCommon-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-SyncPriority-r16 | gnbEnb |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.1.3.4.3-3: +CCUTLE (Test procedure, step 2)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Close and Transmit |

Table 9.1.1.3.4.3-4: +CCUTLE (Test procedure, step 5)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Open |

Table 9.1.1.3.4.3-5: RRCReconfiguration (Test procedure, step 7)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1-13 with condition NR\_MEAS and SIDELINK | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReconfiguration ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcReconfiguration SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| sl-ConfigDedicatedNR-r16 CHOICE { |  |  |  |
| setup | SL-ConfigDedicatedNR | Table 9.1.1.3.4.3-5 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.1.3.4.3-6: SL-ConfigDedicatedNR (Table 9.1.1.3.4.3-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.6-7 with condition SELECTED | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ConfigDedicatedNR-r16 ::= SEQUENCE { |  |  |  |
| sl-PHY-MAC-RLC-Config-r16 SEQUENCE { |  |  |  |
| sl-FreqInfoToAddModList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfig-r16 { | 1 entry |  |  |
| SL-FreqConfig-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-SyncPriority-r16 | gnbEnb |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.1.3.4.3-7: CLOSE UE TEST LOOP (Test procedure, step 9)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 36.508 [25] Table 4.7A-3 with condition UE TEST LOOP MODE E(V2X Transmission) | | | |
| Information Element | Value/remark | Comment | Condition |
| UE test loop mode E LB setup |  |  |  |
| Communication Transmit or Receive | 0 0 0 0 0 0 0 1 | '01' indicates V2X UE triggered to transmit NR sidelink communication with single spatial layer. |  |

9.1.1.3.5 Test requirement

The sidelink transmissions takes place before the subframe starting boundary determined by the reception of the first detected path (in time) of the corresponding downlink frame from the Cell 1, where and .

The transmission timing error for sidelink transmissions shall be less than or equal to ±Te where the timing error limit value Te is defined in Table 9.1.1.3.5-1.

Table 9.1.1.3.5-1: Te Timing Error Limit

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range of sidelink | SCS of SSB signals ( kHz) | SCS of sidelink signals (kHz) | TeNote2 |
| FR1 | 15 | 30 | 15\*64\*Tc |
| 30 | 30 | 13\*64\*Tc |
| Note 1: Tc is the basic timing unit defined in TS 38.211 [7].  Note 2: Including the test tolerance given in Annex F. | | | |

### 9.1.2 Initiation/Cease of S-SSB transmission

#### 9.1.2.0 Minimum conformance requirements

##### 9.1.2.0.1 Minimum conformance requirements for FR1 NR cell as synchronization reference source

The requirements apply when the NR Cell is used as synchronization reference source and when the UE is

- out of coverage on the NR sidelink carrier and in-coverage with a serving cell on a NR non-sidelink carrier,

and when the conditions for SLSS transmissions specified in TS 38.331[13] are met; *networkControlledSyncTx* is not configured; and *syncTxThreshIC* is included in *SIB12*. The UE shall be capable of measuring the RSRP of the cell used as synchronization reference source to evaluate to initiate/cease SLSS transmissions within Tevaluate,SLSS

where,

- Tevaluate,SLSS is as specified in Table 9.1.2.0.1-1 when UE performs SSB based measurements without measurement gaps.

- Tevaluate,SLSS is as specified in Table 9.1.2.0.1-2 when UE performs SSB based measurements with measurement gaps.

Table 9.1.2.0.1-1: Tevaluate,SLSS for measurements without measurement gaps when NR cell is used as synchronization reference source (FR1)

|  |  |
| --- | --- |
| DRX cycle in NR cell | Tevaluate,SLSS |
| No DRX | max(400ms, ceil( 2 x 5 x Kp) x SMTC period)Note 1 |
| DRX cycle≤ 320ms | max(400ms, ceil(1.5 x 2 x 5 x Kp) x max(SMTC period, DRX cycle)) |
| DRX cycle>320ms | ceil( 7 x Kp ) x DRX cycle |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified | |

Table 9.1.2.0.1-2: Tevaluate,SLSS for measurements with measurement gaps when NR cell is used as synchronization reference source (FR1)

|  |  |
| --- | --- |
| DRX cycle in NR cell | Tevaluate,SLSS |
| No DRX | max(400ms, 2 x 5 x max(MGRP, SMTC period)) x CSSFintra |
| DRX cycle≤ 320ms | max(400ms, ceil(2 x 1.5x 5) x max(MGRP, SMTC period,DRX cycle))x CSSFintra |
| DRX cycle>320ms | 7 x max(MGRP, DRX cycle) x CSSFintra |

If higher layer filtering is configured, an additional delay in evaluation to initiate/cease SLSS transmissions can be expected.

For the NR cell as synchronization reference source:

- SS-RSRP related side conditions given in 38.133[6] clauses 10.1.2 for FR1, respectively, for a corresponding Band,

- SS-RSRQ related side conditions given in 38.133[6] clauses 10.1.7 for FR1, respectively, for a corresponding Band,

- SS-SINR related side conditions given in 38.133[6] clauses 10.1.12 for FR1, respectively, for a corresponding Band,

- SSB\_RP and SSB Ês/Iot according to Annex B.2.2 for a corresponding Band.

The normative reference for this requirement is TS 38.133 [6] clause 12.3.1.1.

##### 9.1.1.0.2 Minimum conformance requirements for SyncRef UE as synchronization reference source

The requirements apply when SyncRef UE is used as synchronization reference source and when the UE is

- in any cell selection state, or

- out of coverage on the NR sidelink carrier and is associated with a serving cell on a non-sidelink carrier,

and when the conditions for SLSS transmissions specified in TS 38.331[13] are met and when SyncRef UE is used as synchronization reference source and if *syncTxThreshOoC* is included in the pre-configuration parameters.

The UE shall be capable of measuring the PSBCH-RSRP of the selected SyncRef UE used as synchronization reference source and evaluate it to initiate/cease SLSS transmissions within Tevaluate,SLSS = 4 S-SSB periods.

If higher layer filtering for PSBCH-RSRP measurements is pre-configured, an additional delay in evaluation to initiate/cease SLSS transmissions can be expected.

For the selected SyncRef UE as defined in TS 38.331 [2] used to derive transmission timing for NR sidelink communication:

- PSBCH-RSRP related side conditions given in 38.133[6] clause 10.4 for a corresponding Band are fulfilled,

- NR S-SSB\_RP and S-SSB Ês/Iot according to Annex B.4 for a corresponding Band are fulfilled.

The requirements for absolute accuracy of PSBCH-RSRP apply to a NR sidelink synchronization source on the same frequency as that of the own NR sidelink UE performing the measurement in FR1.

The accuracy requirements in Table 9.1.1.0.2-1 are valid under the following conditions:

- Demodulation reference signals are transmitted from one port.

- Conditions defined in Clause 7.3E of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for PSBCH-RSRP measurements are fulfilled according to Annex B.4.2 for a corresponding Band for each relevant PSBCH-DMRS.

Table 9.1.1.0.2-1: Intra-frequency PSBCH-RSRP absolute accuracy in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | Ês/Iot Note 3 | Io Note 1 range | | | | | |
| NR sidelink operating band groups Note 2 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSL | | | dBm/BWChannel | dBm/BWChannel |
| SCSSL = 15 kHz | SCSSL = 30 kHz | SCSSL = 60 kHz |
| ±4.5 | ±9 | ≥-6 | NR\_TDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -70 |
| NR\_TDD\_FR1\_J | -116.5 | -113.5 | -110.5 | N/A | -70 |
| ±8 | ±11 | ≥-6 | NR\_TDD\_FR1\_B,  NR\_TDD\_FR1\_J | N/A | N/A | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR sidelink operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 3: Ês/Iot for a SyncRef UE is the Ês/Iot of PSBCH-DMRS. | | | | | | | | |

The relative accuracy of PSBCH-RSRP is defined as the PSBCH-RSRP measured from one NR sidelink synchronization source compared to the PSBCH-RSRP measured from another NR sidelink synchronization source on the same frequency in FR1.

The accuracy requirements in Table 9.1.1.0.2-2 are valid under the following conditions:

- Demodulation reference signals are transmitted from one port.

- Conditions defined in Clause 7.3E of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for PSBCH-RSRP accuracy measurements are fulfilled according to Annex B.4.2 for a corresponding Band for each relevant PSBCH-DMRS.

Table 9.1.1.0.2-2: Intra-frequency PSBCH-RSRP relative accuracy in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | Ês/Iot Note 3 | Io Note 1 range | | | | | |
| NR sidelink operating band groups Note 2 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSL | | | dBm/BWChannel | dBm/BWChannel |
| SCSSL = 15 kHz | SCSSL = 30 kHz | SCSSL = 60 kHz |
| ±2 | ±3 | ≥-3 | NR\_TDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -50 |
| NR\_TDD\_FR1\_J | -116.5 | -113.5 | -110.5 | N/A | -50 |
| ±3 | ±3 | ≥-6 | Note 4 | Note 4 | Note 4 | Note 4 | N/A | Note 4 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR sidelink operating band groups in FR1 are as defined in clause 3A.4.1.  NOTE 3: Ês/Iot for a SyncRef UE is the Ês/Iot of PSBCH-DMRS.  NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement. | | | | | | | | |

The normative references for this requirement are TS 38.133 [6] clause 10.4.2 and 12.3.1.4.

#### 9.1.2.1 NR SA FR1 initiation/cease of S-SSB transmission for FR1 NR cell as synchronization reference source

9.1.2.1.1 Test purpose

The purpose of this test is to verify that the NR sidelink UE meets the requirements related to the maximum evaluation time allowed to initiate and cease S-SSB transmissions defined in TS 38.133 [6] clause 12.3.1.1, when the reference timing used for sidelink transmissions is a NR serving cell in FR1 on a non-sidelink carrier.

9.1.2.1.2 Test applicability

This test applies to all types of NR UEs from release 16 onwards and supporting NR Uu and sidelink communication.

9.1.2.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 9.1.2.0.1

The normative reference for this requirement is TS 38.133 [6] clause A.9.1.2.1.

9.1.2.1.4 Test description

9.1.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 9.1.2.1.4.1-1.

Table 9.1.2.1.4.1-1: Supported test configurations for FR1 NR Cell

|  |  |
| --- | --- |
| Configuration | Description |
| 9.1.2.1-1 | NR Uu: FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 9.1.2.1-2 | NR Uu: TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 9.1.2.1-3 | NR Uu: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Configure the test equipment and the DUT according to the parameters in Table 9.1.2.1.4.1-2.

Table 9.1.2.1.4.1-2: Initial conditions for Initiation/Cease of S-SSB Transmission Test for FR1 NR cell as synchronization reference source

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | Uu & PC5: As specified in TS 38.508-1 [14] clause 4.3.1.8.2.1 | | |
| Channel bandwidth | Uu: As specified by the test configuration selected from Table 9.1.1.3.4.1-1  PC5: As specified by the test configuration selected from Table 9.1.1.3.4.1-2. | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.9.3 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.7.3 |
| Exceptions to connection diagram | N/A | |  |

1. The parameter settings for the NR sidelink communication are configured according to Table 9.1.2.1.4.1-3.

2. Message content exceptions are given in clause 9.1.2.1.4.3

3. There is one NR Uu carrier and one NR Cell (Cell 1) specified in this test. Cell 1 is configured according to Annex C.1.1 and C.1.2.

4. General test parameters for Cell 1 are given in Table 9.1.2.1.4.1-3.

Table 9.1.2.1.4.1-3: NR sidelink test parameters and NR Cell general test parameters for Initiation/Cease of S-SSB Transmission Test for FR1 NR cell as synchronization reference source

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| SCS | kHz | 30 |  |
| Active cell |  | Cell 1 | Serving cell on RF channel number 1 |
| Active SyncRef UE |  | None |  |
| Active NR sidelink UE |  | NR sidelink UE | Transmitting S-SSB on RF channel number 2(HD carrier in Band n47 or n38) |
| NR sidelink communication configuration |  | As specified in A.11.2 | IE values unless specified otherwise in this test |
| networkControlledSyncTx |  | Not configured |  |
| syncTxThreshIC | dBm/SCS | -110 | In SIB12 |
| DRX |  | OFF |  |
| T1 | s | 3 |  |
| T2 | s | 5.24 |  |
| T3 | s | 5.24 |  |

9.1.2.1.4.2 Test procedure

In this test there is one active cell (Cell 1). The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively.

1. Ensure the UE is in state 1N-B with generic procedure parameters Test Mode = *On* according to TS 38.508-1 [14] clause 4.4A.2.

2. The SS shall set parameters according to T1 in Table 9.1.2.1.5-1. T1 starts.

3. If the SS observes that no SL SSB is transmitted by the UE until T1 expires then count a success for the event "No S-SSB transmission", otherwise count a fail for the event "No S-SSB transmission".

4. When T1 expires, the SS shall switch the power setting from T1 to T2 in Table 9.1.2.1.5-1. T2 starts.

5. If the UE starts to send S-SSB within 560 ms from the start of T2 then count a success for the event "S-SSB transmission initiation", otherwise count a fail for the event "S-SSB transmission initiation".

6. When T2 expires, the SS shall switch the power setting from T2 to T3 in Table 9.1.2.1.5-1. T3 starts.

7. If the UE stops to send S-SSB within 560 ms from the start of T3 then count a success for the event "S-SSB transmission cease", otherwise count a fail for the event "S-SSB transmission cease".

8. Repeat step 2-7 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

Each of the events "No S-SSB transmission", "S-SSB transmission initiation" and "S-SSB transmission cease" is evaluated independently for the statistic, resulting in an event verdict pass or fail. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

9.1.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 9.1.2.1.4.3-1: Common Exception messages for NR SA FR1 initiation/cease of S-SSB transmission for FR1 NR cell as synchronization reference source

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions | Table H.2.1-1 with condition SMTC.2 and Asynchronous cells for test configuration 9.1.2.1-1  Table H.2.1-1 with condition SMTC.1 and Synchronous cells for test configuration 9.1.2.1-2 and 9.1.2.1-3 |

Table 9.1.2.1.4.3-2: SIB12-IEs-r16(Preamble and test procedure, Cell 1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.2-14A | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB12-IEs-r16 ::= SEQUENCE { |  |  |  |
| sl-ConfigCommonNR-r16 SEQUENCE { |  |  |  |
| sl-FreqInfoList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfigCommon-r16 { | 1 entry |  |  |
| SL-FreqConfigCommon-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-SyncPriority-r16 | gnbEnb |  |  |
| sl-SyncConfigList-r16 SEQUENCE (SIZE (1..maxSL-SyncConfig-r16)) OF SL-SyncConfig-r16 { | 1 entry |  |  |
| SL-SyncConfig-r16[1] | SL-SyncConfig | entry 1  Table 9.1.2.1.4.3-3 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.2.1.4.3-3: SL-SyncConfig (Table 9.1.2.1.4.3-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.6-31 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-SyncConfig-r16 ::= SEQUENCE { |  |  |  |
| sl-filterCoefficient-r16 | fc0 | L3 filtering is not used to avoid introducing additional delay |  |
| txParameters-r16 SEQUENCE { |  |  |  |
| syncTxThreshIC-r16 | 2 | actual threshold is -120+2\*5 = -110 dBm |  |
| syncTxThreshOoC-r16 | Not present |  |  |
| } |  |  |  |
| } |  |  |  |

9.1.2.1.5 Test requirement

Cell specific test parameters for NR Cell 1 is given in Table 9.1.2.1.5-1.

Table 9.1.2.1.5-1: FR1 NR Cell-specific test parameters for Initiation/Cease of S-SSB Transmission Test for FR1 NR cell as synchronization reference source

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell1 | | |
| T1 | T2 | T3 |
| NR RF Channel Number | |  | 1 | | |
| Duplex Mode | Config 1 |  | FDD | | |
| Config 2,3 |  | TDD | | |
| TDD configuration | Config 1 |  | Not applicable | | |
| Config 2 | TDDConf.1.1 | | |
| Config 3 | TDDConf.2.1 | | |
| Channel Bandwidth (BWchannel) | Config 1,2 | MHz | 10:NRB,c = 52 | | |
| Config 3 | 40:NRB,c = 106 | | |
| Initial BWP Configuration | |  | DLBWP.0.1  ULBWP.0.1 | | |
| Dedicated BWP Configuration | |  | DLBWP.1.1  ULBWP.1.1 | | |
| DRX Cycle | | ms | N/A | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | |
| Config 2 | SR.1.1 TDD | | |
| Config 3 | SR.2.1 TDD | | |
| CORESET Reference Channel | Config 1 |  | CR.1.1 FDD | | |
| Config 2 | CR.1.1 TDD | | |
| Config 3 | CR.2.1 TDD | | |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.1.1 FDD | | |
| Config 2 | CCR.1.1 TDD | | |
| Config 3 | CCR.2.1 TDD | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 | | |
| Config 3 | SSB.2 FR1 | | |
| SMTC Configuration | Config 1 |  | SMTC.2 | | |
| Config 2,3 | SMTC.1 | | |
| TRS configuration | Config 1 |  | TRS.1.1 FDD | | |
| Config 2 | TRS.1.1 TDD | | |
| Config 3 | TRS.1.2 TDD | | |
| OCNG Patterns | |  | OP.1 | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS Note 1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
| NocNote2 | | Config 1,2 | dBm/15 kHz | | |
|  | | Config 3 |  | | |
|  | | Config 1,2,3 | dBm/SCS | | |
| Ês/Noc | | dB | 7.6 Note 5 | -4.5 | 7.6 Note 5 |
| Ês/Iot | | dB | 7.6 | -4.5 | 7.6 |
| SS-RSRPNote3 | Config 1,2 | dBm/SCS | -103.95 | 116.05 | -103.95 |
| Config 3 | -103.95 | -116.05 | -103.95 |
| IoNote3 | Config 1,2 | dBm/9.36MHz | -75.30 | -82.28 | -75.30 |
| Config 3 | dBm/38.16MHz | -72.20 | -79.18 | -72.20 |
| 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 Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Including the test tolerance given in Annex F. | | | | | |

During T1, the SS-RSRP of the PCell is above *syncTxThreshIC* and the UE is not expected to be transmitting S-SSB.

During T2, the SS-RSRP of the PCell is lowered below *syncTxThreshIC* and the UE is expected to initiate S-SSB transmissions.

During T3, the SS-RSRP of the PCell is increased back to be above *syncTxThreshIC* and the UE is expected to cease S-SSB transmissions.

The S-SSB transmission initiation delay is defined as the time from the beginning of time period T2 up to the moment when the UE initiates the S-SSB transmission.

The S-SSB transmission initiation delay shall be less than Tevaluate,SLSS + S-SSB period = 560ms, where,

Tevaluate,SLSS = max(400 ms, ceil (10 ∙ Kp) ∙ SMTC period) = 400 ms, is the evaluation time specified in 38.133 [6] Table 12.3.1.1-1, where

SMTC period = 20ms according to Table 9.1.2.1.5-1.

Kp = 1 according to Table 9.1.2.1.5-1.

S-SSB period = 160 ms.

The S-SSB transmission cease delay is defined as the time from the beginning of time period T3 up to the moment when the UE ceases the S-SSB transmission.

The S-SSB transmission cease delay shall be less than Tevaluate,SLSS + S-SSB period = 560ms.

The rate of correct initiation/cease delay of S-SSB transmissions observed during repeated tests shall be at least 90%.

#### 9.1.2.2 NR SA FR1 initiation/cease of S-SSB transmission for SyncRef UE as synchronization reference source

9.1.2.2.1 Test purpose

The purpose of this test is to verify that the NR sidelink UE meets the requirements related to the maximum evaluation time allowed to initiate and cease S-SSB transmissions defined in TS 38.133 [6] clause 12.3.1.4, when the reference timing used for sidelink transmissions is a SyncRef UE.

9.1.2.2.2 Test applicability

This test applies to all types of NR UEs from release 16 onwards and supporting NR sidelink communication.

9.1.2.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 9.1.2.0.2

The normative reference for this requirement is TS 38.133 [6] clause A.9.1.2.2.

9.1.2.2.4 Test description

9.1.2.2.4.1 Initial conditions

Configure the test equipment and the DUT according to the parameters in Table 9.1.2.2.4.1-1.

Table 9.1.2.2.4.1-1: Initial conditions for NR SA FR1 initiation/cease of S-SSB transmission for SyncRef UE as synchronization reference source

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | PC5: As specified in TS 38.508-1 [14] clause 4.3.1.8. | | |
| Channel bandwidth | PC5: As specified by the test configuration selected from Table 9.1.1.3.4.1-2. | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.9.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.7.1 |
| Exceptions to connection diagram | GNSS System Simulator is not used. | |  |

1. The parameter settings for the NR sidelink communication are configured according to Table 9.1.2.2.4.1-2.

2. Message content exceptions are given in clause 9.1.2.2.4.3

3. There is one NR-SS-UE (SyncRef UE 1) specified in this test. SyncRef UE 1 is configured according to the parameters in Table 9.1.1.2.4.1-2.

Table 9.1.2.2.4.1-2: NR sidelink test parameters for NR SA FR1 initiation/cease of S-SSB transmission for SyncRef UE as synchronization reference source

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| SCS | kHz | 30 |  |
| Active cell |  | None |  |
| Active SyncRef UE |  | SyncRef UE 1 | Transmitting S-SSB on RF channel number 1(HD carrier in Band n47 or n38) |
| Active NR sidelink UE |  | NR sidelink UE | Transmitting S-SSB on RF channel number 1(HD carrier in Band n47 or n38) |
| NR sidelink communication preconfiguration |  | As specified in section A.11.2 | IE values unless specified otherwise in this test |
| networkControlledSyncTx |  | Not configured |  |
| syncTxThreshOoC | dBm/30kHz | -100 |  |
| T1 | s | 3 |  |
| T2 | s | 5.24 |  |
| T3 | s | 5.24 |  |

9.1.2.2.4.2 Test procedure

In this test there is one active NR-SS-UE (SyncRef UE 1) and no serving cell nor GNSS signals. The test system shall emulate SyncRef UE 1 to transmit S-SSB every synchronization period with the SLSSID and inCoverage indicator as specified in Table 9.1.2.2.5-1.

The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively.

1. Ensure the UE is in state 4-A with generic procedure parameters Test Mode = *On* according to TS 38.508-1 [14] clause 4.4A.2.

2. The SS powers on SyncRef UE 1, sets parameters according to T3 in Table 9.1.2.2.5-1. Then the SS waits at least 8 seconds for the UE to be synchronized to SyncRef UE 1.

3. The SS sets parameters according to T1 in Table 9.1.2.2.5-1, T1 starts.

4. During T1, if the SS observes that no SL SSB is transmitted by the UE until T1 expires, then count a success for the event "No S-SSB transmission", otherwise count a fail for the event "No S-SSB transmission".

5. When T1 expires, the SS shall switch the power setting from T1 to T2 in Table 9.1.2.2.5-1. T2 starts.

6. If the UE

a) starts to send S-SSB within 800 ms from the start of T2, and

b) uses SLSSID = 30, and

c) *inCoverage* = FALSE in *MasterInformationBlockSidelink*

then count a success for the event "S-SSB transmission initiation", otherwise count a fail for the event "S-SSB transmission initiation".

7. When T2 expires, the SS shall switch the power setting from T2 to T3 in Table 9.1.2.2.5-1. T3 starts.

8. If the UE transmits no SL SSB from 800 ms after the start of T3 then count a success for the event "S-SSB transmission cease", otherwise count a fail for the event "S-SSB transmission cease".

9. Repeat step 3-8 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

Each of the events "No S-SSB transmission", "S-SSB transmission initiation" and "S-SSB transmission cease" is evaluated independently for the statistic, resulting in an event verdict pass or fail. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

9.1.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 9.1.2.2.4.3-1: MasterInformationBlockSidelink (SyncRef UE 1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1A-1 with condition NB\_SYNC and RX |

Table 9.1.2.2.4.3-2: SL-ConfigDedicatedNR (SyncRef UE 1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.6-7 with condition SELECTED | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ConfigDedicatedNR-r16 ::= SEQUENCE { |  |  |  |
| sl-PHY-MAC-RLC-Config-r16 SEQUENCE { |  |  |  |
| sl-FreqInfoToAddModList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfig-r16 { | 1 entry |  |  |
| SL-FreqConfig-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-SyncConfigList-r16 SEQUENCE (SIZE (1..maxSL-SyncConfig-r16)) OF SL-SyncConfig-r16 { | 1 entry |  |  |
| SL-SyncConfig-r16[1] | SL-SyncConfig | entry 1  Table 9.1.2.2.4.3-3 |  |
| } |  |  |  |
| sl-SyncPriority-r16 | gnbEnb |  |  |
| } |  |  |  |
| } |  |  |  |
| networkControlledSyncTx-r16 | on |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.2.2.4.3-3: SL-SyncConfig (Table 9.1.2.2.4.3-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.6-31 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-SyncConfig-r16 ::= SEQUENCE { |  |  |  |
| sl-SSID-r16 | 30 |  |  |
| } |  |  |  |
| } |  |  |  |

9.1.2.2.5 Test requirement

SyncRef UE Specific test parameters for SyncRef UE 1 is given in Table 9.1.2.2.5-1.

Table 9.1.2.2.5-1: SyncRef UE Specific test parameters for NR SA FR1 initiation/cease of S-SSB transmission for SyncRef UE as synchronization reference source

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | SyncRef UE 1 | | |
| T1 | T2 | T3 |
| NR RF Channel Number |  | 1 | | |
| V2X SL communication resource pool configuration |  | As specified in section A.11.2 | | |
| Channel Bandwidth (BWchannel) Note3 | MHz | 20(NRB,c = 50) or 40(NRB,c = 100) | | |
| SLSSID |  | 30 | | |
| inCoverage |  | TRUE | | |
| networkControlledSyncTx |  | ON | | |
| NocNote1 | dBm/30 kHz | -99.35Note 5 | -102.55 Note 5 | -99.35 Note 5 |
| Ês/Noc | dB | 5.5 | -3.5 | 5.5 |
| PSBCH Ês/Noc | dB | 5.5 | -3.5 | 5.5 |
| PSBCH-RSRPNote2 | dBm/30 kHz | -93.85 | -106.05 | -93.85 |
| IoNote2 | dBm /18MHz | -71.57 | -79.74 | -71.57 |
|  | dBm /36MHz | -71.57 | -79.74 | -71.57 |
| Propagation condition |  | AWGN | | |
| Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 2: PSBCH-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io level is based on the allocated RBs for S-PSS/S-SSS/PSBCH symbols.  Note 3: The UE is only required to be tested in one of the supported test configurations.  Note 4: S-PSS Es/Noc and S-SSS Es/Noc are set the same as PSBCH Es/Noc.  Note 5: Including the test tolerance given in Annex F. | | | | |

During T1, the PSBCH-RSRP of SyncRef UE 1 is above *syncTxThreshOOC* and the UE is not expected to be transmitting S-SSB.

During T2, the PSBCH-RSRP of SyncRef UE 1 is lowered below *syncTxThreshOOC* and the UE is expected to initiate S-SSB transmissions.

During T3, the PSBCH-RSRP of SyncRef UE 1 is increased back to be above *syncTxThreshOOC* and the UE is expected to cease S-SSB transmissions.

The S-SSB transmission initiation delay is defined as the time from the beginning of time period T2 up to the moment when the UE initiates the S-SSB transmission.

The S-SSB transmission initiation delay shall be less than Tevaluate,SLSS + S-SSB period = 800 ms, where,

Tevaluate,SLSS = 4 ∙ S-SSB period, is the evaluation time specified in 38.133 [6] clause 12.3.1.4,

S-SSB period = 160 ms.

The S-SSB transmission cease delay is defined as the time from the beginning of time period T3 up to the moment when the UE ceases the S-SSB transmission.

The S-SSB transmission cease delay shall be less than Tevaluate,SLSS + S-SSB period = 800 ms.

The rate of correct initiation/cease delay of S-SSB transmissions observed during repeated tests shall be at least 90%.

### 9.1.3 Synchronization reference selection/reselection

#### 9.1.3.0 Minimum conformance requirements

##### 9.1.3.0.1 Minimum conformance requirements for GNSS configured as the highest priority synchronization reference source

The requirements defined in this clause do not apply to the UEs that do not support transmission and reception of SLSS.

A SyncRef UE is considered to be detectable when

- PSBCH-RSRP related side conditions given in 38.133 [6] clause 10.4 are fulfilled for a corresponding Band,

- S-SSB\_RP and S-SSBÊs/Iot according to Annex B.4.3 for a corresponding Band are fulfilled.

When GNSS synchronization reference source is configured as the highest priority and

- UE is synchronized to GNSS directly,

- UE shall not drop any NR SLSS and data transmission for the purpose of selection/reselection to the SyncRef UE.

- UE is synchronized to a SyncRef UE that is synchronized to GNSS directly or in-directly,

- UE shall not drop any NR sidelink data transmission for the purpose of selection/reselection to the SyncRef UE. The UE shall be able to identify newly detectable intra-frequency SyncRef UE within Tdetect,SyncRef UE\_V2X seconds if the SyncRef UE meets the selection / reselection criterion defined in TS 38.331[13]. Tdetect,SyncRef UE\_V2X is defined as 1.6 seconds at S-SSB Ês/Iot ≥ 0 dB, provided that the UE is allowed to drop a maximum of 30% of its SLSS transmissions during Tdetect,SyncRef UE\_V2X for the purpose of selection / reselection to the SyncRef UE.

- in other case

- The UE shall be able to identify newly detectable intra-frequency SyncRef UE within Tdetect,SyncRef UE\_V2X seconds if the SyncRef UE meets the selection / reselection criterion defined in TS 38.331[13]. Tdetect,SyncRef UE\_V2X is defined as 8 seconds at S-SSB Ês/Iot ≥ 0 dB, provided that the UE is allowed to drop a maximum of 6 % of its NR sidelink data and SLSS transmissions during Tdetect,SyncRef UE\_V2X for the purpose of selection / reselection to the SyncRef UE.

- UE is allowed to drop up to 2 slots of its NR sidelink data reception per PSBCH monitoring occasion and overall drop rate shall not exceed 0.3% of its NR sidelink data reception during Tdetect,SyncRef UE\_V2X for the purpose of selection / reselection to the SyncRef UE.

UE shall be capable of performing PSBCH-RSRP measurements for 3 identified intra-frequency SyncRef UEs with the measurement period of 320 ms. It is assumed that the SyncRef UE do not drop or delay any SLSS transmission within the measurement period. Otherwise, the measurement period may be extended.

When UE is synchronized to GNSS directly, before selection / reselection of the new synchronization reference source UE shall evaluate the GNSS synchronization source reliability for at least 20 seconds before changing the synchronization reference from GNSS to another synchronization reference source. UE shall be always synchronized to GNSS directly during the evaluation of GNSS synchronization source reliability.

The requirements for absolute accuracy of PSBCH-RSRP apply to a NR sidelink synchronization source on the same frequency as that of the own NR sidelink UE performing the measurement in FR1.

The accuracy requirements in Table 9.1.3.0.1-1 are valid under the following conditions:

- Demodulation reference signals are transmitted from one port.

- Conditions defined in Clause 7.3E of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for PSBCH-RSRP measurements are fulfilled according to Annex B.4.2 for a corresponding Band for each relevant PSBCH-DMRS.

Table 9.1.3.0.1-1: Intra-frequency PSBCH-RSRP absolute accuracy in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | Ês/Iot Note 3 | Io Note 1 range | | | | | |
| NR Sidelink operating band groups Note 2 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSL | | | dBm/BWChannel | dBm/BWChannel |
| SCSSL = 15 kHz | SCSSL = 30 kHz | SCSSL = 60 kHz |
| ±4.5 | ±9 | ≥-6 | NR\_TDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -70 |
| NR\_TDD\_FR1\_J | -116.5 | -113.5 | -110.5 | N/A | -70 |
| ±8 | ±11 | ≥-6 | NR\_TDD\_FR1\_B,  NR\_TDD\_FR1\_J | N/A | N/A | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR sidelink operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 3: Ês/Iot for a SyncRef UE is the Ês/Iot of PSBCH-DMRS. | | | | | | | | |

The relative accuracy of PSBCH-RSRP is defined as the PSBCH-RSRP measured from one NR sidelink synchronization source compared to the PSBCH-RSRP measured from another NR sidelink synchronization source on the same frequency in FR1.

The accuracy requirements in Table 9.1.3.0.1-2 are valid under the following conditions:

- Demodulation reference signals are transmitted from one port.

- Conditions defined in Clause 7.3E of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for PSBCH-RSRP accuracy measurements are fulfilled according to Annex B.4.2 for a corresponding Band for each relevant PSBCH-DMRS.

Table 9.1.3.0.1-2: Intra-frequency PSBCH-RSRP relative accuracy in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | Ês/Iot Note 3 | Io Note 1 range | | | | | |
| NR sidelink operating band groups Note 2 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSL | | | dBm/BWChannel | dBm/BWChannel |
| SCSSL = 15 kHz | SCSSL = 30 kHz | SCSSL = 60 kHz |
| ±2 | ±3 | ≥-3 | NR\_TDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -50 |
| NR\_TDD\_FR1\_J | -116.5 | -113.5 | -110.5 | N/A | -50 |
| ±3 | ±3 | ≥-6 | Note 4 | Note 4 | Note 4 | Note 4 | N/A | Note 4 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR sidelink operating band groups in FR1 are as defined in clause 3A.4.1.  NOTE 3: Ês/Iot for a SyncRef UE is the Ês/Iot of PSBCH-DMRS.  NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement. | | | | | | | | |

The normative references for this requirement are TS 38.133 [6] clause 10.4.2 and 12.4.

##### 9.1.3.0.2 Minimum conformance requirements for eNB/gNB configured as the highest priority synchronization reference source

The requirements defined in this clause do not apply to the UEs that do not support transmission and reception of SLSS.

A SyncRef UE is considered to be detectable when

- PSBCH-RSRP related side conditions given in 38.133 [6] clause 10.4 are fulfilled for a corresponding Band,

- S-SSB\_RP and S-SSB Ês/Iot according to Annex B.4.3 for a corresponding Band are fulfilled.

When serving cell/PCell synchronization reference source is configured as the highest priority,

- UE shall be able to identify newly detectable intra-frequency SyncRef UE within Tdetect,SyncRef UE\_V2X seconds if the SyncRef UE meets the selection / reselection criterion defined in TS 38.331 [13]. Tdetect,SyncRef UE\_V2X is defined as 8 seconds at S-SSB Ês/Iot ≥ 0 dB, provided that the NR sidelink UE is allowed to drop a maximum of 6 % of its NR sidelink data and SLSS transmissions for the purpose of selection / reselection to the SyncRef UE.

- UE is allowed to drop up to 2 slots of its NR sidelink data reception per PSBCH monitoring occasion and overall drop rate shall not exceed 0.3% of its NR sidelink data reception during Tdetect,SyncRef UE\_V2X for the purpose of selection / reselection to the SyncRef UE.

UE shall be capable of performing PSBCH-RSRP measurements for 3 identified intra-frequency SyncRef UEs with the measurement period of 320 ms. It is assumed that the SyncRef UE do not drop or delay any SLSS transmission within the measurement period. Otherwise, the measurement period may be extended.

The requirements for absolute accuracy of PSBCH-RSRP apply to a NR sidelink synchronization source on the same frequency as that of the own NR sidelink UE performing the measurement in FR1.

The accuracy requirements in Table 9.1.3.0.2-1 are valid under the following conditions:

- Demodulation reference signals are transmitted from one port.

- Conditions defined in Clause 7.3E of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for PSBCH-RSRP measurements are fulfilled according to Annex B.4.2 for a corresponding Band for each relevant PSBCH-DMRS.

Table 9.1.3.0.2-1: Intra-frequency PSBCH-RSRP absolute accuracy in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | Ês/Iot Note 3 | Io Note 1 range | | | | | |
| NR Sidelink operating band groups Note 2 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSL | | | dBm/BWChannel | dBm/BWChannel |
| SCSSL = 15 kHz | SCSSL = 30 kHz | SCSSL = 60 kHz |
| ±4.5 | ±9 | ≥-6 | NR\_TDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -70 |
| NR\_TDD\_FR1\_J | -116.5 | -113.5 | -110.5 | N/A | -70 |
| ±8 | ±11 | ≥-6 | NR\_TDD\_FR1\_B,  NR\_TDD\_FR1\_J | N/A | N/A | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR sidelink operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 3: Ês/Iot for a SyncRef UE is the Ês/Iot of PSBCH-DMRS. | | | | | | | | |

The relative accuracy of PSBCH-RSRP is defined as the PSBCH-RSRP measured from one NR sidelink synchronization source compared to the PSBCH-RSRP measured from another NR sidelink synchronization source on the same frequency in FR1.

The accuracy requirements in Table 9.1.3.0.2-2 are valid under the following conditions:

- Demodulation reference signals are transmitted from one port.

- Conditions defined in Clause 7.3E of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for PSBCH-RSRP accuracy measurements are fulfilled according to Annex B.4.2 for a corresponding Band for each relevant PSBCH-DMRS.

Table 9.1.3.0.2-2: Intra-frequency PSBCH-RSRP relative accuracy in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | Ês/Iot Note 3 | Io Note 1 range | | | | | |
| NR sidelink operating band groups Note 2 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSL | | | dBm/BWChannel | dBm/BWChannel |
| SCSSL = 15 kHz | SCSSL = 30 kHz | SCSSL = 60 kHz |
| ±2 | ±3 | ≥-3 | NR\_TDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -50 |
| NR\_TDD\_FR1\_J | -116.5 | -113.5 | -110.5 | N/A | -50 |
| ±3 | ±3 | ≥-6 | Note 4 | Note 4 | Note 4 | Note 4 | N/A | Note 4 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR sidelink operating band groups in FR1 are as defined in clause 3A.4.1.  NOTE 3: Ês/Iot for a SyncRef UE is the Ês/Iot of PSBCH-DMRS.  NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement. | | | | | | | | |

#### 9.1.3.1 NR SA FR1 synchronization reference selection/reselection for GNSS configured as the highest priority synchronization reference source

9.1.3.1.1 Test purpose

The purpose of this test is to verify the requirements related to SyncRef UE (re)selection as specified in TS 38.133 [6] clause 12.4, when GNSS is configured as the highest priority.

9.1.3.1.2 Test applicability

This test applies to all types of NR UEs from release 16 onwards and supporting NR sidelink communication.

9.1.3.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 9.1.3.0.1

The normative reference for this requirement is TS 38.133 [6] clause A.9.1.3.1.

9.1.3.1.4 Test description

9.1.3.1.4.1 Initial conditions

Configure the test equipment and the DUT according to the parameters in Table 9.1.3.1.4.1-1.

Table 9.1.3.1.4.1-1: Initial conditions for NR SA FR1 synchronization reference selection/reselection for GNSS configured as the highest priority synchronization reference source

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | PC5: As specified in TS 38.508-1 [14] clause 4.3.1.8. | | |
| Channel bandwidth | PC5: As specified by the test configuration selected from Table 9.1.3.1.4.1-2. | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.9.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.7.1 |
| Exceptions to connection diagram | GNSS System Simulator is not used. | |  |

1. The parameter settings for the NR sidelink communication are pre-configured according to TS 38.508-1 [14] clause 4.10.1.

2. Message content exceptions are given in clause 9.1.3.1.4.3

3. There are three NR-SS-UEs (SyncRef UE 1, SyncRef UE 2 and SyncRef UE 3) specified in this test. SyncRef UE 1, SyncRef UE 2 and SyncRef UE 3 are configured according to the generic parameters in Table 9.1.3.1.4.1-2.

Table 9.1.3.1.4.1-2: NR sidelink test parameters for NR SA FR1 synchronization reference selection/reselection for GNSS configured as the highest priority synchronization reference source

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial condition | Active synchronization source |  | Sync Ref UE 1 | DUT transmits for NR Sidelink Communication and S-SSB with SLSS ID = 30 and in-coverage set as FALSE in MIB-SL. |
| T2 end condition | Active synchronization source |  | Sync Ref UE 2 | DUT transmits for NR Sidelink Communication and S-SSB with SLSS ID = 336 and in-coverage set as FALSE in MIB-SL. |
| Final condition | Active synchronization source |  | Sync Ref UE 3 | UE transmits for NR Sidelink Communication and S-SSB with SLSS ID = 0 and in-coverage set as FALSE in MIB-SL. |
| Active SyncRef UEs | |  | SyncRef UE 1  SyncRef UE 2  SyncRef UE 3 | Transmitting S-SSB on RF channel number 1 (HD carrier in Band n47 or n38) |
| Timing offset among SyncRef UEs | | μs | CP/2 | Synchronous |
| Frequency offset of SyncRef UE 1,2 and 3 | | ppm | 0 |  |
| NR sidelink Communication configuration | |  | As specified in clause A.11.2 | IE values unless specified otherwise in this test. |
| sl-SyncPriority | |  | gnss |  |
| syncTxThreshOoC | |  | +infinity |  |
| T1 | | s | 24 |  |
| T2 | | s | 16 |  |
| T3 | | s | 3.2 |  |

9.1.3.1.4.2 Test procedure

In this test there are three active SyncRef UEs (SyncRef UE 1, SyncRef UE 2 and SyncRef UE 3) and no GNSS signals nor Cells. The test system shall emulate SyncRef UE 1, SyncRef UE 2 and SyncRef UE 3 to transmit S-SSB every S-SSB period with the SLSSIDs and inCoverage indicators specified in Table 9.1.3.1.5-1.

The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. SyncRef UE 1, SyncRef UE 2 and SyncRef UE 3 are all switched off before starting the test. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X Sidelink Communication.

1. Ensure the UE is in state 4-A with generic procedure parameters Test Mode = *On* according to TS 38.508-1 [14] clause 4.4A.2.

2. The UE transmits S-SSB with SLSSID belonging to id\_oon set and *inCoverage* = false in SL MIB.

3. The SS sends AT command +CCUTLE to close test loop function and trigger UE to transmit.

4. The SS sets parameters according to T1 in Table 9.1.3.1.5-1. T1 starts.

5. If the UE

a) starts to transmit S-SSB within 8800 ms from the start of T1 with SLSSID = 30 and *inCoverage* = false in *MasterInformationBlockSidelink*, and

b) drops no more than 6 % of its PSSCH and S-SSB transmissions within 8000 ms from the start of T1.

then count a success for the event "select SyncRef UE 1", otherwise count a fail for the event "select SyncRef UE 1".

6. When T1 expires, the SS shall switch the power setting from T1 to T2 in Table 9.1.3.1.5-1. T2 starts.

7. If the UE

a) starts to transmit S-SSB within 8800 ms from the start of T2 with SLSSID = 336 and *inCoverage* = false in *MasterInformationBlockSidelink*, and

b) drops no more than 6 % of its PSSCH and S-SSB transmissions within 8000 ms from the start of T2.

then count a success for the event "reselect SyncRef UE 2", otherwise count a fail for the event "reselect SyncRef UE 2".

8. When T2 expires, the SS shall switch the power setting from T2 to T3 in Table 9.1.3.1.5-1. T3 starts.

9. If the UE

a) starts to transmit S-SSB within 2400 ms from the start of T3 with SLSSID = 0 and *inCoverage* = false in *MasterInformationBlockSidelink*, and

b) drops no more than 30 % of its S-SSB transmissions within 1600 ms from the start of T3.

then count a success for the event "reselect SyncRef UE 3", otherwise count a fail for the event" reselect SyncRef UE 3".

10. When T3 expires, the SS shall switch off all three SyncRef UEs and wait at least 8 seconds.

11. The SS sends AT command +CCUTLE to open test loop function and trigger UE to stop transmitting.

12. Repeat step 2-11 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

Each of the events " select SyncRef UE 1", " reselect SyncRef UE 2" and " reselect SyncRef UE 3" is evaluated independently for the statistic, resulting in an event verdict pass or fail. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

9.1.3.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 9.1.3.1.4.3-1: SL-ConfigDedicatedNR (SyncRef UE 1 and SyncRef UE 3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.6-7 with condition SELECTED | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ConfigDedicatedNR-r16 ::= SEQUENCE { |  |  |  |
| sl-PHY-MAC-RLC-Config-r16 SEQUENCE { |  |  |  |
| sl-FreqInfoToAddModList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfig-r16 { | 1 entry |  |  |
| SL-FreqConfig-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-SyncConfigList-r16 SEQUENCE (SIZE (1..maxSL-SyncConfig-r16)) OF SL-SyncConfig-r16 { | 1 entry |  |  |
| SL-SyncConfig-r16[1] | SL-SyncConfig | entry 1  Table 9.1.3.1.4.3-3 |  |
| } |  |  |  |
| sl-SyncPriority-r16 | gnbEnb |  | SyncRef UE 1 |
|  | gnss |  | SyncRef UE 3 |
| } |  |  |  |
| } |  |  |  |
| networkControlledSyncTx-r16 | on |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.3.1.4.3-2: SL-PreconfigurationNR (SyncRef UE 2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.10.1-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-PreconfigurationNR-r16 ::= SEQUENCE { |  |  |  |
| sidelinkPreconfigNR-r16 SEQUENCE { |  |  |  |
| sl-PreconfigFreqInfoList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF { | 1 entry |  |  |
| SL-FreqConfigCommon-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-SyncConfigList-r16 SEQUENCE (SIZE (1..maxSL-SyncConfig-r16)) OF SL-SyncConfig-r16 { | 1 entry |  |  |
| SL-SyncConfig-r16[1] | SL-SyncConfig | entry 1  Table 9.1.3.1.4.3-3 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.3.1.4.3-3: SL-SyncConfig (Table 9.1.3.1.4.3-1 and Table 9.1.3.1.4.3-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.6-31 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-SyncConfig-r16 ::= SEQUENCE { |  |  |  |
| sl-SSID-r16 | 30 |  | SyncRef UE 1 |
| txParameters-r16 SEQUENCE { |  |  | SyncRef UE 2 |
| syncTxThreshOoC-r16 | 13 | the special value corresponding to +infinity |  |
| } |  |  |  |
| gnss-Sync-r16 | true |  | SyncRef UE 2  SyncRef UE 3 |
| } |  |  |  |

Table 9.1.3.1.4.3-4: SL-PreconfigurationNR (The UE under test)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.10.1-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-PreconfigurationNR-r16 ::= SEQUENCE { |  |  |  |
| sidelinkPreconfigNR-r16 SEQUENCE { |  |  |  |
| sl-PreconfigFreqInfoList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF { | 1 entry |  |  |
| SL-FreqConfigCommon-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-SyncConfigList-r16 SEQUENCE (SIZE (1..maxSL-SyncConfig-r16)) OF SL-SyncConfig-r16 { | 1 entry |  |  |
| SL-SyncConfig-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-SyncRefMinHyst-r16 | dB0 |  |  |
| sl-filterCoefficient-r16 | fc0 |  |  |
| txParameters-r16 SEQUENCE { |  |  |  |
| syncTxThreshOoC-r16 | 13 | the special value corresponding to +infinity |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.3.1.4.3-5: MasterInformationBlockSidelink (SyncRef UE 1, SyncRef UE 2 and SyncRef UE 3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1A-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| MasterInformationBlockSidelink ::= SEQUENCE { |  |  |  |
| inCoverage-r16 | true |  | SyncRef UE 1,  SyncRef UE 3 |
|  | false |  | SyncRef UE 2 |
| } |  |  |  |

Table 9.1.3.1.4.3-6: MasterInformationBlockSidelink (Test procedure, step 2,5 and 7, the UE under test)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1A-1 with condition TX | | | |
| Information Element | Value/remark | Comment | Condition |
| MasterInformationBlockSidelink ::= SEQUENCE { |  |  |  |
| inCoverage-r16 | false |  |  |
| } |  |  |  |

Table 9.1.3.1.4.3-7: +CCUTLE (Test procedure, step 2)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Close and Transmit |

Table 9.1.3.1.4.3-8: +CCUTLE (Test procedure, step 11)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Open |

9.1.3.1.5 Test requirement

SyncRef UE Specific test parameters for SyncRef UEs are given in Table 9.1.3.1.5-1.

Table 9.1.3.1.5-1: SyncRef UE Specific Test Parameters for NR SA FR1 synchronization reference selection/reselection for GNSS configured as the highest priority synchronization reference source

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | SyncRef UE 1 | | | SyncRef UE 2 | | | SyncRef UE 3 | | |
| T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| NR RF Channel Number |  | 1(HD carrier in Band n47 or n38) | | | | | | | | |
| Channel Bandwidth (BWchannel)Note 4 | MHz | 20 (NRB,c = 50) or 40 (NRB,c = 100) | | | | | | | | |
| V2X Sidelink Communication resource pool configuration |  | As specified in Table A.11.2-2 | | | | | | | | |
| networkControlledSyncTx |  | ON | | | N/A | | | ON | | |
| syncTxThreshOoC | dBm/SCS | N/A | | |  | | | N/A | | |
| SLSSID |  | 30 | | | 0 | | | 0 | | |
| inCoverage (in MIB-SL) |  | TRUE | | | FALSE | | | TRUE | | |
| Noc Note1 | dBm/SCS | -95 | | | | | | | | |
| Ês/Noc Note2 | dB | 0.35 Note 5 | 0 | 0 |  | 0.35 Note 5 | 0 |  |  | 3.35 Note 5 |
| Ês/Iot | dB | 0.35 | 0 | -5.00 |  | 0.35 | 0 |  |  | 0.34 |
| Io Note2 | dBm/18 MHz | -70.61 | -70.78 | -67.60 | -73.79 | -70.61 | -70.78 | -70.61 | -70.78 | -67.60 |
|  | dBm/36 MHz | -70.61 | -70.78 | -67.60 | -73.79 | -70.61 | -70.78 | -70.61 | -70.78 | -67.60 |
| PSBCH-RSRPNote2, Note 3 | dBm/SCS | -94.65 | -95 | -95 |  | -94.65 | -95 |  |  | -91.65 |
| Propagation Condition |  | AWGN | | | | | | | | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 2: Ês/Iot, Io, PSBCH-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: S-PSS/S-SSS Es/Iot is set the same as PSBCH Es/Iot.  Note 4: The UE is only required to be tested in one of the supported test configurations.  Note 5: Including test tolerance given in Annex F. | | | | | | | | | | |

During T1, the UE shall detect, evaluate and select SyncRef UE 1 as synchronization source. Then it shall change its S-SSB transmission timing with SLSSID = 30 and *inCoverage* = FALSE in *MasterInformationBlockSidelink* after SyncRef UE selection delay from start of T1.

During T2, the UE shall detect, evaluate and reselect SyncRef UE 2 as synchronization source. Then it shall change its S-SSB transmission timing with SLSSID = 336 and *inCoverage* = FALSE in *MasterInformationBlockSidelink* after SyncRef UE reselection delay from start of T2.

During T3, the UE will detect, evaluate and reselect SyncRef UE 3 as synchronization source. Then it shall change its S-SSB transmission timing with SLSSID = 0 and *inCoverage* = FALSE in *MasterInformationBlockSidelink* after SyncRef UE reselection delay from start of T2.

SyncRef UE (re)selection delay is defined as the time from the beginning of corresponding time instant to the time UE is synchronized to SyncRef UE and changes its S-SSB transmissions timing and SLSSID to follow SyncRef UE as the synchronization source. The SyncRef UE (re)selection delay can be expressed as:

SyncRef UE selection delay = Tdetect,SyncRef UE + Tevaluate,SLSS + S-SSB period

- Tdetect,SyncRef UE = 1.6 seconds, is the time to identify newly detectable intra-frequency SyncRef UE as specified in 38.133 [6] clause 12.4 when UE is synchronized to a SyncRef UE that is synchronized to GNSS directly or in-directly, otherwise Tdetect,SyncRef UE = 8 seconds if UE is not directly synchronized to GNSS.

- Tevaluate,SLSS = 4 S-SSB periods, is the time to measure the PSBCH-RSRP of the selected SyncRef UE used as synchronization reference source and evaluate it to initiate/cease S-SSB transmissions.

- S-SSB period = 160 ms.

Which gives SyncRef UE (re)selection delay = 8800 ms for T1 and T2, and 2400 ms for T3.

The test system will also verify that the UE does not drop or delay more than 6% of its sidelink data and S-SSB transmissions during the duration of T1 and T2, and does not drop or delay more than 30% of its S-SSB transmissions during the duration of T3.

The rate of correct SyncRef UE (re)selection observed during repeated tests shall be at least 90%.

#### 9.1.3.2 NR SA FR1 synchronization reference selection/reselection for FR1 NR Cell configured as the highest priority synchronization reference source

9.1.3.2.1 Test purpose

The purpose of this test is to verify the requirements related to SyncRef UE (re)selection as specified in TS 38.133 [6] clause 12.4, when gNB is configured as the highest priority.

9.1.3.2.2 Test applicability

This test applies to all types of NR UEs from release 16 onwards and supporting gNB as synchronization source and NR sidelink communication.

9.1.3.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 9.1.3.0.2

The normative reference for this requirement is TS 38.133 [6] clause A.9.1.3.2.

9.1.3.2.4 Test description

9.1.3.2.4.1 Initial conditions

Configure the test equipment and the DUT according to the parameters in Table 9.1.3.2.4.1-1.

Table 9.1.3.2.4.1-1: Initial conditions for NR SA FR1 synchronization reference selection/reselection for FR1 NR Cell configured as the highest priority synchronization reference source

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | PC5: As specified in TS 38.508-1 [14] clause 4.3.1.8. | | |
| Channel bandwidth | PC5: As specified by the test configuration selected from Table 9.1.3.2.4.1-2. | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.9.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.7.1 |
| Exceptions to connection diagram | N/A | |  |

1. The parameter settings for the NR sidelink communication are pre-configured according to TS 38.508-1 [14] clause 4.10.1.

2. Message content exceptions are given in clause 9.1.3.2.4.3

3. There are two NR-SS-UEs (SyncRef UE 1 and SyncRef UE 2) specified in this test. SyncRef UE 1 and SyncRef UE 2 are configured according to the generic parameters in Table 9.1.3.2.4.1-2.

4. The GNSS simulator is configured for Scenario #1: static in Geographical area #1, as defined in TS 38.508-1 [14] Table 4.11.2-2.

Table 9.1.3.2.4.1-2: NR sidelink test parameters for NR SA FR1 synchronization reference selection/reselection for FR1 NR Cell configured as the highest priority synchronization reference source

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| SCS | | kHz | 30 |  |
| Initial condition | Active synchronization source |  | GNSS | DUT transmits for NR Sidelink Communication and S-SSB with SLSSID = 0 and inCoverage set as TRUE in MIB-SL. |
| T2 end condition | Active synchronization source |  | Sync Ref UE 1 | DUT transmits for NR Sidelink Communication and S-SSB with SLSSID = 395 and inCoverage set as FALSE in MIB-SL. |
| Final condition | Active synchronization source |  | Sync Ref UE 2 | DUT transmits for V2X Sidelink Communication and S-SSB with SLSSID = 30 and inCoverage set as FALSE in MIB-SL. |
| Active cell | |  | None |  |
| Active SyncRef UEs | |  | SyncRef UE 1  SyncRef UE 2 | Transmitting S-SSB on RF channel number 1 |
| Timing offset between SyncRef UE 1 and SyncRef UE 2 | | ms | 3 | Asynchronous |
| Frequency offset of SyncRef UE 1 and 2 | | ppm | 0 |  |
| NR sidelink Communication preconfiguration | |  | As specified in Clause A.11.2 | IE values unless specified otherwise in this test. |
| syncPriority | |  | gnb |  |
| syncTxThreshOoC | |  | 13 (+infinity) |  |
| T1 | | s | 24 |  |
| T2 | | s | 16 |  |
| T3 | | s | 16 |  |

9.1.3.2.4.2 Test procedure

In this test there are two active SyncRef UEs (SyncRef UE 1 and SyncRef UE 2). There are no active cells and GNSS is reliable during the whole test. The test system can emulate and send the GNSS signal to the test UE. The test system shall emulate SyncRef UE 1 and SyncRef UE 2 to transmit S-SSB every S-SSB period with the SLSSIDs and inCoverage indicators specified in Table 9.1.3.2.5-1.

The test consists of three successive time periods with time duration of T1, T2 and T3 respectively. SyncRef UE 1 and SyncRef UE 2 are all switched off before starting the test. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X Sidelink Communication.

1. Ensure the UE is in state 4-A with generic procedure parameters Test Mode = *On* according to TS 38.508-1 [14] clause 4.4A.2.

2. The GNSS simulator is triggered to start step 1 of Scenario #1 to simulate a location in the centre of Geographicalarea #1.

3. Wait at least 20 seconds for the UE to acquire the GNSS signal.

4. The SS sends AT command +CCUTLE to close test loop function and trigger UE to transmit.

5. The SS sets parameters according to T1 in Table 9.1.3.2.5-1. T1 starts.

6. The UE transmits S-SSB with SLSSID = 0 and *inCoverage* = true in *MasterInformationBlockSidelink*.

7. When T1 expires, the SS shall switch the power setting from T1 to T2 in Table 9.1.3.2.5-1. T2 starts.

8. If the UE

a) starts to transmit S-SSB within 8800 ms from the start of T2 with SLSSID = 395 and *inCoverage* = false in *MasterInformationBlockSidelink*, and

b) drops no more than 6 % of its PSSCH and S-SSB transmissions within 8000 ms from the start of T2

then count a success for the event "reselect SyncRef UE 1", otherwise count a fail for the event "reselect SyncRef UE 1".

9 When T2 expires, the SS shall switch the power setting from T2 to T3 in Table 9.1.3.2.5-1. T3 starts.

10. If the UE

a) starts to transmit S-SSB within 8800 ms from the start of T3 with SLSSID = 30 and *inCoverage* = false in *MasterInformationBlockSidelink*, and

b) drops no more than 6 % of its PSSCH and S-SSB transmissions within 8000 ms from the start of T2

then count a success for the event "reselect SyncRef UE 2", otherwise count a fail for the event" reselect SyncRef UE 2".

11. When T3 expires, the SS shall switch off all SyncRef UEs.

12. The SS sends AT command +CCUTLE to open test loop function and trigger UE to stop transmitting.

13. Repeat step 3-12 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

Each of the events " reselect SyncRef UE 1" and " reselect SyncRef UE 2" is evaluated independently for the statistic, resulting in an event verdict pass or fail. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

9.1.3.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 9.1.3.2.4.3-1: SL-PreconfigurationNR (SyncRef UE 1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.10.1-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-PreconfigurationNR-r16 ::= SEQUENCE { |  |  |  |
| sidelinkPreconfigNR-r16 SEQUENCE { |  |  |  |
| sl-PreconfigFreqInfoList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF { | 1 entry |  |  |
| SL-FreqConfigCommon-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-SyncPriority-r16 | gnbEnb |  |  |
| sl-SyncConfigList-r16 SEQUENCE (SIZE (1..maxSL-SyncConfig-r16)) OF SL-SyncConfig-r16 { | 1 entry |  |  |
| SL-SyncConfig-r16[1] | SL-SyncConfig | entry 1  Table 9.1.3.2.4.3-3 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.3.2.4.3-2: SL-ConfigDedicatedNR (SyncRef UE 2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.6-7 with condition SELECTED | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ConfigDedicatedNR-r16 ::= SEQUENCE { |  |  |  |
| sl-PHY-MAC-RLC-Config-r16 SEQUENCE { |  |  |  |
| sl-FreqInfoToAddModList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfig-r16 { | 1 entry |  |  |
| SL-FreqConfig-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-SyncConfigList-r16 SEQUENCE (SIZE (1..maxSL-SyncConfig-r16)) OF SL-SyncConfig-r16 { | 1 entry |  |  |
| SL-SyncConfig-r16[1] | SL-SyncConfig | entry 1  Table 9.1.3.2.4.3-3 |  |
| } |  |  |  |
| sl-SyncPriority-r16 | gnbEnb |  |  |
| } |  |  |  |
| } |  |  |  |
| networkControlledSyncTx-r16 | on |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.3.2.4.3-3: SL-SyncConfig (Table 9.1.3.2.4.3-1 and Table 9.1.3.2.4.3-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.6-31 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-SyncConfig-r16 ::= SEQUENCE { |  |  |  |
| sl-SSID-r16 | 30 |  | SyncRef UE 2 |
| txParameters-r16 SEQUENCE { |  |  | SyncRef UE 1 |
| syncTxThreshOoC-r16 | 13 | the special value corresponding to +infinity |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.3.2.4.3-4: SL-PreconfigurationNR (The UE under test)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.10.1-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-PreconfigurationNR-r16 ::= SEQUENCE { |  |  |  |
| sidelinkPreconfigNR-r16 SEQUENCE { |  |  |  |
| sl-PreconfigFreqInfoList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF { | 1 entry |  |  |
| SL-FreqConfigCommon-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-SyncPriority-r16 | gnbEnb |  |  |
| sl-SyncConfigList-r16 SEQUENCE (SIZE (1..maxSL-SyncConfig-r16)) OF SL-SyncConfig-r16 { | 1 entry |  |  |
| SL-SyncConfig-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-SyncRefMinHyst-r16 | dB0 |  |  |
| sl-filterCoefficient-r16 | fc0 |  |  |
| txParameters-r16 SEQUENCE { |  |  |  |
| syncTxThreshOoC-r16 | 13 | the special value corresponding to +infinity |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.3.2.4.3-5: MasterInformationBlockSidelink (SyncRef UE 1 and SyncRef UE 2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1A-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| MasterInformationBlockSidelink ::= SEQUENCE { |  |  |  |
| inCoverage-r16 | true |  | SyncRef UE 2, |
|  | false |  | SyncRef UE 1 |
| } |  |  |  |

Table 9.1.3.2.4.3-6: MasterInformationBlockSidelink (Test procedure, step 6,8 and 10, the UE under test)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1A-1 with condition TX | | | |
| Information Element | Value/remark | Comment | Condition |
| MasterInformationBlockSidelink ::= SEQUENCE { |  |  |  |
| inCoverage-r16 | true |  | Step 6 |
|  | false |  | Step 8, Step 10 |
| } |  |  |  |

Table 9.1.3.2.4.3-7: +CCUTLE (Test procedure, step 4)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Close and Transmit |

Table 9.1.3.2.4.3-8: +CCUTLE (Test procedure, step 12)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Open |

9.1.3.2.5 Test requirement

SyncRef UE Specific test parameters for SyncRef UEs are given in Table 9.1.3.2.5-1.

Table 9.1.3.2.5-1: SyncRef UE Specific Test Parameters for NR SA FR1 synchronization reference selection/reselection for FR1 NR Cell configured as the highest priority synchronization reference source

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | SyncRef UE 1 | | | SyncRef UE 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| NR RF Channel Number |  | 1(HD carrier in Band n47 or n38) | | | | | |
| Channel Bandwidth (BWchannel) Note 4 | MHz | 20(NRB,c = 50) or 40(NRB,c = 100) | | | | | |
| NR Sidelink Communication resource pool configuration |  | As specified in Table A.11.2-2 | | | As specified in Table A.11.2-2 | | |
| networkControlledSyncTx |  | N/A | | | ON | | |
| syncTxThreshOoC | dBm/15 kHz | +infinity | | | N/A | | |
| SLSSID |  | 59 | | | 30 | | |
| inCoverage (in MIB-SL) |  | FALSE | | | TRUE | | |
| Noc Note1 | dBm/30 kHz | -95 | | | | | |
| Ês/Noc | dB | -∞ | 0 | 0 | -∞ | -∞ | 0 |
|  | dB | -∞ | 0 | 0 | -∞ | -∞ | 0 |
| PSBCH-RSRP Note2, Note 3 | dBm/30 kHz | -∞ | -95 | -95 | -∞ | -∞ | -95 |
| Propagation Condition |  | AWGN | | | | | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 2: PSBCH-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: S-PSS Es/Iot and S-SSS Es/Iot are set the same as PSBCH Es/Iot.  Note 4: The UE is only required to be tested in one of the supported test configurations. | | | | | | | |

During T1, both SyncRef UE 1 and SyncRef UE 2 are powered off. The UE will select GNSS as synchronization source.

During T2, the UE shall detect, evaluate and reselect SyncRef UE 1 as synchronization source. Then it shall change its S-SSB transmission timing with SLSSID = 395 and *inCoverage* = false in *MasterInformationBlockSidelink* after SyncRef UE reselection delay from start of T2.

During T3, the UE will detect, evaluate and reselect SyncRef UE 2 as synchronization source. Then it shall change its S-SSB transmission timing with SLSSID = 30 and *inCoverage* = false in *MasterInformationBlockSidelink* after SyncRef UE reselection delay from start of T2.

SyncRef UE reselection delay is defined as the time from the beginning of corresponding time instant to the time UE is synchronized to SyncRef UE and changes its S-SSB transmissions timing and SLSSID to follow SyncRef UE as the synchronization source. The SyncRef UE (re)selection delay can be expressed as:

SyncRef UE reselection delay = Tdetect,SyncRef UE + Tevaluate,SLSS + S-SSB period

- Tdetect,SyncRef UE = 8 seconds, is the time to identify newly detectable intra-frequency SyncRef UE as specified in 38.133 [6] clause 12.4 when UE is not directly synchronized to GNSS.

- Tevaluate,SLSS = 4 S-SSB periods, is the time to measure the PSBCH-RSRP of the selected SyncRef UE used as synchronization reference source and evaluate it to initiate/cease S-SSB transmissions.

- S-SSB period = 160 ms.

Which gives SyncRef UE reselection delay = 8800 ms.

The test system will also verify that the UE does not drop or delay more than 6% of its sidelink data and S-SSB transmissions during the duration of T1 and T2.

The rate of correct SyncRef UE reselection observed during repeated tests shall be at least 90%.

### 9.1.4 L1 SL-RSRP measurements

#### 9.1.4.0 Minimum conformance requirements

##### 9.1.4.0.1 Minimum conformance requirements for resource selection/reselection, re-evaluation and pre-emption

The UE physical layer shall be capable of performing the L1 SL-RSRP measurements on the carrier operating NR sidelink communication for determining the subset of resources to be excluded in PSSCH resource selection in sidelink transmission mode 2. The L1 SL-RSRP measurement period corresponds to one slot and the measurement shall meet the L1 SL-RSRP measurement accuracy requirement in 38.133 [6] clause 10.4.4. After resource (re-)selection procedure, re-evaluation is performed on the reserved resources by L1 SL-RSRP measurements before transmission of SCI with reservation when the conditions specified in TS 38.214 [9] are satisfied.

When the pre-emption mechanism is enabled for the resource pool that UE is monitoring and selecting resource from, after UE selects from the resource not excluded based on L1 SL-RSRP measurement procedure, the UE shall be capable of triggering reselection of already signalled resource(s) as a resource reservation when the conditions specified in TS 38.214 [9] are satisfied.

The requirements for absolute accuracy of L1 SL-RSRP in this clause apply to a UE performing PSCCH-RSRP and/or PSSCH-RSRP measurements on the same frequency as used by operating NR sidelink communication.

The accuracy requirements in Table 9.1.4.0.1-1 are valid under the following conditions:

- Demodulation reference signals for PSCCH and/or PSSCH are transmitted from one port.

- Conditions defined in clause 7.3E of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- PSCCH-RSRP|dBm and/or PSSCH-RSRP|dBm according to Annex B.4.4 for a corresponding Band are fulfilled.

Table 9.1.4.0.1-1: Intra-frequency L1 SL-RSRP absolute accuracy for UE capable of NR sidelink communication

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | Ês/Iot Note 3 | Io Note 1 range | | | | | |
| NR Sidelink operating band groups Note 2 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm/SCS | | | dBm/BWChannel | dBm/BWChannel |
| SCS = 15kHz | SCS = 30kHz | SCS = 60kHz |
| ± 4.5 | ± 9 | ≥0 dB | NR\_TDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -70 |
| NR\_TDD\_FR1\_J | -116.5 | -113.5 | -110.5 | N/A | -70 |
| ± 8 | ± 11 | ≥0 dB | NR\_TDD\_FR1\_B NR\_TDD\_FR1\_J | N/A | N/A | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR sidelink operating band groups are as defined in Section 3.5 for the corresponding NR operating bands.  NOTE 3: The parameter Ês/Iot is the Ês/Iot of PSCCH-DMRS and/or PSSCH-DMRS. | | | | | | | | |

The normative references for this requirement are TS 38.133 [6] clause 10.4.4 and 12.5.

#### 9.1.4.1 NR SA FR1 L1 SL-RSRP measurement for autonomous resource selection/reselection

9.1.4.1.1 Test purpose

The purpose of this test is to verify the requirements related to autonomous resource selection / reselection for NR sidelink UE in mode 2 defined in TS 38.133 [6] clause 12.5.

9.1.4.1.2 Test applicability

This test applies to all types of NR UEs from release 16 onwards and supporting and NR sidelink communication.

9.1.4.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 9.1.4.0.1

The normative reference for this requirement is TS 38.133 [6] clause A.9.1.4.1.

9.1.4.1.4 Test description

9.1.4.1.4.1 Initial conditions

Configure the test equipment and the DUT according to the parameters in Table 9.1.4.1.4.1-1.

Table 9.1.4.1.4.1-1: Initial conditions for NR SA FR1 L1 SL-RSRP measurement for autonomous resource selection/reselection

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | PC5: As specified in TS 38.508-1 [14] clause 4.3.1.8. | | |
| Channel bandwidth | PC5: As specified by the test configuration selected from Table 9.1.4.1.4.1-2. | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.9.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.7.1 |
| Exceptions to connection diagram | N/A | |  |

1. The parameter settings for the NR sidelink communication are pre-configured according to TS 38.508-1 [14] clause 4.10.1.

2. Message content exceptions are given in clause 9.1.4.1.4.3

3. There are 50 NR-SS-UEs (active sidelink UE i, i=0,1,...,49) specified in this test. active sidelink UE i, i=0,1,...,49, is configured according to the generic parameters in Table 9.1.4.1.4.1-2.

4. The GNSS simulator is configured for Scenario #1: static in Geographical area #1, as defined in TS 38.508-1 [14] Table 4.11.2-2.

Table 9.1.4.1.4.1-2: NR sidelink test parameters for NR SA FR1 L1 SL-RSRP measurement for autonomous resource selection/reselection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | HD carrier in Band n47 or n38 |
| Channel Bandwidth (BWchannel) Note 2 | | MHz | 20 (NRB,c = 50) or  40 (NRB,c = 100) |  |
| SCS | | kHz | 30 |  |
| NR sidelink communication pre-configuration | |  | As specified in clause A.11.2 | IE values unless specified otherwise in this test. |
| sl-TimeResource-r16 included in SL-ResourcePool | |  | 1111111111 | Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213 [8]) |
| sl-NumSubchannel-r16 included in SL-ResourcePool | |  | 5 | Indicates the number of sub-channels for TX resource pool |
| sl-SubchannelSize-r16 included in SL-ResourcePool | |  | 10 | Indicates the minimum granularity in frequency domain for the sensing for PSSCH resource selection in the unit of PRB |
| Number of Active Sidelink UEs | |  | 50 | Active Sidelink UE i = 0, .., 49 |
| SL-Thres-RSRP | |  | 15Note 3 | Corresponding -100 dBm as defined in Section 6.3.5 in TS 38.331[13]  Same for all priority level pairs. |
| Active Sidelink UEs (UE i = 0, .., 49) | NR sidelink Communication preconfiguration |  | As specified in clause A.11.2 | IE values unless specified otherwise in this test. |
| sl-TimeResource-r16 included in SL-ResourcePool |  | {1i}Note1 | Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213 [8]) |
| sl-NumSubchannel-r16 included in SL-ResourcePool |  | 1 | Indicates the number of sub-channels for TX resource pool |
| sl-StartRB-Subchannel-r16 included in SL-ResourcePool |  | floor(i/10)x10 | Indicates the lowest RB index of the subchannel with the lowest index.  UE 0~9 start RB=0;  UE 10~19 start RB=10;  UE 20~29 start RB=20;  UE 30~39 start RB=30;  UE 40~49 start RB=40; |
| sl-SubchannelSize-r16 included in SL-ResourcePool |  | 10 | Indicates the minimum granularity in frequency domain for the sensing for PSSCH resource selection in the unit of PRB |
| Timing offset among Active Sidelink UEs | | μs | CP/2 | Synchronous |
| Note 1: {1i}is a sequence of nine 0’s with one 1 in (mod(i,10 )+1’th position.  Note 2: The UE is only required to be tested in one of the supported test configurations.  Note 3: Including test tolerance given in Annex F. | | | | |

9.1.4.1.4.2 Test procedure

In this test there are 50 active sidelink UEs (UE i, i=0,1,...,49). There are no active cells and GNSS is reliable during the whole test. The test system can emulate and send the GNSS signal to the test UE. DUT and all active sidelink UEs select GNSS as synchronization reference source. The test system shall emulate the active sidelink UEs to transmit PSCCH/PSSCH every 5ms as specified in Table 9.1.4.1.4.1-2.

The test consists of two successive time periods with time duration of T1, T2 respectively. T1 and T2 should be long enough. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X Sidelink Communication.

1. Ensure the UE is in state 4-A with generic procedure parameters Test Mode = *On* according to TS 38.508-1 [14] clause 4.4A.2.

2. The GNSS simulator is triggered to start step 1 of Scenario #1 to simulate a location in the centre of Geographicalarea #1.

3. Wait at least 20 seconds for the UE to acquire the GNSS signal.

4. The SS sends AT command +CCUTLE to close test loop function and trigger UE to transmit.

5. The SS switches on all sidelink UEs and sets parameters according to T1 in Table 9.1.4.1.5-1. T1 starts.

6. During T1, the SS records:

- Nresource, total: the number of resources occupied by the PSSCH transmissions of the DUT on all subchannels.

- Nresource, subch 2 the number of resources occupied by the PSSCH transmissions of the DUT on subchannel #2.

If Nresource, subch 2 (corresponds to the "ne" in Annex G.2.3) and Nresource, total (corresponds to the "ns" in Annex G.2.3) achieve the confidence level according to Tables G.2.3-1, T1 expires.

7. If the ratio Nresource, subch 2/ Nresource, total is less than 10%, count a success for the event "subchannel #2 resource not available", otherwise count a fail for the event "subchannel #2 resource not available ".

8. When T1 expires, the SS shall switch the power setting from T1 to T2 in Table 9.1.4.1.5-1. T2 starts.

9. During T2, the SS records:

- Nresource, total: the number of resources occupied by PSSCH transmission of the DUT on all subchannels.

- Nresource, non-subch 2 the number of resources occupied by PSSCH transmission of the DUT on subchannels other than subchannel #2.

If Nresource, non-subch 2 (corresponds to the "ne" in Annex G.2.3) and Nresource, total (corresponds to the "ns" in Annex G.2.3) achieve the confidence level according to Tables G.2.3-1, T2 expires.

10. If the ratio Nresource, non-subch 2/ Nresource, total is less than 10%, count a success for the event "subchannel #2 resource available", otherwise count a fail for the event " subchannel #2 resource available ".

12. When T2 expires, the SS sends AT command +CCUTLE to open test loop function and trigger UE to stop transmitting.

Each of the events " subchannel #2 resource not available" and " subchannel #2 resource available" is evaluated independently, resulting in an event verdict pass or fail. If all events pass, the test passes. If one event fails, the test fails.

9.1.4.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 9.1.4.1.4.3-1: SL-ResourcePool (UE under test)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 7.3.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ResourcePool-r16 ::= SEQUENCE { |  |  |  |
| sl-NumSubchannel-r16 | 5 |  |  |
| sl-UE-SelectedConfigRP-r16 SEQUENCE { |  |  |  |
| sl-Thres-RSRP-List-r16 SEQUENCE (SIZE (64)) OF SL-Thres-RSRP-r16 { | 64 entries |  |  |
| SL-Thres-RSRP-r16[k, k=1,..64] | 15 | entry k  actual value is -130 +2\*15 = -100 dBm |  |
| } |  |  |  |
| } |  |  |  |
| sl-PreemptionEnable-r16 | Not present |  |  |
| sl-TimeResource-r16 | 1111111111 |  |  |
| } |  |  |  |

Table 9.1.4.1.4.3-2: SL-ResourcePool (active sidelink UE 0 ~ 49)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 7.3.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ResourcePool-r16 ::= SEQUENCE { |  |  |  |
| sl-StartRB-Subchannel-r16 | floor(i/10)x10 | i is the index of active sidelink UE, i = 0, 1,..., 49 | active sidelink UE i |
| sl-UE-SelectedConfigRP-r16 SEQUENCE { |  |  |  |
| sl-Thres-RSRP-List-r16 SEQUENCE (SIZE (64)) OF SL-Thres-RSRP-r16 { | 64 entries |  |  |
| SL-Thres-RSRP-r16[k, k=1,..64] | 0 | entry k  special value corresponds to -infinity |  |
| } |  |  |  |
| } |  |  |  |
| sl-PreemptionEnable-r16 | Not present |  |  |
| sl-TimeResource-r16 | {1i} | {1i}is a sequence of nine 0’s with one 1 in (mod(i,10 )+1’th position. | active sidelink UE i |
| } |  |  |  |

Table 9.1.4.1.4.3-3: +CCUTLE (Test procedure, step 4)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Close and Transmit |

Table 9.1.4.1.4.3-4: +CCUTLE (Test procedure, step 12)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Open |

9.1.4.1.5 Test requirement

Active sidelink UE specific test parameters are given in Table 9.1.4.1.5-1.

Table 9.1.4.1.5-1: SyncRef UE Specific Test Parameters for NR SA FR1 L1 SL-RSRP measurement for autonomous resource selection/reselection

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Active Sidelink UE i  (i = 0, .., 49) | |
| T1 | T2 |
| NR RF Channel Number | - | 1 | |
| Channel Bandwidth (BWchannel)Note 5 | MHz | 20 (NRB,c = 50) or 40 (NRB,c = 100) | |
| PSCCH RMC | - | CC.1A HD | |
| PSSCH RMC | - | CD.1A HD | |
| Noc Note1 | dBm/30 kHz | -111 | -121 |
| Ês/Noc Note3 | dB | 10 | |
| Ês/Iot Note2,3 | dB | 10 | |
| Ês/Noc Note3 | dB | 20.55 Note 6 | 10 |
| Ês/Iot Note2,3 | dB | 20.55 | 10.00 |
| Ês/Noc Note4 | dB | 0.35 Note 6 | 30.55 Note 6 |
| Ês/Iot Note2,4 | dB | 0 | 30.55 |
| PSSCH-RSRP1 Note 2,3 | dBm/SCS | -90.45 | -111 |
| PSSCH-RSRP2 Note 2,4 | dBm/SCS | -110.65 | -90.45 |
| Io Note 2 | dBm/18 MHz | -69.31 | -63.62 |
|  | dBm/36 MHz | -69.31 | -63.62 |
| Antenna Configuration | - | 1x2 | |
| Propagation Condition | - | AWGN | |
| Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 2: Es/Iot, PSSCH-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: For UE 20 to 29, occupying subchannel #2  Note 4: For UE 0 to 19 and 30 to 49, occupying subchannel #0/1/3/4  Note 5: The UE is only required to be tested in one of the supported test configurations.  Note 6 Including test tolerance given in Annex F. | | | |

During T1, the signal from test equipment are configured such that

- The measured PSSCH-RSRP for 10 active NR sidelink UEs(UE 20~UE 29) is above *SL-Thres-RSRP*. Then the resources occupied by these 10 active NR sidelink UEs (resources on subchannel #2) are expected to be excluded in the resource selection procedure and,

- The measured PSSCH-RSRP for other 40 active NR sidelink UEs(UE 0~UE 19, UE 30~UE 49) is below the *SL-Thres-RSRP*, and the resources occupied by these 40 active NR sidelink UEs (resources on subchannels other than subchannel #2) are expected to be included in the resource selection procedure.

The rate of PSSCH transmissions on the resources on subchannel #2 shall be less than 10% during T1.

During T2, the signal from test equipment are configured such that

- the measured PSSCH-RSRP for the 10 active NR sidelink UEs (UE 20~UE 29) is below *SL-Thres-RSRP*. Then the resources occupied by these 10 active NR sidelink UEs (resources on subchannel #2) are expected to be included in the resource selection procedure and,

- the measured PSSCH-RSRP for other 40 active NR sidelink UEs (UE 0~UE 19, UE 30~UE 49) is above *SL-Thres-RSRP*, and the resources occupied by these 40 active NR sidelink UEs (subchannels other than subchannel #2) are expected to be excluded in the resource selection procedure.

The rate of PSSCH transmissions on the resources on subchannel #2 shall be larger than 90% during T2.

Figure 9.1.4.1.5-2 shows the two different time durations and the corresponding variation of the power level in the active sidelink UEs to emulate change of candidate resource set.

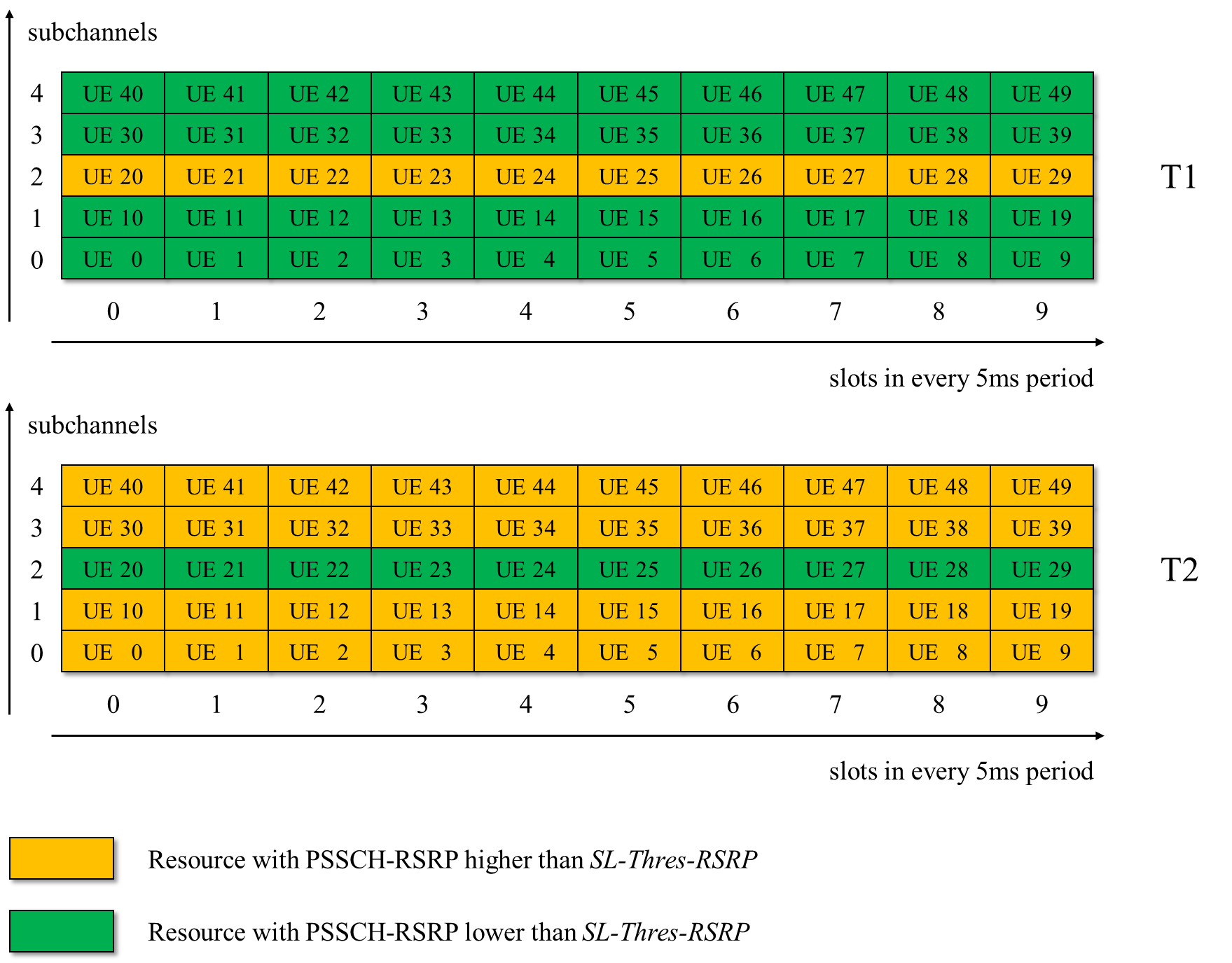


Figure 9.1.4.1.5-2: Power level variation of active sidelink UEs for NR SA FR1 L1 SL-RSRP measurement for autonomous resource selection/reselection

#### 9.1.4.2 NR SA FR1 L1 SL-RSRP measurement for resource pre-emption

9.1.4.2.1 Test purpose

The purpose of this test is to verify the requirements related to autonomous resource pre-emption for NR sidelink UE in mode 2 defined in TS 38.133 [6] clause 12.5.

9.1.4.2.2 Test applicability

This test applies to all types of NR UEs from release 16 onwards and supporting and NR sidelink communication.

9.1.4.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 9.1.4.0.1

The normative reference for this requirement is TS 38.133 [6] clause A.9.1.4.2.

9.1.4.2.4 Test description

9.1.4.2.4.1 Initial conditions

Configure the test equipment and the DUT according to the parameters in Table 9.1.4.2.4.1-1.

Table 9.1.4.2.4.1-1: Initial conditions for NR SA FR1 L1 SL-RSRP measurement for resource pre-emption

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | PC5: As specified in TS 38.508-1 [14] clause 4.3.1.8. | | |
| Channel bandwidth | PC5: As specified by the test configuration selected from Table 9.1.4.2.4.1-2. | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.9.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.7.1 |
| Exceptions to connection diagram | N/A | |  |

1. The parameter settings for the NR sidelink communication are pre-configured according to TS 38.508-1 [14] clause 4.10.1.

2. Message content exceptions are given in clause 9.1.4.2.4.3

3. There are 1 NR-SS-UEs (active NR sidelink UE) specified in this test. active NR sidelink UE is configured according to the generic parameters in Table 9.1.4.2.4.1-2.

4. The GNSS simulator is configured for Scenario #1: static in Geographical area #1, as defined in TS 38.508-1 [14] Table 4.11.2-2.

Table 9.1.4.2.4.1-2: NR sidelink test parameters for NR SA FR1 L1 SL-RSRP measurement for resource pre-emption

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | HD carrier in Band n47 and n38 |
| Channel Bandwidth (BWchannel) Note 1 | | MHz | 20 (NRB,c = 50) or  40 (NRB,c = 100) |  |
| SCS | | kHz | 30 |  |
| V2X sidelink communication pre-configuration | |  | As specified in Annex A.11.2 | IE values unless specified otherwise in this test. |
| sl-TimeResource-r16 included in SL-ResourcePool in SL-ResourcePool in sl-TxPoolSelectedNormal-r16 | |  | 10000000000000000000 | Indicates the time resource of resource pool within *sl-Period*. (see TS 38.213 [8]) Note that this is for Tx pool. |
| sl-TimeResource-r16 included in SL-ResourcePool in sl-RxPool-r16 | |  | 11111111111111111111 | Indicates the time resource of resource pool within *sl-Period*. (see TS 38.213 [8]) Note that this is for Rx pool. |
| sl-NumSubchannel-r16 included in SL-ResourcePool | |  | 1 | Indicates the number of subchannels in the corresponding resource pool, which consists of contiguous PRBs only |
| sl-SubchannelSize-r16 included in SL-ResourcePool | |  | 10 | Indicates the minimum granularity in frequency domain for the sensing for PSSCH resource selection in the unit of PRB |
| sl-StartRB-Subchannel-r16 included in SL-ResourcePool | |  | 10 | Indicates the lowest RB index of the subchannel with the lowest index. |
| Number of Active Sidelink UEs | |  | 1 |  |
| SL-Thres-RSRP | |  | 12 | Corresponding -106 dBm as defined in Section 6.3.8 in TS38.331[13] |
| Active Sidelink UEs | V2X sidelink Communication preconfiguration |  | As specified in Annex A.11.2 | IE values unless specified otherwise in this test. |
| sl-TimeResource-r16 included in SL-ResourcePool |  | 11111111111111111111 | Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213[8]) |
| sl-NumSubchannel-r16 included in SL-ResourcePool |  | 1 | Indicates the number of sub-channels for TX resource pool |
| sl-StartRB-Subchannel-r16 included in SL-ResourcePool |  | 0 | Indicates the lowest RB index of the subchannel with the lowest index. |
| Sl-SubchannelSize-r16 included in SL-ResourcePool |  | 10 | Indicates the minimum granularity in frequency domain for the sensing for PSSCH resource selection in the unit of PRB |
| Timing offset among Active Sidelink Ues | | μs | CP/2 | Synchronous |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | | | | |

9.1.4.2.4.2 Test procedure

In this test there is one active sidelink UE. There are no active cells and GNSS is reliable during the whole test. The test system can emulate and send the GNSS signal to the test UE. Both DUT and active sidelink UE select GNSS as synchronization reference source.

The test consists of two successive time periods with time duration of T1, T2 respectively. T1 and T2 should be long enough. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X Sidelink Communication.

1. Ensure the UE is in state 4-A with generic procedure parameters Test Mode = *On* according to TS 38.508-1 [14] clause 4.4A.2.

2. The GNSS simulator is triggered to start step 1 of Scenario #1 to simulate a location in the centre of Geographicalarea #1.

3. Wait at least 20 seconds for the UE to acquire the GNSS signal.

4. The SS sends AT command +CCUTLE to close test loop function and trigger UE to transmit.

5. The SS switches on active sidelink UE and sets parameters according to T1 in Table 9.1.4.2.5-1. T1 starts.

6. The SS keeps monitoring PSCCH sent by the UE. If the SS detecting a PSCCH sent by the UE which reserves multiple PSSCH resources, T1 expires.

7. When T1 expires, the SS shall switch the power setting from T1 to T2 in Table 9.1.4.2.5-1. T2 starts.

8. Denoting the slot occupied by the second PSCCH scheduled by the PSSCH in step 6 as "slot n". The active sidelink UE shall send PSCCH no later than slot n-5 which:

- indicates higher priority than the PSCCH in step 6, and

- schedules the same resource in slot n as the PSCCH in step 6.

9. If the UE sends no PSSCH on the resource in slot n, count a success for the test, otherwise count a fail for the test. T2 expires.

10. When T2 expires, the SS sends AT command +CCUTLE to open test loop function and trigger UE to stop transmitting

11. Repeat step 4-10 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved

9.1.4.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 9.1.4.2.4.3-1: SL-BWP-PoolConfigCommon (UE under test)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 7.3.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-BWP-PoolConfigCommon-r16 ::= SEQUENCE { |  |  |  |
| sl-RxPool-r16 SEQUENCE (SIZE (1..maxNrofRXPool-r16)) OF SL-ResourcePool-r16 { | 1 entry |  |  |
| SL-ResourcePool-r16[1] | SL-ResourcePool-TX | entry 1  Table 9.1.4.2.4.3-2 |  |
| } |  |  |  |
| sl-TxPoolSelectedNormal-r16 SEQUENCE (SIZE (1..maxNrofTXPool-r16)) OF SL-ResourcePoolConfig-r16 { | 1 entry |  |  |
| SL-ResourcePoolConfig-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-ResourcePool-r16 | SL-ResourcePool-RX | Table 9.1.4.2.4.3-3 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.4.2.4.3-2: SL-ResourcePool-TX (Table 9.1.4.2.4.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 7.3.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ResourcePool-r16 ::= SEQUENCE { |  |  |  |
| sl-UE-SelectedConfigRP-r16 SEQUENCE { |  |  |  |
| sl-Thres-RSRP-List-r16 SEQUENCE (SIZE (64)) OF SL-Thres-RSRP-r16 { | 64 entries |  |  |
| SL-Thres-RSRP-r16[k, k=1,..64] | 12 | entry k  actual value is -130 +2\*12 = -106 dBm |  |
| } |  |  |  |
| sl-MultiReserveResource-r16 | enabled |  |  |
| } |  |  |  |
| sl-TimeResource-r16 | 10000000000000000000 |  |  |
| } |  |  |  |

Table 9.1.4.2.4.3-3: SL-ResourcePool-RX (Table 9.1.4.2.4.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 7.3.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ResourcePool-r16 ::= SEQUENCE { |  |  |  |
| sl-UE-SelectedConfigRP-r16 SEQUENCE { |  |  |  |
| sl-Thres-RSRP-List-r16 SEQUENCE (SIZE (64)) OF SL-Thres-RSRP-r16 { | 64 entries |  |  |
| SL-Thres-RSRP-r16[k, k=1,..64] | 12 | entry k  actual value is -130 +2\*12 = -106 dBm |  |
| } |  |  |  |
| sl-MultiReserveResource-r16 | enabled |  |  |
| } |  |  |  |
| sl-TimeResource-r16 | 11111111111111111111 |  |  |
| } |  |  |  |

Table 9.1.4.2.4.3-4: SL-LogicalChannelConfig (UE under test)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.6-12 with condition LO | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-LogicalChannelConfig-r16 ::= SEQUENCE { |  |  |  |
| sl-Priority-r16 | 8 | PSSCH sents from DUT has the lowest priority |  |
| } |  |  |  |

Table 9.1.4.2.4.3-5: SL-ResourcePool (active sidelink UE)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 7.3.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ResourcePool-r16 ::= SEQUENCE { |  |  |  |
| sl-TimeResource-r16 | 11111111111111111111 |  |  |
| } |  |  |  |

Table 9.1.4.2.4.3-6: +CCUTLE (Test procedure, step 4)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Close and Transmit |

Table 9.1.4.2.4.3-7: +CCUTLE (Test procedure, step 10)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Open |

9.1.4.2.5 Test requirement

Active sidelink UE specific test parameters are given in Table 9.1.4.2.5-1.

Table 9.1.4.2.5-1: SyncRef UE Specific Test Parameters for NR SA FR1 L1 SL-RSRP measurement for resource pre-emption

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Active Sidelink UE | |
| T1 | T2 |
| NR RF Channel Number | - | 1 | |
| Channel Bandwidth (BWchannel) Note 3 | MHz | 20 (NRB,c = 50) or 40 (NRB,c = 100) | |
| PSCCH RMC | - | CC.1A HD | |
| PSSCH RMC | - | CD.1A HD | |
| Noc Note1 | dBm/30 kHz | N/A | -100 |
| PSCCH Ês/Noc | dB | 5 |
| PSSCH Ês/Noc | dB | 5 |
| PSCCH Ês/Iot Note2 | dB | 5 |
| PSSCH Ês/Iot Note2 | dB | 5 |
| PSSCH-RSRP Note 2 | dBm/30kHz | -95 |
| Io Note 2 | dBm/18MHz | -73.01 |
|  | dBm/36MHz | -73.01 |
| Antenna Configuration | - | 1x2 | |
| Propagation Condition | - | AWGN | |
| Note 1: Interference from other Ues and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 2: Es/Iot, PSSCH-RSRP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: The UE is only required to be tested in one of the supported test configurations. | | | |

During T1, The UE under test keep transmitting PSCCH/PSSCH and reserve resources in slot n for future transmission.

During T2, The UE under test is required to trigger resource reselection and not to transmit on the reserved resource at slot n when the high priority reservation is transmitted by the active sidelink UE before n-Tpre-empt, where,

Tpre-empt = T3+Tproc,0

- T3 = 5 slots, is given in 38.214 Table 8.1.4-2.

- Tproc,0 = 1 slot, is given in 38.214 Table 8.1.4-1.

Which gives a total of Tpre-empt = 6 slots.

The rate of PSSCH transmissions on the resources at slot n shall be less than 10% during repeated tests.

Figure 9.1.4.2.5-2 shows the two different time durations and the corresponding variation of the power level in the active sidelink UE to emulate resource pre-emption.

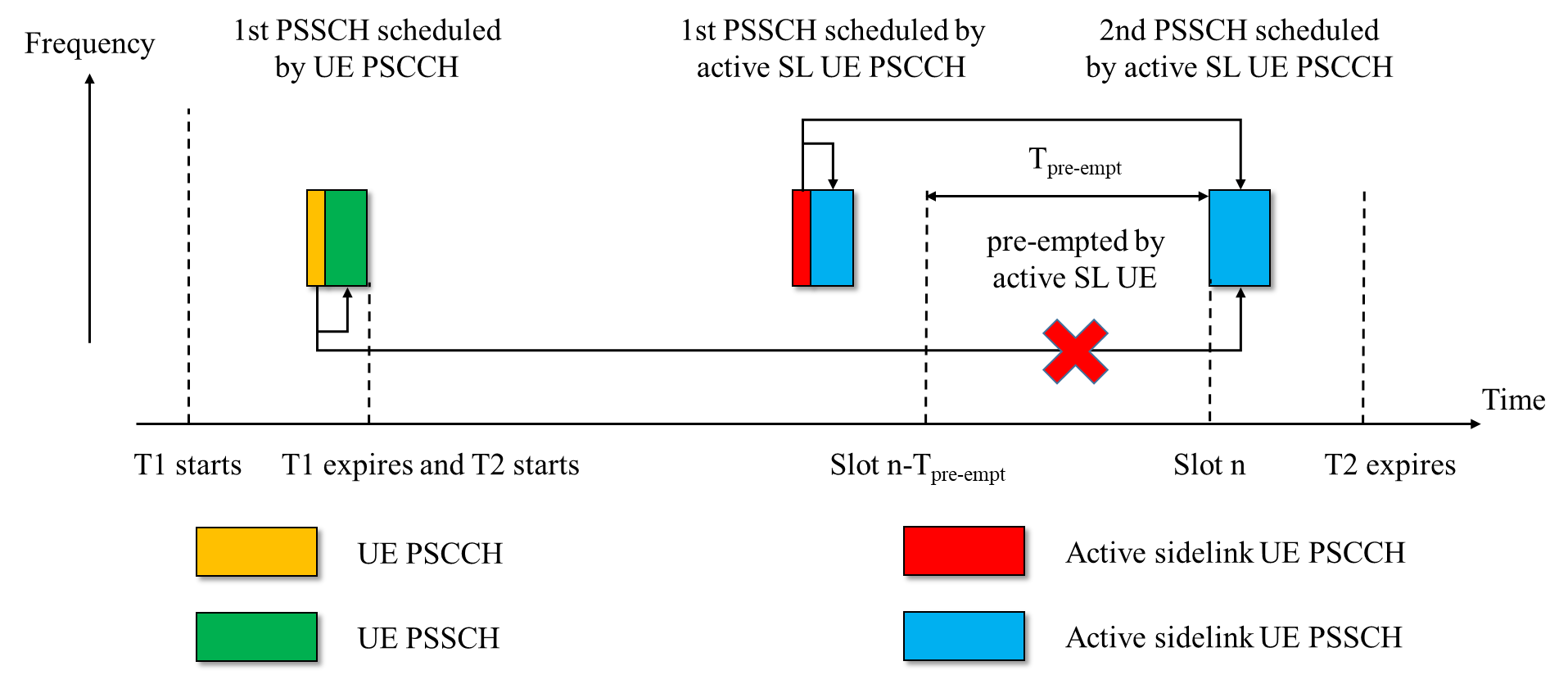


Figure 9.1.4.2.5-2: Power level variation of active sidelink UE for NR SA FR1 L1 SL-RSRP measurement for resource pre-emption

#### 9.1.4.3 NR SA FR1 L1 SL-RSRP measurement for resource re-evaluation

9.1.4.3.1 Test purpose

The purpose of this test is to verify the requirements related to autonomous resource re-evaluation for NR sidelink UE in mode 2 defined in TS 38.133 [6] clause 12.5.

9.1.4.3.2 Test applicability

This test applies to all types of NR UEs from release 16 onwards and supporting and NR sidelink communication.

9.1.4.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 9.1.4.0.1

The normative reference for this requirement is TS 38.133 [6] clause A.9.1.4.3.

9.1.4.3.4 Test description

9.1.4.3.4.1 Initial conditions

Configure the test equipment and the DUT according to the parameters in Table 9.1.4.3.4.1-1.

Table 9.1.4.3.4.1-1: Initial conditions for NR SA FR1 L1 SL-RSRP measurement for resource re-evaluation

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | PC5: As specified in TS 38.508-1 [14] clause 4.3.1.8. | | |
| Channel bandwidth | PC5: As specified by the test configuration selected from Table 9.1.4.3.4.1-2. | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.9.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.7.1 |
| Exceptions to connection diagram | N/A | |  |

1. The parameter settings for the NR sidelink communication are pre-configured according to TS 38.508-1 [14] clause 4.10.1.

2. Message content exceptions are given in clause 9.1.4.3.4.3

3. There are 130 NR-SS-UEs (active NR sidelink UE i, i = 0, 1, ..., 129) specified in this test. Active NR sidelink UEs are configured according to the generic parameters in Table 9.1.4.3.4.1-2.

4. The GNSS simulator is configured for Scenario #1: static in Geographical area #1, as defined in TS 38.508-1 [14] Table 4.11.2-2.

Table 9.1.4.3.4.1-2: NR sidelink test parameters for NR SA FR1 L1 SL-RSRP measurement for resource re-evaluation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | HD carrier in Band n47 and n38 |
| Channel Bandwidth (BWchannel) Note 2 | | MHz | 20 (NRB,c = 50) or  40 (NRB,c = 100) |  |
| SCS | | kHz | 30 |  |
| V2X sidelink communication pre-configuration | |  | As specified in Annex A.11.2 | IE values unless specified otherwise in this test. |
| sl-TimeResource-r16 included in SL-ResourcePool | |  | 11111111111111111111  11111111111111111111  11111111111111111111  11111111111111111111  11111111111111111111 | Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213[3]) |
| sl-NumSubchannel-r16 included in SL-ResourcePool | |  | 1 | Indicates the number of sub-channels for TX resource pool |
| sl-SubchannelSize-r16 included in SL-ResourcePool | |  | 10 |  |
| sl-StartRB-Subchannel-r16 | |  | 0 |  |
| Number of Active Sidelink UEs | |  | 130 | Active Sidelink UE i = 0, .., 129 |
| SL-Thres-RSRP-r16 | |  | 14Note 3 | Corresponding -102 dBm as defined in Section 6.3.5 in TS38.331[2] |
| Active Sidelink UEs(UE i=0-99) | V2X sidelink Communication preconfiguration |  | As specified in Annex A.11.2 | IE values unless specified otherwise in this test. |
| sl-TimeResource-r16 included in SL-ResourcePool |  | {1i}Note1 | Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213 [3]) |
| sl-NumSubchannel-r16 included in SL-ResourcePool |  | 1 | Indicates the number of sub-channels for TX resource pool |
| sl-SubchannelSize-r16 included in SL-ResourcePool |  | 10 | Indicates the size of sub-channels for TX resource pool |
| sl-ResourceReservePeriod2-r16 | ms | 50 |  |
| Active Sidelink UEs(UE i= 100-129) | V2X sidelink Communication preconfiguration |  | As specified in Annex A.11.2 | IE values unless specified otherwise in this test. |
| sl-TimeResource-r16 included in SL-ResourcePool |  | {1i}Note1 | Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213 [3]) |
| sl-NumSubchannel-r16 included in SL-ResourcePool |  | 1 | Indicates the number of sub-channels for TX resource pool |
| sl-SubchannelSize included in SL-ResourcePool |  | 10 | Indicates the size of sub-channels for TX resource pool |
| sl-MultiReserveResource-r16 |  | enabled |  |
| sl-MaxNumPerReserve-r16 |  | n2 |  |
| sl-ResourceReservePeriod2-r16 |  | 0 | Unit:ms |
| Timing offset among Active Sidelink UEs | | μs | CP/2 | Synchronous |
| T0 | | s | 1 |  |
| T1 | | ms | 50 |  |
| T2 | | ms | 50 |  |
| Note 1: {1i} is a sequence of ninety-nine 0’s with one 1 in (mod(i,100)+1)’th position.  Note 2: The UE is only required to be tested in one of the supported test configurations.  Note 3: Including the test tolerance given in Annex F. | | | | |

9.1.4.3.4.2 Test procedure

In this test there is 130 active sidelink UEs (denoted as UE i, i = 0,1,...,129). There are no active cells and GNSS is reliable during the whole test. The test system can emulate and send the GNSS signal to the test UE. DUT and all active sidelink UEs select GNSS as synchronization reference source. The first 100 active sidelink UEs are scheduled to send with 50ms periodicity. The last 30 active sidelink UEs are aperiodic service UE with reservation period of 15ms.

The test consists of three successive time periods with time duration of T0, T1 and T2 respectively. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X Sidelink Communication.

1. Ensure the UE is in state 4-A with generic procedure parameters Test Mode = *On* according to TS 38.508-1 [14] clause 4.4A.2.

2. The GNSS simulator is triggered to start step 1 of Scenario #1 to simulate a location in the centre of Geographicalarea #1.

3. Wait at least 20 seconds for the UE to acquire the GNSS signal.

4. The SS switches on UE 0~UE 99, triggers UE 0 ~UE 99 to transmit PSCCH/PSSCH with 50ms periodicity, and set power level of UE 0~UE 99 to ensure their measured PSSCH-RSRP is higher than *SL-Thres-RSRP*. T0 starts.

5. When T0 expires, the SS sets parameters according to T1 in Table 9.1.4.3.5-1. T1 starts.

6. The SS sends AT command +CCUTLE to close test loop function and trigger UE to transmit at the end of T1.

7. When T1 expires, the SS shall switch the power setting from T1 to T2 in Table 9.1.4.3.5-1. T2 starts.

8. The SS switches off UE 0~UE 29, switches on UE 101~UE 129, and triggers UE 101~UE 129 to transmit PSCCH/PSSCH aperiodically with a time resource assignment interval of 15ms.

9. During T2, the SS accumulates:

- Nresource, total: the number of resources occupied by the PSSCH transmissions of the DUT during T2 since the beginning of the test.

- Nresource, 65-84 the number of resources in slot (i mod 100 = 65,66...,84) occupied by the PSSCH transmissions of the DUT during T2 since the beginning of the test.

10. When T2 expires, the SS sends AT command +CCUTLE to open test loop function and trigger UE to stop transmitting

11. The SS switches off all active sidelink UEs.

12. Repeat step 4-11 until Nresource, total - Nresource, 65-84 (corresponds to the "ne" in Annex G.2.3) and Nresource, total (corresponds to the "ns" in Annex G.2.3) achieve the confidence level according to Tables G.2.3-1.

If the ratio Nresource, 65-84/ Nresource, total is larger than 90%, count a success for the test, otherwise count a fail for the test.

9.1.4.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 9.1.4.3.4.3-1: SL-ResourcePool (UE under test)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 7.3.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ResourcePool-r16 ::= SEQUENCE { |  |  |  |
| sl-UE-SelectedConfigRP-r16 SEQUENCE { |  |  |  |
| sl-Thres-RSRP-List-r16 SEQUENCE (SIZE (64)) OF SL-Thres-RSRP-r16 { | 64 entries |  |  |
| SL-Thres-RSRP-r16[k, k=1,..64] | 14 | entry k  actual value is -130 +2\*14 = -102 dBm |  |
| } |  |  |  |
| sl-ResourceReservePeriodList-r16 SEQUENCE (SIZE (1..16)) OF SL-ResourceReservePeriod-r16 { | 2 entries |  |  |
| SL-ResourceReservePeriod-r16[1] CHOICE { |  | entry 1 |  |
| sl-ResourceReservePeriod1-r16 | ms0 |  |  |
| } |  |  |  |
| SL-ResourceReservePeriod-r16[2] CHOICE { |  | entry 2 |  |
| sl-ResourceReservePeriod2-r16 | 50 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| sl-PreemptionEnable-r16 | Not present |  |  |
| sl-TimeResource-r16 | ones(1,100) | ones(1,100) is a sequence of 100 "1"s |  |
| } |  |  |  |

Table 9.1.4.3.4.3-2: SL-ResourcePool (active sidelink UE 0~129)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 7.3.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ResourcePool-r16 ::= SEQUENCE { |  |  |  |
| sl-UE-SelectedConfigRP-r16 SEQUENCE { |  |  |  |
| sl-Thres-RSRP-List-r16 SEQUENCE (SIZE (64)) OF SL-Thres-RSRP-r16 { | 64 entries |  |  |
| SL-Thres-RSRP-r16[k, k=1,..64] | 14 | entry k  actual value is -130 +2\*14 = -102 dBm |  |
| } |  |  |  |
| sl-MultiReserveResource-r16 | Not present |  | sidelink UE 0~99 |
|  | enabled |  | sidelink UE 100~129 |
| sl-ResourceReservePeriodList-r16 SEQUENCE (SIZE (1..16)) OF SL-ResourceReservePeriod-r16 { | 2 entries |  |  |
| SL-ResourceReservePeriod-r16[1] CHOICE { |  | entry 1 |  |
| sl-ResourceReservePeriod1-r16 | ms0 |  |  |
| } |  |  |  |
| SL-ResourceReservePeriod-r16[2] CHOICE { |  | entry 2 |  |
| sl-ResourceReservePeriod2-r16 | 50 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| sl-PreemptionEnable-r16 | Not present |  |  |
| sl-TimeResource-r16 | {1i} | {1i} is a sequence of ninety-nine 0’s with one 1 in (mod(i,100)+1)’th position  i = 0,1,...,129 | sidelink UE i |
| } |  |  |  |

Table 9.1.4.3.4.3-3: Physical layer parameters for SCI format 1-A (Sidelink UE 0~129)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 4.3.6.2.1.1-1 | | | |
| Parameter | Value | Value in binary | Condition |
| Frequency resource assignment | Not present | - |  |
| Time domain resource assignment | Indicates only one resource is scheduled | "00000"B | Sidelink UE 0~99 |
|  | Indicate 2 resources are scheduled and the time interval between the 1st resource and 2nd resource is 30 slot (i.e. 15ms) | "11110"B | Sidelink UE 10~129 |
| Resource reservation period | Indicates the 2nd entry in sl-ResourceReservePeriodList, i.e. 50 ms | "1"B | Sidelink UE 0~99 |
|  | Indicates the 1st entry in sl-ResourceReservePeriodList, i.e. 0 ms | "0"B | Sidelink UE 10~129 |

Table 9.1.4.3.4.3-4: +CCUTLE (Test procedure, step 6)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Close and Transmit |

Table 9.1.4.3.4.3-5: +CCUTLE (Test procedure, step 10)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Open |

9.1.4.3.5 Test requirement

Active sidelink UE specific test parameters for UE 0~UE 99 and UE 100~UE 129 are given in Table 9.1.4.3.5-1 and Table 9.1.4.3.5-2 respectively.

Table 9.1.4.3.5-1: SyncRef UE Specific Test Parameters for NR SA FR1 L1 SL-RSRP measurement for resource re-evaluation (UE #0...99)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Active Sidelink UE i  (i = 0, .., 99) | |
| T1 | T2 |
| NR RF Channel Number | - | 1 | |
| Channel Bandwidth (BWchannel) Note 7 | MHz | 20 (NRB,c = 50) or 40 (NRB,c = 100) | |
| PSCCH RMC | - | CC.1A HD | |
| PSSCH RMC | - | CD.1A HD | |
| Noc Note1 | dBm/SCS | -110.05Note 13 | |
| PSSCH1 Ês/Noc Note 3 | dB | 32.60 Note 13 | 32.60 Note 13 |
| PSSCH2 Ês/Noc  Note 4 | dB | 2 | 2 |
| PSSCH3 Ês/Noc  Note 5 | dB | 14.10 Note 13 | -infinity |
| PSSCH4 Ês/Noc Note 6 | dB | 14.1 Note 13 | 14.10 Note 13 |
| PSSCH1 Ês/Iot Note2,3,10 | dB | 32.60 | -0.45 |
| PSSCH1 Ês/Iot Note2,3,11 |  | 32.60 | 32.60 |
| PSSCH2 Ês/Iot Note2,4 | dB | 2 | -31.05 |
| PSSCH3 Ês/Iot Note2,5 | dB | 14.10 | -infinity |
| PSSCH4 Ês/Iot Note2,6 | dB | 14.10 | 14.10 |
| PSSCH -RSRP1 Note 2, 3 | dBm/SCS | -77.45 | -77.45 |
| PSSCH -RSRP2 Note 2, 4 | dBm/SCS | -108.05 | -108.05 |
| PSSCH -RSRP3 Note 2, 5 | dBm/SCS | -95.95 | -infinity |
| PSSCH -RSRP4 Note 2, 6 | dBm/SCS | -95.95 | -95.95 |
| Io Note 2, 8 | dBm/18 MHz | -74.99 | -56.21 |
|  | dBm/36 MHz | -74.99 | -56.21 |
| Io Note 2, 9 | dBm/18 MHz | -85.13 | -56.20 |
|  | dBm/36 MHz | -85.13 | -56.20 |
| Io Note 2, 10 | dBm/18 MHz | -56.66 | -53.42 |
|  | dBm/36 MHz | -56.66 | -53.42 |
| Io Note 2, 11 | dBm/18 MHz | -56.66 | -56.66 |
|  | dBm/36 MHz | -56.66 | -56.66 |
| Io Note 2, 12 | dBm/18 MHz | -74.99 | -74.99 |
|  | dBm/36 MHz | -74.99 | -74.99 |
| Antenna Configuration | - | 1x2 | |
| Propagation Condition | - | AWGN | |
| Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 2: Ês/Iot, PSSCH-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: UE #50~64 and UE #85~99 will periodically occupy the subchannels on the slot with "#slot index mod 100" = #50-64 and #85-99.  Note 4: UE #30~49 will periodically occupy the subchannels on the slot with “#slot index mod 100” = #30-49.  Note 5: UE #0~29 will periodically occupy the subchannels on the slot with “#slot index mod 100” = #0-29.  Note 6: UE #65~84 will periodically occupy the subchannels on the slot with “#slot index mod 100” = #65-84.  Note 7: The UE is only required to be tested in one of the supported configurations.  Note 8: Calculated on slot with “#slot index mod 100” = #0~29.  Note 9: Calculated on slot with “#slot index mod 100” = #30~49.  Note 10: Calculated on slot with “#slot index mod 100” = #50~59.  Note 11: Calculated on slot with “#slot index mod 100” = #60~64 and slot #85~99.  Note 12: Calculated on slot with “#slot index mod 100” = #65~84.  Note 13 Including test tolerance given in Annex F. | | | |

Table 9.1.4.3.5-2: SyncRef UE Specific Test Parameters for NR SA FR1 L1 SL-RSRP measurement for resource re-evaluation (UE #100...129)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Active Sidelink UE i  (i = 100, ..., 129) | |
| T1 | T2 |
| NR RF Channel Number | - | 1 | |
| Channel Bandwidth (BWchannel) Note 4 | MHz | 20 (NRB,c = 50) or 40 (NRB,c = 100) | |
| PSCCH RMC | - | CC.1A HD | |
| PSSCH RMC | - | CD.1 A HD | |
| Noc Note1 | dBm/SCS | -110.05Note 8 | |
| PSSCH Ês/Noc | dB | -infinity | 33.05 Note 8 |
| PSSCH Ês/Iot Note2,5 | dB | -infinity | 33.05 |
| PSSCH Ês/Iot Note2,6 |  | -infinity | 28.93 |
| PSSCH Ês/Iot Note2,7 |  | -infinity | 0.45 |
| PSSCH-RSRP Note 2, Note 3 | dBm/SCS | -infinity | -77.0 |
| Io Note 2, 5 | dBm/18 MHz | -74.99 | -56.21 |
|  | dBm/36 MHz | -74.99 | -56.21 |
| Io Note 2, 6 | dBm/18 MHz | -85.13 | -56.20 |
|  | dBm/36 MHz | -85.13 | -56.20 |
| Io Note 2, 7 | dBm/18 MHz | -56.66 | -53.42 |
|  | dBm/36 MHz | -56.66 | -53.42 |
| Antenna Configuration | - | 1x2 | |
| Propagation Condition | - | AWGN | |
| Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 2: Es/Iot, PSSCH-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: UE #100~129 will occupy the subchannels on the slots with “#slot index mod 100”= #0-29 during T2.  Note 4: The UE is only required to be tested in one of the supported configurations.  Note 5: Calculated on slot with “#slot index mod 100” = #0~29.  Note 6: Calculated on slot with “#slot index mod 100” = #30~49.  Note 7: Calculated on slot with “#slot index mod 100” = #50~59.  Note 8: Including the test tolerance given in Annex F. | | | |

During T0, the SS shall configure UE 0~UE 99 to transmit PSCCH/PSSCH every 50ms. The measured PSSCH-RSRP of UE 0 ~UE 99 is above *SL-Thres-RSRP*. Hence the resources occupied by UE 0 ~UE 99 are expected to be excluded in the resource selection procedure.

During T1, the SS shall configure UE 0~UE 99 to transmit PSCCH/PSSCH every 50ms. The measured PSSCH-RSRP of UE 0~UE 29, UE 50 ~ UE 99 is above *SL-Thres-RSRP*, and the measured PSSCH-RSRP of UE 30~UE 49 is below *SL-Thres-RSRP*. Hence the resource occupied by UE 30 ~UE 49 are expected to be included in the resource selection procedure and other resources are expected to be excluded in the resource selection procedure.

At the end of T1, the UE under test shall be triggered to periodically transmit PSCCH/PSSCH.

During T2, the SS switches off UE 0~UE 29. and switches on UE 100~UE 129. UE 100~UE 129 transmit PSCCH/PSSCH with the maximum number of reserved PSCCH/PSSCH resources equalling n2 and time resource assignment interval as 15ms in the beginning 30 slots. The measured PSSCH-RSRP of UE 100~UE 129 is above *SL-Thres-RSRP*. Hence the resource occupied by UE 100 ~UE 129 are expected to be excluded in the resource re-evaluation procedure. The UE under test is expected to reselect the resources and transmit the PSCCH/PSSCH in the newly re-evaluated resources.

The rate of PSSCH transmissions on the resources which are occupied by UE #65-84 shall be more than 90% during T2.

Figure 9.1.4.3.5-3 shows the two different time durations and the corresponding variation of the power level in the active sidelink UEs to emulate change of candidate resource set.

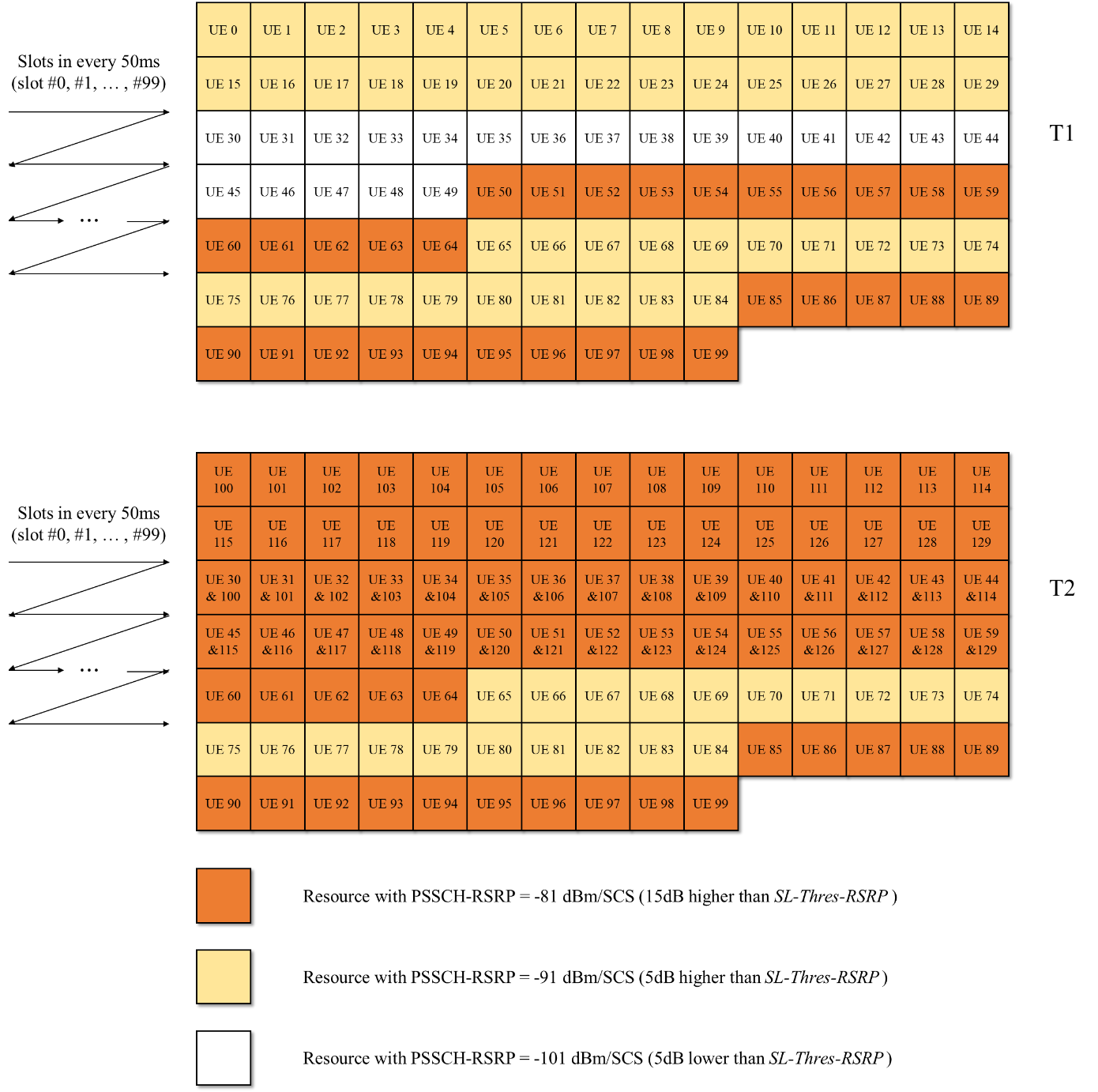


Figure 9.1.4.3.5-3: Power level variation of active sidelink UEs for NR SA FR1 L1 SL-RSRP measurement for resource re-evaluation

### 9.1.5 Congestion control measurement

#### 9.1.5.0 Minimum conformance requirements

##### 9.1.5.0.1 Minimum conformance requirements for congestion control measurements

The UE shall be capable of estimating the channel busy ratio for one or more transmission pools indicated by higher layers in TS 38.331[13], based on SL-RSSI measurements provided by the physical layer.

When no sidelink transmissions occur, the UE physical layer shall perform a single-shot SL-RSSI measurement for each sub-channel included in all the slots configured as transmission pools.

The SL-RSSI measurement performed according to this clause shall meet the SL-RSSI measurement accuracy requirements defined in 38.133 [6] clause 10.4.

The UE shall perform channel busy ratio (CBR) measurement based on SL-RSSI measurements as described in TS 38.215 [10].

The intra-frequency SL-RSSI requirements are specified in Table 9.1.5.0.1-1. The requirements apply for measurement period of 1 slot and for any configured measurement bandwidth larger than 10 RBs, provided that:

- All symbols during each RSSI measurement duration are available for RSSI sampling within the same measurement interval.

Table 9.1.5.0.1-1: Intra-frequency SL-RSSI absolute accuracy

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | Io Note 1 range | | | | |
| NR sidelink operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB |  | dBm/SCSSL | | | dBm/BWChannel |
| SCSSL = 15kHz | SCSSL = 30kHz | SCSSL = 60kHz |
| ±2.5 | ±5.5 | NR\_TDD\_FR1\_B | -120.5 | -117.5 | -114.5 | -50 |
| NR\_TDD\_FR1\_J | -116.5 | -113.5 | -110.5 | -50 |
| ±4.5 | ±7.5 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR sidelink operating band groups are as defined in Section 3A.4 for the corresponding NR operating bands.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement. | | | | | | |

The normative references for this requirement are TS 38.133 [6] clause 10.4.3 and 12.6.

#### 9.1.5.1 NR SA FR1 congestion control measurement for concurrent operation

9.1.5.1.1 Test purpose

The purpose of this test is to verify the congestion control measurement requirements in TS 38.133 [6] clause 12.6. This test will also verify that UE makes correct reporting of an event for CBR measurement.

9.1.5.1.2 Test applicability

This test applies to all types of NR UEs from release 16 onwards and supporting both Uu and sidelink communication.

9.1.5.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 9.1.5.0.1

The normative reference for this requirement is TS 38.133 [6] clause A.9.1.5.

9.1.5.1.4 Test description

9.1.5.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 9.1.5.1.4.1-1.

Table 9.1.5.1.4.1-1: Supported test configurations for FR1 NR Cell

|  |  |
| --- | --- |
| Configuration | Description |
| 9.1.5.1-1 | NR Uu: FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 9.1.5.1-2 | NR Uu: TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 9.1.5.1-3 | NR Uu: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Configure the test equipment and the DUT according to the parameters in Table 9.1.5.1.4.1-2.

Table 9.1.5.1.4.1-2: Initial conditions for NR SA FR1 congestion control measurement for concurrent operation

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | Uu&PC5: As specified in TS 38.508-1 [14] clause 4.3.1.8.2.1. | | |
| Channel bandwidth | Uu: As specified by the test configuration selected from Table 9.1.5.1.4.1-1  PC5: As specified by the test configuration selected from Table 9.1.5.1.4.1-3. | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.9.3 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.7.3 |
| Exceptions to connection diagram | N/A | |  |

1. The parameter settings for the NR sidelink communication are pre-configured according to TS 38.508-1 [14] clause 4.10.1.

2. Message content exceptions are given in clause 9.1.5.1.4.3

3. There is one NR Uu carrier and one NR Cell (Cell 1) specified in this test. Cell 1 is configured according to Annex C.1.1 and C.1.2.

4. Test parameters for Cell 1 are given in Table 9.1.5.1.5-2.

5. There are 4 NR-SS-UEs (active NR sidelink UE i, i = 0,1,2,3) specified in this test. Active NR sidelink UEs are configured according to the generic parameters in Table 9.1.5.1.4.1-3.

Table 9.1.5.1.4.1-3: NR sidelink test parameters for NR SA FR1 congestion control measurement for concurrent operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | HD carrier in Band n47 or n38 |
| Channel Bandwidth (BWchannel)Note 2 | | MHz | 20 (NRB,c = 50) or  40 (NRB,c = 100) |  |
| SCS | | kHz | 30 |  |
| V2X sidelink communication configuration | |  | As specified in Annex A.11.2 | IE values unless specified otherwise in this test. |
| sl-TimeResource-r16 included in SL-ResourcePool | |  | 11111111111111111111  11111111111111111111  11111111111111111111  11111111111111111111  11111111111111111111 | Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213[8]) |
| sl-NumSubchannel-r16 included in SL-ResourcePool | |  | 1 | ENUMERATED {n1} |
| sl-SubchannelSize included in SL-ResourcePool | |  | 10 | ENUMERATED {n10} |
| sl-StartRB-Subchannel-r16 | |  | 0 |  |
| *threshS-RSSI-CBR* | |  | 19 | Corresponding -74dBm as defined in Section 6.3.8 in TS38.331[13] |
| Number of Active Sidelink UEs every 50ms | |  | 4 | Active Sidelink UE i, where i = 0, 1, 2, 3 |
| Active Sidelink UEs (i = 0,1,2,3) | V2X sidelink Communication configuration |  | As specified in Table A.3.21.2-1  and A.3.21.2-3 | IE values unless specified otherwise in this test. |
| sl-TimeResource-r16 included in SL-ResourcePool |  | {1i}Note1 | Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213[8]) |
| sl-NumSubchannel-r16 included in SL-ResourcePool |  | 1 |  |
| sl-SubchannelSize included in SL-ResourcePool |  | 10 |  |
| Timing offset between V2X UE and Active Sidelink UEs | | μs | CP/2 | Synchronous |
| c1-Threshold-r16 | |  | 2 | Corresponding 0.02 as defined in Section 6.3.2 in TS38.331[13] |
| Hysteresis | |  | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| T1 | | s | 5 |  |
| T2 | | s | 5 |  |
| Note 1: {1i}is a sequence of ninety nine 0’s with one 1 in i+1’th position.  Note 2: The UE is only required to be tested in one of the channel bandwidths. | | | | |

9.1.5.1.4.2 Test procedure

In this test there is 4 active sidelink UEs (denoted as UE i, i = 0,1,2,3). There are 1 active cells (Cell 1) and no GNSS during the whole test. DUT and all active sidelink UEs select Cell 1 as synchronization reference source. All active sidelink UEs are scheduled to transmit PSCCH/PSSCH with 50ms periodicity.

The test consists of two successive time periods with time duration of T1 and T2 respectively.

1. Ensure the UE is in state 3N-B with generic procedure parameters Test Mode = *On* according to TS 38.508-1 [14] clause 4.4A.2.

2. The SS switches on all active sidelink UEs, triggers all active sidelink UEs to transmit PSCCH/PSSCH with 50ms periodicity.

3. The SS sets parameters according to T1 in Table 9.1.5.1.5-1. T1 starts.

4. The SS sends a *RRCReconfiguration* message with *sl-ConfigDedicatedNR* and *measConfig* to configure event C1 triggered CBR measurement and reporting.

5. The UE sends a *RRCReconfigurationComplete* message.

6. If the UE send no *measurmentReport* message before T1 expires, then count a success for the event "entry condition is not satisfied", otherwise count a fail for the event "entry condition is not satisfied".

7. When T1 expires, the SS shall switch the power setting from T1 to T2 in Table 9.1.5.1.5-1. T2 starts.

8. If the UE sends a *measurmentReport* message before T2 expires, then count a success for the event "entry condition is satisfied", otherwise count a fail for the event "entry condition is satisfied".

9. The SS sends a *RRCReconfiguration* message with *measConfig* to release configure event C1 triggered CBR measurement and reporting.

10. The UE sends a *RRCReconfigurationComplete* message.

11. Repeat step 3-10 until the confidence level according to Table G.3.3-1 is achieved.

9.1.5.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 9.1.5.1.4.3-1: RRCReconfiguration (Test procedure, step 4 and step 9)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1-13 with condition NR\_MEAS and SIDELINK | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReconfiguration ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcReconfiguration SEQUENCE { |  |  |  |
| measConfig | MeasConfig | Table 9.1.5.1.4.3-2 |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| sl-ConfigDedicatedNR-r16 | SL-ConfigDedicatedNR specified in 38.508-1 [14] Table 4.6.6-7 with condition SELECTED |  | Step 4 |
|  | Not present |  | Step 9 |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.5.1.4.3-2: MeasConfig (Table 9.1.5.1.4.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-69 | | | |
| Information Element | Value/remark | Comment | Condition |
| MeasConfig ::= SEQUENCE { |  |  |  |
| measObjectToAddModList | Not present |  | step 9 |
| measObjectToAddModList SEQUENCE (SIZE (1..maxNrofMeasId)) OF MeasObjectToAddMod { | 2 entries |  | step 4 |
| MeasObjectToAddMod[1] SEQUENCE { |  | entry 1 |  |
| measObjectId | 1 |  |  |
| measObject CHOICE { |  |  |  |
| measObjectNR | MeasObjectNR-DEFAULT specified in Table H.3.1-3 with condition INTRA-FREQ MO | MO for PCell |  |
| } |  |  |  |
| } |  |  |  |
| MeasObjectToAddMod[2] SEQUENCE { |  | entry 2 |  |
| measObjectId | 2 |  |  |
| measObject CHOICE { |  |  |  |
| measObjectNR-SL-r16 | MeasObjectNR-SL specified in 38.508-1 [14] Table 4.6.3-76A | MO for CBR |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| reportConfigToAddModList | Not present |  | step 9 |
| reportConfigToAddModList SEQUENCE(SIZE (1..maxReportConfigId)) OF ReportConfigToAddMod { | 1 entry |  | step 4 |
| ReportConfigToAddMod[1] SEQUENCE { |  | entry 1 |  |
| reportConfigId | 1 |  |  |
| reportConfig CHOICE { |  |  |  |
| reportConfigNR-SL-r16 | ReportConfigNR-SL | Table 9.1.5.1.4.3-3 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| measIdToRemoveList | Not present |  | step 4 |
| measIdToRemoveList SEQUENCE (SIZE (1..maxNrofMeasId)) OF MeasId { | 1 entry |  | step 9 |
| MeasId[1] | 1 | entry 1 |  |
| } |  |  |  |
| measIdToAddModList | Not present |  | step 9 |
| measIdToAddModList SEQUENCE (SIZE (1..maxNrofMeasId)) OF MeasIdToAddMod { | 1 entry |  | step 4 |
| MeasIdToAddMod[1] SEQUENCE { |  | entry 1 |  |
| measId | 1 |  |  |
| measObjectId | 2 |  |  |
| reportConfigId | 1 |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.5.1.4.3-3: ReportConfigNR-SL (Table 9.1.5.1.4.3-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 4.6.3-142A with condition EVENT\_C1 | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR-SL-r16 ::= SEQUENCE { |  |  |  |
| reportType-r16 CHOICE { |  |  |  |
| eventTriggered-r16 SEQUENCE { |  |  |  |
| eventId-r16 CHOICE { |  |  |  |
| eventC1 SEQUENCE { |  |  |  |
| c1-Threshold-r16 | 2 | actual CBR threshold value is 2\*0.01 = 2% |  |
| hysteresis-r16 | 0 |  |  |
| timeToTrigger-r16 | ms0 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.5.1.4.3-4: SL-ResourcePool (UE under test)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 7.3.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ResourcePool-r16 ::= SEQUENCE { |  |  |  |
| sl-ThreshS-RSSI-CBR-r16 | 19 | actual value is -112 + 2\*19 = -74 dBm |  |
| sl-UE-SelectedConfigRP-r16 SEQUENCE { |  |  |  |
| sl-ResourceReservePeriodList-r16 SEQUENCE (SIZE (1..16)) OF SL-ResourceReservePeriod-r16 { | 2 entries |  |  |
| SL-ResourceReservePeriod-r16[1] CHOICE { |  | entry 1 |  |
| sl-ResourceReservePeriod1-r16 | ms0 |  |  |
| } |  |  |  |
| SL-ResourceReservePeriod-r16[2] CHOICE { |  | entry 2 |  |
| sl-ResourceReservePeriod2-r16 | 50 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| sl-FilterCoefficient-r16 | fc0 | L3 filtering is disabled |  |
| sl-TimeResource-r16 | ones(1,100) | ones(1,100) is a sequence of 100 "1"s |  |
| } |  |  |  |

Table 9.1.5.1.4.3-5: SL-ResourcePool (active sidelink UE 0~3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 7.3.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ResourcePool-r16 ::= SEQUENCE { |  |  |  |
| sl-UE-SelectedConfigRP-r16 SEQUENCE { |  |  |  |
| sl-ResourceReservePeriodList-r16 SEQUENCE (SIZE (1..16)) OF SL-ResourceReservePeriod-r16 { | 2 entries |  |  |
| SL-ResourceReservePeriod-r16[1] CHOICE { |  | entry 1 |  |
| sl-ResourceReservePeriod1-r16 | ms0 |  |  |
| } |  |  |  |
| SL-ResourceReservePeriod-r16[2] CHOICE { |  | entry 2 |  |
| sl-ResourceReservePeriod2-r16 | 50 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| sl-TimeResource-r16 | {1i} | {1i} is a sequence of ninety-nine 0’s with one 1 in (mod(i,100)+1)’th position  i = 0,1,2,3 | sidelink UE i |
| } |  |  |  |

Table 9.1.5.1.4.3-6: Physical layer parameters for SCI format 1-A (Sidelink UE 0~3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 4.3.6.2.1.1-1 | | | |
| Parameter | Value | Value in binary | Condition |
| Frequency resource assignment | Not present | - |  |
| Time domain resource assignment | Indicates only one resource is scheduled | "00000"B |  |
| Resource reservation period | Indicates the 2nd entry in sl-ResourceReservePeriodList, i.e. 50 ms | "1"B |  |

Table 9.1.5.1.4.3-7: MeasurementReport (Test procedure, step 8)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.38.508-1[14] Table 4.6.1-5A | | | |
| Information Element | Value/remark | Comment | Condition |
| MeasurementReport ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| measurementReport SEQUENCE { |  |  |  |
| measResults SEQUENCE { | MeasResults |  |  |
| measId | 1 |  |  |
| measResultServingMOList | Not checked |  |  |
| measResultsSL-r16 SEQUENCE { |  |  |  |
| measResultsListSL-r16 CHOICE { |  |  |  |
| measResultNR-SL-r16 SEQUENCE { |  |  |  |
| measResultListCBR-NR-r16 SEQUENCE (SIZE (1.. maxNrofSL-PoolToMeasureNR-r16)) OF MeasResultCBR-NR-r16 { | 1 entry |  |  |
| MeasResultCBR-NR-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-poolReportIdentity-r16 | 1 |  |  |
| sl-CBR-ResultsNR-r16 | (3..4) |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

9.1.5.1.5 Test requirement

Active sidelink UE specific test parameters for UE 0~UE 4 are given in Table 9.1.5.1.5-1. Cell specific test parameters for Cell 1 are given in Table 9.1.5.1.5-2.

Table 9.1.5.1.5-1: SyncRef UE Specific Test Parameters for NR SA FR1 congestion control measurement for concurrent operation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Active Sidelink UE *i* (*i* = 0, 1, 2, 3) | | | |
| T1 | T2 | | |
| NR RF Channel Number |  | 1 | | | |
| Channel Bandwidth (BWchannel) Note 7 | MHz | 20 (NRB,c = 50) or 40 (NRB,c = 100) | | | |
| PSCCH RMC (defined in A.3.21.3) |  | CC.1A HD | | | |
| PSSCH RMC (defined in A.3.21.3) |  | CD.1A HD | | | |
| Noc Note1 | dBm/30 kHz | -104.55 Note 8 | | | |
| Ês/Noc | dB | 4.35 | | 13.62 Note 8 | |
| SL-RSSI1 Note 2,3 | dBm/3.6 MHz | -78.05 | | -69.95 | |
| SL-RSSI2 Note 2,4 | dBm/3.6 MHz | -83.76 | | -83.76 | |
| Io1 Note 2,5 | dBm/18 MHz | -78.05 | | -69.95 | |
|  | dBm/36 MHz | -78.05 | | -69.95 | |
| Io2 Note 2,6 | dBm/18 MHz | -83.76 | | -83.76 | |
|  | dBm/36 MHz | -83.76 | | -83.76 |
| Propagation Condition | - | AWGN | | | |
| Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 2: SL-RSSI1, SL-RSSI2, Io1 and Io2 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SL-RSSI1 is the SL-RSSI level measured on the slot# 0 - 3 with “SFN mod 5 = 0”.  Note 4: SL-RSSI2 is the SL-RSSI level measured on the slot# 4-9 with “SFN mod 5 = 0” and the slot# 0-9 with “SFN mod 5 = 1,…, 4”.  Note 5: Io1 is the Io level measured on the slot# 0 - 3 with “SFN mod 5 = 0”.  Note 6: Io2 is the Io level measured on the slot# 4-9 with “SFN mod 5 = 0” and the slot# 0-9 with “SFN mod 5 = 1,…, 4”.  Note 7: The UE is only required to be tested in one of the supported test configurations.  Note 8: Including test tolerance given in Annex F. | | | | | |

Table 9.1.5.1.5-2: Cell specific Test Parameters for NR SA FR1 congestion control measurement for concurrent operation

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 |
| RF Channel Number | |  | 2 |
| Duplex Mode | Config 1 |  | FDD |
| Config 2,3 |  | TDD |
| TDD configuration | Config 1 |  | Not Applicable |
| Config 2 |  | TDDConf.1.1 |
| Config 3 |  | TDDConf.2.1 |
| Channel Bandwidth (BWchannel) | Config 1,2 | MHz | 10: NRB,c = 52 |
| Config 3 | 40: NRB,c = 106 |
| Initial BWP Configuration | |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP Configuration | |  | DLBWP.1.1  ULBWP.1.1 |
| DRX Cycle | |  | N/A |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD |
| Config 2 |  | SR.1.1 TDD |
| Config 3 |  | SR.2.1 TDD |
| CORESET Reference Channel | Config 1 |  | CR.1.1 FDD |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.1.1 FDD |
| Config 2 |  | CCR.1.1 TDD |
| Config 3 |  | CCR.2.1 TDD |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 |
| Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | |  | SMTC.2 |
| OCNG Patterns | |  | OP.1 |
| EPRE ratio of PSS to SSS | | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Noc Note2 | Config 1,2,3 | dBm/15 kHz | -98 |
| Noc Note2 | Config 1,2 | dBm/SCS | -98 |
| Config 3 | -95 |
| Ês/Noc | | dB | 3 |
| SS-RSRP Note3 | Config 1,2 | dBm/SCS | -95 |
| Config 3 | -92 |
| Io Note 3 | Config 1,2 | dBm/9.36 MHz | -65.2 |
| Config 3 | dBm/38.1 MHz | -59.2 |
| 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: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

During T1, all of active sidelink UEs are configured to transmit PSCCH/PSSCH every 50ms such that the SL-RSSI on the resources occupied by active sidelink UEs is lower than *threshS-RSSI-CBR.* Then the measured CBR is lower than *c1-Threshold*. No CBR measurement reporting shall be triggered.

During T2, all of active sidelink UEs are configured to transmit PSCCH/PSSCH every 50ms such that the SL-RSSI on the resources occupied by active sidelink UEs is higher than *threshS-RSSI-CBR*. Then the measured CBR is higher than *c1-Threshold*. CBR measurement reporting shall be triggered.

The rate of correct events observed during repeated tests shall be at least 98%.

#### 9.1.5.2 NR SA FR1 congestion control measurement for PC5-only operation

9.1.5.2.1 Test purpose

The purpose of this test is to verify the congestion control measurement requirements in TS 38.133 [6] clause 12.6.

9.1.5.2.2 Test applicability

This test applies to all types of NR UEs from release 16 onwards and supporting only sidelink communication.

9.1.5.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 9.1.5.0.1

The normative reference for this requirement is TS 38.133 [6] clause A.9.1.5.

9.1.5.2.4 Test description

9.1.5.2.4.1 Initial conditions

Configure the test equipment and the DUT according to the parameters in Table 9.1.5.2.4.1-1.

Table 9.1.5.2.4.1-1: Initial conditions for NR SA FR1 congestion control measurement for PC5-only operation

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | PC5: As specified in TS 38.508-1 [14] clause 4.3.1.8. | | |
| Channel bandwidth | PC5: As specified by the test configuration selected from Table 9.1.5.2.4.1-2. | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.9.1FFS | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.7.1FFS |
| Exceptions to connection diagram | N/A | |  |

1. The parameter settings for the NR sidelink communication are pre-configured according to TS 38.508-1 [14] clause 4.10.1.

2. Message content exceptions are given in clause 9.1.5.2.4.3

3. There are 4 NR-SS-UEs (active NR sidelink UE i, i = 0,1,2,3) specified in this test. Active NR sidelink UEs are configured according to the generic parameters in Table 9.1.5.2.4.1-2.

Table 9.1.5.2.4.1-2: NR sidelink test parameters for NR SA FR1 congestion control measurement for PC5-only operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | HD carrier in Band n47 or n38 |
| Channel Bandwidth (BWchannel)Note 2 | | MHz | 20 (NRB,c = 50) or  40 (NRB,c = 100) |  |
| SCS | | kHz | 30 |  |
| V2X sidelink communication configuration | |  | As specified in Annex A.11.2 | IE values unless specified otherwise in this test. |
| sl-TimeResource-r16 included in SL-ResourcePool | |  | 11111111111111111111  11111111111111111111  11111111111111111111  11111111111111111111  11111111111111111111 | Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213[8]) |
| sl-NumSubchannel-r16 included in SL-ResourcePool | |  | 1 | ENUMERATED {n1} |
| sl-SubchannelSize included in SL-ResourcePool | |  | 10 | ENUMERATED {n10} |
| sl-StartRB-Subchannel-r16 | |  | 0 |  |
| *threshS-RSSI-CBR* | |  | 19 | Corresponding -74dBm as defined in Section 6.3.8 in TS38.331[13] |
| Number of Active Sidelink UEs every 50ms | |  | 4 | Active Sidelink UE i, where i = 0, 1, 2, 3 |
| Active Sidelink UEs (i = 0,1,2,3) | V2X sidelink Communication configuration |  | As specified in Table A.3.21.2-1  and A.3.21.2-3 | IE values unless specified otherwise in this test. |
| sl-TimeResource-r16 included in SL-ResourcePool |  | {1i}Note1 | Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213[8]) |
| sl-NumSubchannel-r16 included in SL-ResourcePool |  | 1 |  |
| sl-SubchannelSize included in SL-ResourcePool |  | 10 |  |
| Timing offset between V2X UE and Active Sidelink UEs | | μs | CP/2 | Synchronous |
| sl-CBR-RangeConfigList-r16 | |  | [2 100] | Two ranges are defined by this list: 0 to 0.02 and 0.02 to 1 |
| sl-CR-Limit-r16 | |  | 10000 and 10 | Corresponding to the two CBR ranges: if CBR > 0.02, CR ≤ 0.001, otherwise CR > 0.001 |
| sl-Thres-RSRP-r16 | |  | 12 | Configure threshold <-98.64dBm/30kHz to ensure not blocking transmission |
| Hysteresis | |  | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| T1 | | s | 5 |  |
| T2 | | s | 5 |  |
| Note 1: {1i}is a sequence of ninety nine 0’s with one 1 in i+1’th position.  Note 2: The UE is only required to be tested in one of the channel bandwidths. | | | | |

9.1.5.2.4.2 Test procedure

In this test there is 4 active sidelink UEs (denoted as UE i, i = 0,1,2,3). There are 1 active cells (Cell 1) and no GNSS during the whole test. DUT and all active sidelink UEs select Cell 1 as synchronization reference source. All active sidelink UEs are scheduled to transmit PSCCH/PSSCH with 50ms periodicity.

The test consists of two successive time periods with time duration of T1 and T2 respectively.

1. Ensure the UE is in state 4-A with generic procedure parameters Test Mode = *On* according to TS 38.508-1 [14] clause 4.4A.2.

2. The SS switches on all active sidelink UEs, triggers all active sidelink UEs to transmit PSCCH/PSSCH with 50ms periodicity.

3. The SS sends AT command +CCUTLE to close test loop function and trigger UE to transmit.

4. The SS sets parameters according to T1 in Table 9.1.5.2.5-1. T1 starts.

5. During T1, the SS recodes the number of resources occupied by the PSSCH transmission of the UE under test (denoted as Nresource, low CBR:) until T1 expires. If Nresource, low CBR > 10, then count as success for the event "high CR limit", otherwise count a fail for the event "high CR limit".

6. When T1 expires, the SS shall switch the power setting from T1 to T2 in Table 9.1.5.2.5-1. T2 starts.

7. During T2, the SS recodes the number of resources occupied by the PSSCH transmission of the UE under test (denoted as Nresource, high CBR:) until T2 expires. If Nresource, low CBR ≤ 10, then count as success for the event "low CR limit", otherwise count a fail for the event "low CR limit".

8. When T2 expires, the SS sends AT command +CCUTLE to open test loop function and trigger UE to stop transmitting.

9. Repeat step 3-7 until the confidence level according to Table G.3.3-1 is achieved.

9.1.5.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 9.1.5.2.4.3-1: SL-ResourcePool (UE under test)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 7.3.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ResourcePool-r16 ::= SEQUENCE { |  |  |  |
| sl-ThreshS-RSSI-CBR-r16 | 19 | actual value is -112 + 2\*19 = -74 dBm |  |
| sl-UE-SelectedConfigRP-r16 SEQUENCE { |  |  |  |
| sl-CBR-PriorityTxConfigList-r16 | SL-CBR-PriorityTxConfigList | Table 9.1.5.2.4.3-2 |  |
| sl-ResourceReservePeriodList-r16 SEQUENCE (SIZE (1..16)) OF SL-ResourceReservePeriod-r16 { | 2 entries |  |  |
| SL-ResourceReservePeriod-r16[1] CHOICE { |  | entry 1 |  |
| sl-ResourceReservePeriod1-r16 | ms0 |  |  |
| } |  |  |  |
| SL-ResourceReservePeriod-r16[2] CHOICE { |  | entry 2 |  |
| sl-ResourceReservePeriod2-r16 | 50 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| sl-FilterCoefficient-r16 | fc0 | L3 filtering is disabled |  |
| sl-TimeResource-r16 | ones(1,100) | ones(1,100) is a sequence of 100 "1"s |  |
| } |  |  |  |

Table 9.1.5.2.4.3-2: SL-CBR-PriorityTxConfigList (Table 9.1.5.2.4.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 4.6.6-5 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-CBR-PriorityTxConfigList -r16 ::= SEQUENCE (SIZE (1..8)) OF SL-PriorityTxConfigIndex-r16 { | 8 entries |  |  |
| SL-PriorityTxConfigIndex-r16[k, k=1..8] SEQUENCE { |  | entry k |  |
| sl-DefaultTxConfigIndex-r16 | Not present |  |  |
| sl-Tx-ConfigIndexList-r16 SEQUENCE (SIZE (1.. maxCBR-Level-r16)) OF SL-TxConfigIndex-r16 { | 2 entries |  |  |
| SL-TxConfigIndex-r16[1] | 0 | entry 1  First entry in sl-CBR-PSSCH-TxConfigList is used for the first CBR range in sl-CBR-RangeConfigList, i.e. 0<=CBR<0.02 |  |
| SL-TxConfigIndex-r16[2] | 1 | entry 2  Second entry in sl-CBR-PSSCH-TxConfigList is used for the second CBR range in sl-CBR-RangeConfigList, i.e. 0.02<=CBR<1 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.5.2.4.3-3: SL-CBR-CommonTxConfigList (UE under test)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.6-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-CBR-CommonTxConfigList-r16 ::= SEQUENCE { |  |  |  |
| sl-CBR-RangeConfigList-r16 SEQUENCE (SIZE (1..maxCBR-Config-r16)) OF SL-CBR-LevelsConfig-r16 { | 1 entry |  |  |
| SL-CBR-LevelsConfig-r16[1] SEQUENCE (SIZE (1..maxCBR-Level-r16)) OF SL-CBR-r16 { | 2 entries | entry 1 |  |
| SL-CBR-r16[1] | 2 | entry 1  0<=CBR<0.02 |  |
| SL-CBR-r16[2] | 100 | entry 2  0.02<=CBR<1 |  |
| } |  |  |  |
| } |  |  |  |
| sl-CBR-PSSCH-TxConfigList-r16 SEQUENCE (SIZE (1.. maxTxConfig-r16)) OF SL-CBR-PSSCH-TxConfig-r16 { | 2 entries |  |  |
| SL-CBR-PSSCH-TxConfig-r16[1] SEQUENCE { |  | entry 1 |  |
| sl-CR-Limit-r16 | 10000 | 0.001 <CR <=1 |  |
| sl-TxParameters-r16 | Not present |  |  |
| } |  |  |  |
| SL-CBR-PSSCH-TxConfig-r16[2] SEQUENCE { |  | entry 2 |  |
| sl-CR-Limit-r16 | 10 | CR <=0.001 |  |
| sl-TxParameters-r16 | Not present |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.5.2.4.3-4: SL-ResourcePool (active sidelink UE 0~3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 7.3.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| SL-ResourcePool-r16 ::= SEQUENCE { |  |  |  |
| sl-UE-SelectedConfigRP-r16 SEQUENCE { |  |  |  |
| sl-ResourceReservePeriodList-r16 SEQUENCE (SIZE (1..16)) OF SL-ResourceReservePeriod-r16 { | 2 entries |  |  |
| SL-ResourceReservePeriod-r16[1] CHOICE { |  | entry 1 |  |
| sl-ResourceReservePeriod1-r16 | ms0 |  |  |
| } |  |  |  |
| SL-ResourceReservePeriod-r16[2] CHOICE { |  | entry 2 |  |
| sl-ResourceReservePeriod2-r16 | 50 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| sl-TimeResource-r16 | {1i} | {1i} is a sequence of ninety-nine 0’s with one 1 in (mod(i,100)+1)’th position  i = 0,1,2,3 | sidelink UE i |
| } |  |  |  |

Table 9.1.5.2.4.3-5: Physical layer parameters for SCI format 1-A (Sidelink UE 0~3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14] Table 4.3.6.2.1.1-1 | | | |
| Parameter | Value | Value in binary | Condition |
| Frequency resource assignment | Not present | - |  |
| Time domain resource assignment | Indicates only one resource is scheduled | "00000"B |  |
| Resource reservation period | Indicates the 2nd entry in sl-ResourceReservePeriodList, i.e. 50 ms | "1"B |  |

Table 9.1.5.2.4.3-6: +CCUTLE (Test procedure, step 3)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Close and Transmit |

Table 9.1.5.2.4.3-7: +CCUTLE (Test procedure, step 8)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Open |

9.1.5.2.5 Test requirement

Active sidelink UE specific test parameters for UE 0~UE 4 are given in Table 9.1.5.2.5-1.

Table 9.1.5.2.5-1: SyncRef UE Specific Test Parameters for NR SA FR1 congestion control measurement for PC5-only operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Active Sidelink UE *i* (*i* = 0, 1, 2, 3) | | |
| T1 | T2 | |
| NR RF Channel Number |  | 1 | | |
| Channel Bandwidth (BWchannel) Note 7 | MHz | 20 (NRB,c = 50) or 40 (NRB,c = 100) | | |
| PSCCH RMC (defined in A.3.21.3) |  | CC.1A HD | | |
| PSSCH RMC (defined in A.3.21.3) |  | CD.1A HD | | |
| Noc Note1 | dBm/30 kHz | -104.55 Note 8 | | |
| Ês/Noc | dB | 4.35 | | 13.62 Note 8 |
| SL-RSSI1 Note 2,3 | dBm/3.6 MHz | --78.05 | | -69.95 |
| SL-RSSI2 Note 2,4 | dBm/3.6 MHz | -83.76 | | -83.76 |
| Io1 Note 2,5 | dBm/18 MHz | -78.05 | | -69.95 |
|  | dBm/36 MHz | -78.05 | | -69.95 |
| Io2 Note 2,6 | dBm/18 MHz | -83.76 | | -83.76 |
|  | dBm/36 MHz | -83.76 | | -83.76 |
| Propagation Condition | - | AWGN | | |
| Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 2: SL-RSSI1, SL-RSSI2, Io1 and Io2 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SL-RSSI1 is the SL-RSSI level measured on the slot# 0 - 3 with “SFN mod 5 = 0”.  Note 4: SL-RSSI2 is the SL-RSSI level measured on the slot# 4-9 with “SFN mod 5 = 0” and the slot# 0-9 with “SFN mod 5 = 1,…, 4”.  Note 5: Io1 is the Io level measured on the slot# 0 - 3 with “SFN mod 5 = 0”.  Note 6: Io2 is the Io level measured on the slot# 4-9 with “SFN mod 5 = 0” and the slot# 0-9 with “SFN mod 5 = 1,…, 4”.  Note 7: The UE is only required to be tested in one of the supported test configurations.  Note 8: Including test tolerance given in Annex F. | | | | |

During T1, all of active sidelink UEs are configured to transmit PSCCH/PSSCH every 50ms such that the SL-RSSI on the resources occupied by active sidelink UEs is lower than *threshS-RSSI-CBR.* Then the measured CBR is lower than 2%. The UE needs to ensure its channel occupancy ratio higher than 1% in T1.

During T2, all of active sidelink UEs are configured to transmit PSCCH/PSSCH every 50ms such that the SL-RSSI on the resources occupied by active sidelink UEs is higher than *threshS-RSSI-CBR*. Then the measured CBR is higher than 2%. The UE needs to ensure its channel occupancy ratio lower than 1% in T2.

The rate of correct events observed during repeated tests shall be at least 98%.

### 9.1.6 Congestion control measurement

#### 9.1.6.0 Minimum conformance requirements

##### 9.1.6.0.1 Minimum conformance requirements for interruption to WAN due to NR sidelink communication

This clause contains the requirements related to the interruptions on the PCell/serving cell due to NR sidelink communication.

A UE capable of NR sidelink communication may indicate its interest (initiation or termination) in NR sidelink communication to the connected gNB using IE *SidelinkUEInformationNR* in TS 38.331 [13].

The UE is allowed an interruption of up to the duration shown in Table 9.1.6.0.1-1 on the PCell/serving cell during the RRC reconfiguration procedure that includes the V2X sidelink communication configuration message *SL-ConfigDedicatedNR* in TS 38.331 [13] (setup and release). This interruption is for both uplink and downlink of the PCell/serving cell.

Table 9.1.6.0.1-1: Interruption length at V2X RRC reconfiguration

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length  (number of slots) |
| 0 | 1 | 2 |
| 1 | 0.5 | 3 |
| 2 | 0.25 | 5 |
| 3 | 0.125 | 9 |

The normative references for this requirement are TS 38.133 [6] clause 12.7.

#### 9.1.6.1 NR SA FR1 interruption to WAN due to NR sidelink communication

9.1.6.1.1 Test purpose

The purpose of this test is to verify the requirements related to interruptions due to NR sidelink communication as specified in TS 38.133 [6] clause 12.7.1, when UE is out of coverage on the NR sidelink carrier and is associated with a serving cell on a non-sidelink carrier.

9.1.6.1.2 Test applicability

This test applies to all types of NR UEs from release 16 onwards and supporting NR Uu and sidelink communication.

9.1.6.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 9.1.6.0.1

The normative reference for this requirement is TS 38.133 [6] clause A.9.1.6.1.

9.1.6.1.4 Test description

9.1.6.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 9.1.6.1.4.1-1.

Table 9.1.6.1.4.1-1: Supported test configurations for FR1 NR Cell

|  |  |
| --- | --- |
| Configuration | Description |
| 9.1.6.1-1 | NR Uu: FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 9.1.6.1-2 | NR Uu: TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 9.1.6.1-3 | NR Uu: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Configure the test equipment and the DUT according to the parameters in Table 9.1.6.1.4.1-2.

Table 9.1.6.1.4.1-2: Initial conditions for NR SA FR1 interruption to WAN due to NR sidelink communication

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | Uu&PC5: As specified in TS 38.508-1 [14] clause 4.3.1.8.2.1. | | |
| Channel bandwidth | Uu: As specified by the test configuration selected from Table 9.1.6.1.4.1-1  PC5: As specified by the test configuration selected from Table 9.1.6.1.4.1-4 | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.9.3 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.7.3 |
| Exceptions to connection diagram | N/A | |  |

1. The parameter settings for the NR sidelink communication are pre-configured according to TS 38.508-1 [14] clause 4.10.1.

2. Message content exceptions are defined in clause 9.1.6.1.4.3

3. There is one NR Uu carrier and one NR Cell (Cell 1) specified in this test. Cell 1 is configured according to Annex C.1.1 and C.1.2.

4. Test parameters for Cell 1 are given in Table 9.1.6.1.4.1-3.

5. There are 8 active sidelink UEs (UE i, i=0,1,...,7) in this test. Test parameters for active sidelink UEs are given in Table 9.1.6.1.4.1-3 and Table 9.1.6.1.4.1-4.

Table 9.1.6.1.4.1-3: General test parameters for NR SA FR1 interruption to WAN due to NR sidelink communication

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number | - | 1, 2 | RF channel 1 is non-sidelink carrier  RF channel 2 is sidelink carrier |
| SCS | kHz | 30 |  |
| Active cell | - | Cell 1 | PCell on RF channel number 1 |
| CP length of Cell 1 | - | Normal |  |
| T1 | s | 5.12 |  |
| T2 | s | Up to receiving RRC reconfiguration setup complete from the UE, or up to 2 second if UE does not transmit *SidelinkUEInformationNR* during this period. |  |
| T3 | s | 10 |  |

Table 9.1.6.1.4.1-4: Sidelink test parameters for NR SA FR1 interruption to WAN due to NR sidelink communication

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | | - | 2 | HD carrier in Band n47 or n38 |
| Channel Bandwidth (BWchannel) Note 1 | | MHz | 20 (NRB,c = 50) or  40 (NRB,c = 100) |  |
| Sidelink Communication configuration | | - | As specified in Annex A.11.2 | IE values unless specified otherwise in this test. |
| Number of Active Sidelink UEs | | - | 8 | Active Sidelink UE i = 0, .., 7 |
| Active Sidelink UEs (UE i = 0, .., 7) | Sidelink Communication configuration | - | As specified in Annex A.11.2 | IE values unless specified otherwise in this test. |
| PSCCH Reference Measurement Channel | - | CC.1A HD | As specified in Table A.11.2.2-1 |
| PSSCH Reference Measurement Channel | - | CD.1A HD | As specified in Table A.11.2.2-2 |
| sl-NumSubchannel-r16 included in SL-ResourcePool | - | 1 | Indicates the number of sub-channels for TX resource pool |
| sl-StartRB-Subchannel-r16 included in SL-ResourcePool | - | i | Indicates the lowest RB index of the subchannel with the lowest index for active Sidelink UE i = 0, .., 7. |
| PSBCH-RSRP | dBm/30kHz | -95 |  |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | | | | |

9.1.6.1.4.2 Test procedure

In this test there is one active cell (Cell 1) and 8 active sidelink UEs transmitting sidelink communication. The UE under test and all active sidelink UEs select the active cell as synchronization source.

The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively.

For this test, the UE is triggered by the test loop function or the upper layers to monitor NR sidelink communication.

1. Ensure the UE is in state 1N-B with generic procedure parameters Test Mode = *On* according to TS 38.508-1 [14] clause 4.4A.2.

2. The SS switches on all active sidelink UEs. Active sidelink UEs are configured to transmit PSCCH/PSSCH according to the parameters specified in Table 9.1.6.1.4.1-4.

3. The SS sends AT command +CCUTLE to close test loop function and trigger UE to receive.

4. The SS sets parameters according to T1 in Table 9.1.6.1.5-1. T1 starts.

5, When T1 expires, the SS sends a paging message including matched *ng-5G-S-TMSI*.

6. The UE sends an *RRCSetupRequest* message.

7. The SS sends an *RRCSetup* message.

8. The UE sends an *RRCSetupComplete* message.

9. The SS shall switch the power setting from T1 to T2 in Table 9.1.6.1.5-1 upon receiving the *RRCSetupComplete* message sent by the UE, T2 starts.

10. If the UE sends a *SidelinkUEInformationNR* message within 2 seconds from the beginning of T2. continues with step 11, otherwise skips to step 13.

11. The SS sends an *RRCReconfiguration* message with *SL-ConfigDedicatedNR* to provide sidelink communication configuration to the UE.

12. The UE sends a *RRCReconfigurationComplete* message.

13. T2 expires. The SS shall switch the power setting from T2 to T3 in Table 9.1.6.1.5-1. T3 starts.

14. During T3, The SS continuously schedules the UE to perform DL reception in every DL slots and monitoring corresponding ACK/NACK feedback in UL slots.

15. If the SS observes on missing ACK/NACKs until T3 expiring, then count a success for the test, otherwise count a fail for the test.

16. When T3 expires, the SS sends AT command +CCUTLE to open test loop function.

9.1.6.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 9.1.6.1.4.3-1: +CCUTLE (Test procedure, step 3)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Close and Receive |

Table 9.1.6.1.4.3-2: +CCUTLE (Test procedure, step 16)

|  |
| --- |
| Derivation Path: 38.508-1[14] Table 4.7B-1 with condition Open |

9.1.6.1.5 Test requirement

Cell-specific test parameters for Cell 1 are given in Table 9.1.6.1.5-1.

Table 9.1.6.1.5-1: Cell specific test parameters for NR SA FR1 interruption to WAN due to NR sidelink communication

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | |
| T1 | T2 | T3 |
| RF Channel Number | |  | 1 | | |
| UE RRC state | |  | IDLE | CONNECTED | |
| Duplex Mode | Config 1 |  | FDD | | |
| Config 2,3 |  | TDD | | |
| TDD configuration | Config 1 |  | Not Applicable | | |
| Config 2 |  | TDDConf.1.1 | | |
| Config 3 |  | TDDConf.2.1 | | |
| Channel Bandwidth (BWchannel) | Config 1,2 | MHz | 10: NRB,c = 52 | | |
| Config 3 | 40: NRB,c = 106 | | |
| Initial BWP Configuration | |  | DLBWP.0.1  ULBWP.0.1 | | |
| Dedicated BWP Configuration | |  | DLBWP.1.1  ULBWP.1.1 | | |
| DRX Cycle | |  | N/A | | |
| PDSCH Reference measurement channel | Config 1 |  | N/A | None | SR.1.1 FDD |
| Config 2 |  | N/A | None | SR.1.1 TDD |
| Config 3 |  | N/A | None | SR.2.1 TDD |
| CORESET Reference Channel | Config 1 |  | CR.1.1 FDD | | |
| Config 2 |  | CR.1.1 TDD | | |
| Config 3 |  | CR.2.1 TDD | | |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.1.1 FDD | | |
| Config 2 |  | CCR.1.1 TDD | | |
| Config 3 |  | CCR.2.1 TDD | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 | | |
| Config 3 |  | SSB.2 FR1 | | |
| SMTC Configuration | |  | SMTC.2 | | |
| OCNG Patterns | |  | OP.1 | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Noc Note2 | Config 1,2,3 | dBm/15 kHz | -98 | | |
| Noc Note2 | Config 1,2 | dBm/SCS | -98 | | |
| Config 3 | -95 | | |
| Ês/Noc | | dB | 3 | | |
| SS-RSRP Note3 | Config 1,2 | dBm/SCS | -95 | | |
| Config 3 | -92 | | |
| Io Note 3 | Config 1,2 | dBm/9.36 MHz | -65.3 | | |
| Config 3 | dBm/38.1 MHz | -59.2 | | |
| Antenna Configuration | |  | 1x2 | | |
| 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: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

During T1, the UE is in RRC\_IDLE and monitoring the sidelink communication transmission from other active Sidelink UEs on the sidelink communication resources.

During T2, the test system establishes a RRC connection with the UE. No PDSCH is scheduled for UE, and the UE is expected to transmit *SidelinkUEInformationNR* indicating *sl-RxInterestedFreqList*. On reception of *SidelinkUEInformationNR*, thetest system shall send *RRCReconfiguration* message to the UE and wait for the UE to respond with *RRCReconfigurationComplete* message before transitioning to T3. If the UE does not transmit *SidelinkUEInformationNR* for up to 2 second, the test system shall transition to T3.

During T3, the UE is continuously scheduled with PDSCH on PCell downlink. The test system will count the missed ACK/NACKs during T3 to verify the allowed interruptions during NR sidelink communication. 100% of all expected ACK/NACKs shall be transmitted by the UE.

# 10 EN-DC Tests with NR PSCell under CCA and Other NR Cells in FR1

Editor’s note: Test cases for EN-DC with NR PSCell under CCA and SCell under CCA are also included here.

## 10.0 General

### 10.0.1 Principle of testing for UE capable of EN-DC with only NR bands with shared spectrum access

Test cases in table 10.0.1-1 are defined for UE capable of EN-DC with only NR band(s) with shared spectrum access and are not required for UE supporting also other NR band(s) (i.e. band with no shared spectrum access). The EN-DC configurations are defined in clause of 5.5B of TS 38.101-3 [4].

Table 10.0.1-1: Test cases applicable to UE supporting EN-DC with only NR bands with shared spectrum access

|  |  |  |
| --- | --- | --- |
| Test category | Section | Test case |
| Active BWP switching | 10.3.5.2.1 | EN-DC FR1 E-UTRAN – NR PSCell under CCA FR1 DL active BWP switch in non-DRX in synchronous EN-DC |
| 10.3.5.2.2 | EN-DC FR1 E-UTRAN – NR PSCell under CCA FR1 DL active BWP switch with FR1 SCell in non-DRX in synchronous EN-DC |
| 10.3.5.3.1 | EN-DC FR1 E-UTRAN – NR PSCell under CCA FR1 DL active BWP switch in non-DRX in synchronous EN-DC |

## 10.1 RRC\_CONNECTED state mobility

FFS

## 10.2 Timing

### 10.2.1 UE transmit timing

#### 10.2.1.0 Minimum conformance requirements

##### 10.2.1.0.1 Minimum conformance requirements for UE transmit timing accuracy

Same as section 4.4.1.0.1 with the following additional considerations:

The term reference cell on a carrier frequency subject to CCA is not available at the UE refers to when at least one SSB is configured by gNB, but the first two successive candidate SSB positions for the same SSB index within the discovery burst transmission window are not available during at least one discovery burst transmission window, at the UE due to DL CCA failures at gNB during the last 1280 ms; otherwise the reference cell on the carrier frequency subject to CCA is considered as available at the UE.

If the UE uses a reference cell on a carrier frequency subject to CCA for deriving the UE transmit timing, then the UE shall meet all the transmit timing requirements defined in TS 38.133 [6] clause 7.1.2 provided that the reference cell is available at the UE. If the reference cell is not available at the UE on a carrier frequency subject to CCA, then the UE is allowed to transmit in the uplink provided that the UE meets all the transmit timing requirements defined in TS 38.133 [6] clause 7.1.2; otherwise the UE shall not transmit any uplink signal.

If a reference cell on a carrier frequency belonging to the PTAG, which is subject to CCA, is not available at the UE then the UE is allowed to use any of available activated SCell(s) at the UE in PTAG as a new reference cell. If the SCell used as reference cell is deactivated, or becomes not available, the UE is allowed to use another active serving cell in PTAG as new reference cell.

If a reference cell on a carrier frequency belonging to the STAG, which is subject to CCA is not available at the UE then the UE is allowed to use any of available activated SCell(s) at the UE in STAG as a new reference cell.

The normative reference for this requirement is TS.38.133 [6] clause 7.1.2.

#### 10.2.1.1 EN-DC FR1 UE Transmit Timing Test with PSCell under DL CCA

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS

10.2.1.1.1 Test purpose

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb when PSCell is subject to DL CCA and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits.

10.2.1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a UL shared spectrum NR carrier.

10.2.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.2.1.0.1.

The normative reference for this requirement is TS.38.133 [6] clause A.10.2.1.1.

10.2.1.1.4 Test Description

10.2.1.1.4.1 Initial Conditions

This test can be run in one of the configurations defined in Table 10.2.1.1.4.1-1.

Table 10.2.1.1.4.1-1: Supported test configurations for EN-DC FR1 UE Transmit Timing Test with PSCell under DL CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 10.2.1.1-1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.2.1.1-2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| NOTE: The UE is only required to be tested in one of the supported test configurations in FR1 depending on UE capability. | |

Configure the test equipment and the DUT according to the parameters in Table 10.2.1.1.4.1-2

Table 10.2.1.1.4.1-2: Initial conditions for EN-DC FR1 UE Transmit Timing Test with PSCell under DL CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.2.1.1.4.1-1 | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | N/A | |  |

1. Message contents are defined in clause 10.2.1.1.4.3.

2. There are one E-UTRAN carrier and one NR carrier cells specified in the test. Cell 1 is the PCell on E-UTRAN carrier, Cell 2 is the PSCell on NR carrier. Cell 2 is subject to CCA. Cell 1 is the cell used for connection setup with the power level set according to Table A.6B.1-1. Cell 2 shall be configured according to clauses C.1.1 and C.1.2.

10.2.1.1.4.2 Test procedure

The test consists of two cells, a single E-UTRA cell (Pcell), and a single NR cell (PSCell) subject to CCA. Cell 2 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The downlink timing of the PSCell is changed and the changes in UE transmit timing are observed. The transmit timing is verified by the UE transmitting SRS used as a measurement reference facilitating the SS timing estimation. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

The test sequence shall be carried out in RRC\_CONNECTED for every test case.

Following will be the test sequence for this test:

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [6] clause 4.5.

2. Set up E-UTRA PCell according to parameters given in Table A.6B.1-1 and setup NR PSCell according to parameters given in Table 10.2.1.1.5-1.

3. The SS shall transmit an RRCConnectionReconfiguration message configuring the UE with the message content defined in clause 10.2.1.1.4.3.

4. The UE shall transmit RRCConnectionReconfigurationComplete message. Afterwards, the SS shall enable DL and UL CCA model according to Table 10.2.1.1.5-1

5. After connection set up with the cell and during 2 seconds before DL timing adjustment, the test equipment shall monitor all SRS transmissions and verify that, for each received SRS, the timing of the NR cell is within (NTA + NTA\_offset) ×Tc ± Te of the first detected path of DL SSB:

a. The NTA offset value (in Tc units) is 25600 for FR1.

b. The Te values depend on the DL and UL SCS for which the test is being run and are given in Table 10.2.1.1.5‑4.

6. The test system shall adjust the timing of the DL path by values given in Table 10.2.1.1.4.2-1. For Test 2, the DL timing change shall be applied within the first half of the DRX cycle upon expiration of the preceding DRX ON duration.

Table 10.2.1.1.4.2-1: Adjustment Value for EN-DC FR1 UE Transmit Timing Test with PSCell under DL CCA

|  |  |  |
| --- | --- | --- |
| SCS of SSB signals (kHz) | Adjustment Value | |
|  | Test1 | Test2 |
| 30 | +32\*64Tc | +16\*64Tc |

7. The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in Table 10.2.1.1.5-5. This will only be done for Test1. The test system samples the UE Transmit Timing once per SRS transmission (as per configured SRS periodicity). To check Rule 1, the SS shall check that the maximum time adjustment step size Tq between one SRS transmission to next consecutive SRS transmission of a valid UL slot is within Rule 1 as specified in clause 10.2.1.0.1 and Table 10.2.1.0.1-3. To check that the minimum adjustment rate is within Rule 2 as specified in clause 10.2.1.0.1 and Table 10.2.1.0.1-3, the SS shall measure the change in SRS transmission timing over a 1 + offset seconds sliding window (offset in ms to the next consecutive SRS transmission), with step size p (where p is the periodicity of SRS) , as long as the resulting slot is a valid UL slot. To check that the maximum adjustment rate is within Rule 3 as specified in clause 10.2.1.0.1 and Table 10.2.1.0.1-3, the SS shall measure the change in SRS transmission timing over a 200ms - offset sliding window of previous SRS transmission, with step size p (where p is the periodicity of SRS) , as long as the resulting slot is a valid UL slot. The three rules apply until the UE transmit timing offset is within the limits specified in 10.2.1.0.1 and Table 10.2.1.0.1-3 with respect to the first detected path (in time) of the corresponding downlink frame of Cell 1. The test system will wait till evaluation interval of T seconds is met to ensure UE transmit timing is stable at the end of the step, where T=.DL\_timing\_change[Ts]/[5.5+TT]Ts and DL\_timing\_change is specified in Table 10.2.1.1.4.2-1.

8. After the UE transmit timing is within the limits specified in step 7, and during 2 seconds, the test system shall monitor all SRS transmissions and verify that, for each received SRS, the UE transmit timing offset stays within (NTA + NTA\_offset) ×Tc ± Te of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

10.2.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.2.1.1.4.3-0: Common Exception messages for EN-DC FR1 UE Transmit Timing Test with PSCell under DL CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.9-1  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

Table 10.2.1.1.4.3-1: *SRS-Config* : Additional test requirement  
for EN-DC FR1 UE Transmit Timing Test with PSCell under DL CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.331 [6], clause 6.3.2 | | | |
| Information Element | Value/remark | Comment | Condition |
| SRS-Config ::= SEQUENCE { |  |  |  |
| srs-ResourceSetToAddModList SEQUENCE (SIZE(0..maxNrofSRS-ResourceSets)) OF SEQUENCE { |  |  |  |
| SRS-ResourceSet[1] SEQUENCE { |  | entry 1 |  |
| resourceType CHOICE { |  |  |  |
| periodic SEQUENCE { |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| srs-ResourceToAddModList SEQUENCE (SIZE(1..maxNrofSRS-Resources)) OF SEQUENCE { |  |  |  |
| SRS-Resource[1] SEQUENCE { |  | entry 1 |  |
| freqHopping SEQUENCE { |  |  |  |
| c-SRS | 14 |  | SCS15 |
| 25 |  | SCS30 |
| } |  |  |  |
| groupOrSequenceHopping | neither |  |  |
| resourceType CHOICE { |  |  |  |
| periodic SEQUENCE { |  |  |  |
| periodicityAndOffset-p CHOICE { |  |  |  |
| sl1 | 0 |  | Test 1 |
| sl320 | 3 |  | Test 2 and SCS15 |
| sl640 | 5 |  | Test 2 and SCS30 |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 10.2.1.1.4.3-2: *DRX-Config* : Additional test requirement  
for EN-DC FR1 UE Transmit Timing Test with PSCell under DL CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.331 [6], clause 6.3.2 | | | |
| Information Element | Value/remark | Comment | Condition |
| DRX-Config ::= CHOICE { |  |  |  |
| drx-onDurationTimer CHOICE { |  |  |  |
| milliSeconds | ms6 |  |  |
| } |  |  |  |
| drx-InactivityTimer | ms1 |  |  |
| drx-HARQ-RTT-TimerDL | 56 |  |  |
| drx-HARQ-RTT-TimerUL | 56 |  |  |
| drx-RetransmissionTimerDL | sl1 |  |  |
| drx-RetransmissionTimerUL | sl1 |  |  |
| drx-LongCycleStartOffset CHOICE { |  |  |  |
| ms320 | 0 |  |  |
| } |  |  |  |
| shortDRX |  | NOT PRESENT |  |
| } |  |  |  |

10.2.1.1.5 Test Requirements

Table 10.2.1.1.5-1: Cell Specific Test Parameters for EN-DC FR1 UE Transmit Timing Test with PSCell under DL CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Config | Test1 | Test2 |
| SSB ARFCN | |  | 1,2 | Freq1 | Freq1 |
| TDD configuration | |  | 1,2 | TDDConf.1.1 CCA | |
| BWchannel | | MHz | 1,2 | 40: NRB,c = 106 | |
| Initial BWP Configuration | |  | 1,2 | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP Configuration | |  | 1,2 | DLBWP.1.1  ULBWP.1.1 | |
| DRX Cycle | | ms | 1,2 | N/A | DRX.8Note5 |
| DL CCA model | |  | 1,2 | As specified in clause D.7.2.1 | |
| UL CCA model | |  | 1,2 | As specified in clause D.7.2.2 | |
| PDSCH Reference | |  | 1,2 | SR.1.1 CCA | |
| CORESET Reference | |  | 1,2 | CR.1.1 CCA | |
| OCNG Patterns | |  | 1,2 | OCNG pattern 1 | |
| SSB configuration | Semi- static channel access |  | 1,2 | SSB.1 CCA | |
| Dynamic channel access |  | 1,2 | SSB.2 CCA | |
| SMTC configuration | |  | 1,2 | SMTC.1 FR1 | |
| TRS configuration | |  | 1,2 | TRS.1.2 TDD | |
| DL CCA probability for semi-static channel access (PCCA\_DL) | |  | 1,2 | 0.9375 | 0.9375 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_1) | |  | 1,2 | 0.75 | 0.75 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_2) | |  | 1,2 | 0.75 | 0.75 |
| UL CCA probability (PCCA\_UL) | |  | 1,2 | 1 | 1 |
| EPRE ratio of PSS to SSS | |  |  |  |  |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 1,2 | 0 | 0 |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) | |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  |  |
| Note2 | | dBm/30 kHz | 1,2 | -95+TT | -95+TT |
|  | |  | 1,2 | 3+TT | 3+TT |
|  | |  | 1,2 | 3+TT | 3+TT |
| SS-RSRPNote3 | | dBm/30 kHz | 1,2 | -92+TT | -92+TT |
| IoNote3 | | dBm/38.1MHz | 1,2 | -59.2+TT | -59.2+TT |
| Propagation condition | |  | 1,2 | AWGN | |
| SRS Config | |  | 1,2 | SRSConf.1Note6 | SRSConf.2Note6 |
| 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: DRX related parameters are given in Table 10.2.1.1.5-3.  Note 6: SRS configs are given in Table 10.2.1.1.5-2.  Note 7: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in clause D.7.2.  Note 8: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | |

Table 10.2.1.1.5-2: SRS Configuration for EN-DC FR1 UE Transmit Timing Test with PSCell under DL CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Field | SRSConf.1 | SRSConf.2 | Comments |
| SRS-ResourceSet | srs-ResourceSetId | 0 | 0 |  |
| srs-ResourceIdList | 0 | 0 |  |
| resourceType | Periodic | Periodic |  |
| Usage | Codebook | Codebook |  |
| SRS-Resource | SRS-ResourceId | 0 | 0 |  |
| nrofSRS-Ports | Port1 | Port1 |  |
| transmissionComb | n2 | n2 |  |
| combOffset-n2 | 0 | 0 |  |
| cyclicShift-n2 | 0 | 0 |  |
| resourceMapping startPosition | 0 | 0 |  |
| resourceMapping nrofSymbols | n1 | n1 |  |
| resourceMapping  repetitionFactor | n1 | n1 |  |
| freqDomainPosition | 0 | 0 |  |
| freqDomainShift | 0 | 0 |  |
| freqHopping c-SRS | 14 for test configuration 1,2  25 for test configuration 3 | 25 | Matches NRB,c |
| freqHopping b-SRS | 0 | 0 |  |
| freqHopping b-hop | 0 | 0 |  |
| groupOrSequenceHopping | Neither | Neither |  |
| resourceType | Periodic | Periodic |  |
| periodicityAndOffset-p | sl1, 0 | sl640, 0 | Offset to align with DRx periodicity |
| sequenceId | 0 | 0 | Any 10 bit number |

Table 10.2.1.1.5-3: DRX-Configuration for EN-DC FR1 UE Transmit Timing Test with PSCell under DL CCA

|  |  |
| --- | --- |
| **Field** | **Test 2** |
| **Value** |
| drx-onDurationTimer | 6 ms |
| drx-InactivityTimer | 1 ms |
| drx-RetransmissionTimerDL | 1 slot |
| drx-RetransmissionTimerUL | 1 slot |
| longDRX-CycleStartOffset | 320 ms |
| shortDRX | disable |
| TimeAlignmentTimer | Infinity |
| NOTE: The DRX cycle and time alignment timer parameters are specified in clause 6.3.2 in TS 38.331 [13]. | |

Table 10.2.1.1.5-4: Te Timing Error Limit for EN-DC FR1 UE Transmit Timing Test with PSCell under DL CCA

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency Range** | **SCS of SSB signals (KHz)** | **SCS of uplink signals s(KHz)** | **Te** |
| 1 | 30 | 15 | 8\*64\*Tc + TT |
| 30 | 8\*64\*Tc+ TT |
| 60 | 7\*64\*Tc+ TT |
| NOTE: Tc is the basic timing unit defined in TS 38.211 [6]. | | | |

Table 10.2.1.1.5-5: Tq Maximum Autonomous Time Adjustment Step and  
Tp Minimum Aggregate Adjustment rate for EN-DC FR1 UE Transmit Timing Test with PSCell under DL CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Frequency Range** | **SCS of uplink signals (KHz)** | **Tq** | **Tp** | **Maximum Adjustment Rate** |
| 1 | 15 | 5.5\*64\*Tc + TT | 5.5\*64\*Tc+ TT | 5.5\*64\*Tc + TT |
| 30 | 5.5\*64\*Tc+ TT | 5.5\*64\*Tc+ TT | 5.5\*64\*Tc + TT |
| 60 | 5.5\*64\*Tc+ TT | 5.5\*64\*Tc+ TT | 5.5\*64\*Tc + TT |
| NOTE: Tc is the basic timing unit defined in TS 38.211 [6]. | | | | |

### 10.2.2 UE timing advance

#### 10.2.2.0Minimum conformance requirements

The timing advance is initiated from PSCell in EN-DC operation mode with MAC message that implies and adjustment of the timing advance, as defined in clause 5.2 of TS 38.321 [12].

##### 10.2.2.0.1 Minimum conformance requirements for timing advance adjustment delay

UE shall adjust the timing of its uplink transmission timing at time slot *n*+ *k+1* for a timing advance command received in time slot *n*, and the value of *k* is defined in clause 4.2 in TS 38.213 [3]. The same requirement applies also when the UE is not able to transmit a configured uplink transmission due to the channel assessment procedure.

##### 10.2.2.0.2 Minimum conformance requirements for timing advance adjustment accuracy

The UE shall adjust the timing of its transmissions with a relative accuracy better than or equal to the UE Timing Advance adjustment accuracy requirement in Table 10.2.2.0.2-1, to the signalled timing advance value compared to the timing of preceding uplink transmission. The timing advance command step is defined in TS 38.213 [3].

Table 10.2.2.0.1-1: UE Timing Advance adjustment accuracy

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| UL Sub Carrier Spacing(kHz) | 15 | 30 | 60 | 120 | 480 | 960 |
| UE Timing Advance adjustment accuracy | ±256 Tc | ±256 Tc | ±128 Tc | ±32 Tc | ±10 Tc | ±6 Tc |

The normative reference for this requirement is TS.38.133 [6] clause A.10.2.2.1.

#### 10.2.2.1 EN-DC FR1 UE Timing Advance Adjustment Accuracy with PSCell under DL CCA

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS

10.2.2.1.1 Test purpose

The purpose of the test is to verify UE timing advance adjustment delay and accuracy requirement defined in clause 7.3 of TS 38.133 [6].

10.2.2.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a UL shared spectrum NR carrier.

10.2.2.1.3 Minimum conformance requirement

The minimum conformance requirements are specified in clause 10.2.2.0.1 and clause 10.2.2.0.2.

The normative reference for this requirement is TS.38.133 [6] clause A.10.2.2.1.

10.2.2.1.4 Test description

10.2.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.2.2.1.4.1-1.

Table 10.2.2.1.4.1-1: Supported test configurations for EN-DC FR1 UE Timing Advance Adjustment Accuracy with PSCell under DL CCA

|  |  |
| --- | --- |
| Test Case ID | Description |
| 10.2.2.1.4.1-1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.2.2.1.4.1-2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test equipment and the DUT according to the parameters in Table 10.2.2.1.4.1-2

Table 10.2.2.1.4.1-2: Initial conditions for EN-DC FR1 UE Timing Advance Adjustment Accuracy with PSCell under DL CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.2.2.1.4.1-1 | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | N/A | |  |

Table 10.2.2.1.4.1-3: General test parameters for EN-DC FR1 UE Timing Advance Adjustment Accuracy with PSCell under DL CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF channel number |  | Cell 1: 1  Cell 2: 2 | 1 for E-UTRAN PCell  2 for NR PSCell |
| Initial DL BWP |  | DLBWP.0.1 | As specified in Table A.8.1-1 |
| Dedicated DL BWP |  | DLBWP.1.1 | As specified in Table A.8.1-2 |
| Initial UL BWP |  | ULBWP.0.1 | As specified in Table A.8.2-1 |
| Dedicated UL BWP |  | ULBWP.1.1 | As specified in Table A.8.2-2 |
| Timing Advance Command (*TA*) value during T1 |  | 31 | *NTA\_new = NTA\_old* for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command (*TA*) value during T2 |  | 39 | *For 30 kHz SCS NTA\_new = NTA\_old + 4096\*Tc*  (based on equation in clause 4.2 of TS 38.213 [3]) |
| T1 | s | 5 |  |
| T2 | s | 5 |  |

1. Message contents are defined in clause 10.2.2.1.4.3.

2. There are one E-UTRAN carrier and one NR carrier cells specified in the test. Cell 1 is the PCell on E-UTRAN carrier, Cell 2 is the PSCell on NR carrier. Cell 2 is subject to CCA. Cell 1 is the cell used for connection setup with the power level set according to Table A.6.1.1-1. Cell 2 shall be configured according to clauses C.1.1 and C.1.2.

10.2.2.1.4.2 Test Procedure

The test consists of two cells, a single E-UTRA cell (Pcell), and a single NR cell (PSCell) subject to CCA. Cell 2 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. Cell 1 is the PCell in the primary Timing Advance Group (pTAG) and cell 2 is the PSCell is in the secondary Timing Advance Group (sTAG). The test consists of two successive time periods, with time durations of T1 and T2 respectively. In each time period, timing advance commands for sTAG are sent to the UE and Sounding Reference Signals (SRS), as specified in Table 10.2.2.1.4.1-3 and Table 10.2.2.1.5-2, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured for PSCell in sTAG. The UE Time Alignment Timer (timeAlignmentTimer IE), described in Clause 5.2 in TS 38.321 [12], shall be configured so that it does not expire in the duration of the test. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508‑1 [14] clause 4.5. Message content are defined in clause 10.2.2.1.4.3.

2. Set the parameters according to values in Tables 10.2.2.1.4.1-3 and Table 10.2.2.1.5-1 as appropriate. Propagation conditions are set according to clause C.2.2.

3. SS shall transmit an *RRCConnectionReconfiguration* message.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message. Afterwards, the SS shall enable DL and UL CCA model according to Table 10.2.2.1.5-1

5. During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element for sTAG, as specified in clause 6.1.3.4 in TS 38.321 [12]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [8] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance for sTAG used by the UE is established.

6. During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value of 39 as specified in Table 10.2.2.1.4.1-3.

7. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

8. As specified in clause 7.3.2.1 of TS 38.133 [6], the UE adjusts its uplink timing at slot n+k+1 for a timing advance command received in slot n. This delay should be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

9. The UE Time Alignment Timer, described in clause 5.2 in TS 38.321 [12], shall be configured so that it does not expire in the duration of the test.

10. The result from the SRS and adjustment of the timing advance in step 7) is used to measure that the UE adjusts the timing of its transmission with a relative accuracy better than or equal to value specified in Table 10.2.2.0.1‑1 to the signalled timing advance value compared to the timing of preceding uplink transmission.

11. If the UE adjust the timing of its transmission within a relative accuracy greater than or equal to value specified in Table 10.2.2.0.1-1 to the signalled timing advance value compared to the timing of preceding uplink transmission then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.

12. The SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message.

13. The SS then shall transmit *RRCConnectionReconfiguration* message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message.

14. If any of the above Reconfiguration in Step 12 or 13 fails, switch off and on the UE and ensure the UE is in RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.

15. Repeat steps 3-14 until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

10.2.2.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 7.3, with the following exceptions:

Table 10.2.2.1.4.3-0: Common Exception messages for EN-DC FR1 UE Timing Advance Adjustment Accuracy with PSCell under DL CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.9-1  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

Table 10.2.2.1.4.3-1: *srs-Config* setup for EN-DC FR1 UE Timing Advance Adjustment Accuracy with PSCell under DL CCA

| Derivation Path: TS 38.508-1, Table 4.6.3-182 | | | |
| --- | --- | --- | --- |
| Information Element | Value/remark | Comment | Condition |
| SRS-Config ::= SEQUENCE { |  |  |  |
| srs-ResourceSetToAddModList SEQUENCE (SIZE(0..maxNrofSRS-ResourceSets)) OF SEQUENCE { | 1 entry |  |  |
| SRS-ResourceSet[1] SEQUENCE { |  | entry 1 |  |
| resourceType CHOICE { |  |  |  |
| periodic SEQUENCE { |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| srs-ResourceToAddModList SEQUENCE (SIZE(1..maxNrofSRS-Resources)) OF SEQUENCE { | 1 entry |  |  |
| SRS-Resource[1] SEQUENCE { |  | entry 1 |  |
| freqHopping SEQUENCE { |  |  |  |
| c-SRS | 12 |  | Config 1,2,4,5 |
| 24 |  | Config 3,6 |
| } |  |  |  |
| groupOrSequenceHopping | neither |  |  |
| resourceType CHOICE { |  |  |  |
| periodic SEQUENCE { |  |  |  |
| periodicityAndOffset-p CHOICE { |  |  |  |
| sl5 | 2 | Once every 5 Slots | SCS15 |
| sl5 | 4 | Once every 5 Slots | SCS30 |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

10.2.2.1.5 Test Requirement

The UE shall apply the signalled Timing Advance value for PSCell in sTAG to the transmission timing at the designated activation time i.e. *k+1* slots after the reception of the timing advance command, where:

*k* = 5 for Config 1, 2, 3, 4, 5, 6

The Timing Advance adjustment accuracy for PSCell in sTAG shall be within the limits specified in Table 10.2.2.1.5-3.

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

Table 10.2.2.1.5-1 and Table 10.2.2.1.5-2 define the primary level settings.

Table 10.2.2.1.5-1: Cell specific test parameters for EN-DC FR1 UE Timing Advance Adjustment Accuracy with PSCell under DL CCA

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Test1 | |
|  | | | |  | T1 | T2 |
| TDD configuration | | | Config 1,2 |  | TDDConf.1.1 CCA | |
| BWchannel | | | Config 1,2 | MHz | 40: NRB,c = 106 | |
| BWP BW | | | Config 1,2 | MHz | 40: NRB,c = 106 | |
| DRX Cycle | | | Config 1,2 | ms | Not Applicable | |
| DL CCA model | | | Config 1,2 |  | As specified in clause D.7.2.1 | |
| UL CCA model | | | Config 1,2 |  | As specified in clause D.7.2.2 | |
| PDSCH Reference | | | Config 1,2 |  | SR.1.1 CCA | |
| CORESET Reference | | | Config 1,2 |  | CR.1.1 CCA | |
| TRS configuration | | | Config 1,2 |  | TRS.1.2 TDD | |
| OCNG Patterns | | | Config 1,2 |  | OCNG pattern 1 | |
| SSB Configuration | | Semi- static channel access | Config 1,2 |  | SSB.1 CCA | |
| Dynamic channel access | Config 1,2 |  | SSB.2 CCA | |
| SMTC configuration | | | Config 1,2 |  | SMTC.1 FR1 | |
| DL CCA probability for semi-static channel access (PCCA\_DL) | | | Config 1,2 |  | 1 | |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_1) | | | Config 1,2 |  | 1 | |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_2) | | | Config 1,2 |  | 1 | |
| UL CCA probability PCCA | | | Config 1,2 |  | 1 | |
| EPRE ratio of PSS to SSS | | | |  |  | |
| EPRE ratio of PBCH DMRS to SSS | | | |  |  | |
| EPRE ratio of PBCH to PBCH DMRS | | | |  |  | |
| EPRE ratio of PDCCH DMRS to SSS | | | |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | | dB | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | | | |  |  | |
| EPRE ratio of PDSCH to PDSCH | | | |  |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | |  |  | |
| Note2 | Config 1,2 | | | dBm/30 kHz | -95+TT | |
|  | Config 3,6 | | |  | -95+TT | |
|  | | | | dB | 3+TT | |
|  | | | | dB | 3+TT | |
| IoNote3 | Config 1,2 | | | dBm/38.16MHz | -62.58+TT | |
| 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in clause D.7.2.  Note 5: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | |

Table 10.2.2.1.5-2: Sounding Reference Symbol Configuration for EN-DC FR1 UE Timing Advance Adjustment Accuracy with PSCell under DL CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Field | | Value | Comment |
| c-SRS | Config 1,2 | 24 | Frequency hopping is disabled |
| b-SRS | | 0 |  |
| b-hop | | 0 |  |
| freqDomainPosition | | 0 | Frequency domain position of SRS |
| freqDomainShift | | 0 |  |
| groupOrSequenceHopping | | neither | No group or sequence hopping |
| SRS-PeriodicityAndOffset | | sl5=4 for SCS 30kHz | Once every 5 slots |
| pathlossReferenceRS | | ssb-Index=0 | SSB #0 is used for SRS path loss estimation |
| usage | | Codebook | Codebook based UL transmission |
| startPosition | | 0 | resourceMapping setting: SRS on last symbol of slot, and 1symbols for SRS without repetition. |
| nrofSymbols | | n1 |  |
| repetitionFactor | | n1 |  |
| combOffset-n2 | | 0 | transmissionComb setting |
| cyclicShift-n2 | | 0 |  |
| nrofSRS-Ports | | port1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 38.331 [13]. | | | |

Table 10.2.2.1.5-3: UE Timing Advance adjustment accuracy for EN-DC FR1 UE Timing Advance Adjustment Accuracy with PSCell under DL CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Sub Carrier Spacing, SCS kHz | 15 | 30 | 60 |
| UE Timing Advance adjustment accuracy | ±256 Tc +TT | ±256 Tc +TT | ±128 Tc +TT |

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95 %.

## 10.3 Signalling characteristics

### 10.3.1 Radio link monitoring

#### 10.3.1.0 General

The requirements in this section apply for radio link monitoring on a carrier frequency with CCA for the following cells:

- PCell in SA NR operation mode,

- PSCell in EN-DC operation mode.

- PSCell in NR-DC operation mode.

The UE shall monitor the downlink radio link quality based on the reference signal configured as RLM-RS resource(s) in order to detect the downlink radio link quality of the PCell and PSCell as specified in TS 38.213 [8]. The configured RLM-RS resources can be all SSBs, or all CSI-RSs, or a mix of SSBs and CSI-RSs. UE is not required to perform RLM outside the active DL BWP.

On each RLM-RS resource, the UE shall estimate the downlink radio link quality and compare it to the thresholds Qout,CCA and Qin,CCA for the purpose of monitoring downlink radio link quality of the cell.

The threshold Qout,CCA is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to the out-of-sync block error rate (BLERout,CCA) as defined in Table 10.3.1.0-1. For SSB based radio link monitoring, Qout\_SSB,CCA is derived based on the hypothetical PDCCH transmission parameters listed in Table 10.3.1.0.1-1.

The threshold Qin,CCA is defined as the level at which the downlink radio link quality can be received with significantly higher reliability than at Qout,CCA and shall correspond to the in-sync block error rate (BLERin) as defined in Table 10.3.1.0-1. For SSB based radio link monitoring, Qin\_SSB,CCA is derived based on the hypothetical PDCCH transmission parameters listed in Table 10.3.1.0.1-2.

The out-of-sync block error rate (BLERout,CCA) and in-sync block error rate (BLERin,CCA) are determined from the network configuration via parameter *rlmInSyncOutOfSyncThreshold* signalled by higher layers. When UE is not configured with *rlmInSyncOutOfSyncThreshold* from the network, UE determines out-of-sync and in-sync block error rates from Configuration #0 in Table 10.3.1.0-1 as default. All requirements in clause 10.3.1.0 are applicable for BLER Configuration #0 in Table 10.3.1.0-1.

Table 10.3.1.0-1: Out-of-sync and in-sync block error rates

|  |  |  |
| --- | --- | --- |
| Configuration | BLERout,CCA | BLERin,CCA |
| 0 | 10% | 2% |

UE shall be able to monitor up to NRLM RLM-RS resources of the same or different types in each corresponding carrier frequency range, depending on a maximum number Lmax of SSBs per half frame according to TS 38.213 [8], where NRLM is specified in Table 10.3.1.0-2, and meet the requirements as specified in clause 10.3.1.0. UE is not required to meet the requirements in clause 10.3.1.0 if RLM-RS is not configured and no TCI state for PDCCH is activated.

Table 10.3.1.0-2: Maximum number of RLM-RS resources NRLM

|  |  |  |
| --- | --- | --- |
| Carrier frequency range of PCell/PSCell | Lmax | Maximum number of RLM-RS resources, NRLM |
| FR1 | 8 | 4 |

In the requirements of clause 10.3.1.0, the term RLM-RS SSB occasion not available at the UE refers to when the RLM-RS SSB is configured by gNB in a cell on a carrier frequency subject to CCA, but the first two successive candidate SSB positions for the same SSB index within the set of configured RLM-RS resources are not available at the UE due to DL CCA failures at gNB during the corresponding evaluation period; otherwise the RLM-RS SSB is considered as available at the UE.

The requirements in clause 10.3.1.0 apply for any *channelAccessMode* configuration [TS 38.331, 13].

The normative reference for this requirement is TS 38.133 [6] clause 8.1A.1.

##### 10.3.1.0.1 Minimum conformance requirements for SSB based Radio Link Monitoring under CCA

The requirements in this clause apply for each SSB based RLM-RS resource configured for PCell or PSCell, provided that the SSB configured for RLM are actually configured to be transmitted within UE active DL BWP during the entire evaluation period specified in clause 10.3.1.0.1.1 but occasionally may not be transmitted due to CCA operation.

Table 10.3.1.0.1-1: PDCCH transmission parameters for out-of-sync evaluation

|  |  |
| --- | --- |
| Attribute | Value for BLER Configuration #0 |
| DCI format | 1-0 |
| Number of control OFDM symbols | 2 |
| Aggregation level (CCE) | 8 |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 4 dB |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 4 dB |
| Bandwidth (PRBs) | 24 |
| Sub-carrier spacing (kHz) | SCS of the active DL BWP |
| DMRS precoder granularity | REG bundle size |
| REG bundle size | 6 |
| CP length | Normal |
| Mapping from REG to CCE | Distributed |

Table 10.3.1.0.1-2: PDCCH transmission parameters for in-sync evaluation

|  |  |
| --- | --- |
| Attribute | Value for BLER Configuration #0 |
| DCI payload size | 1-0 |
| Number of control OFDM symbols | 2 |
| Aggregation level (CCE) | 4 |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 0dB |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 0dB |
| Bandwidth (PRBs) | 24 |
| Sub-carrier spacing (kHz) | SCS of the active DL BWP |
| DMRS precoder granularity | REG bundle size |
| REG bundle size | 6 |
| CP length | Normal |
| Mapping from REG to CCE | Distributed |

The normative reference for this requirement is TS 38.133 [6] clause 8.1A.2.1.

10.3.1.0.1.1 Minimum requirement for SSB based Radio Link Monitoring under CCA

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last TEvaluate\_out\_SSB,CCA [ms] period becomes worse than the threshold Qout\_SSB,CCA within TEvaluate\_out\_SSB,CCA [ms] evaluation period.

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last TEvaluate\_in\_SSB,CCA [ms] period becomes better than the threshold Qin\_SSB,CCA within TEvaluate\_in\_SSB,CCA [ms] evaluation period. During the in-sync evaluation procedure, layer 1 of the UE shall not send any in-sync indication for the cell to the higher layers when Lin exceeds Lin,max, where Lin and Lin,max are defined in Table 10.3.1.0.1.1-1.

TEvaluate\_out\_SSB,CCA and TEvaluate\_in\_SSB,CCA are defined in Table 10.3.1.0.1.1-1 for FR1.

When concurrent gaps are configured,

- P value for an RLM-RS resource to be measured is defined as Ntotal / Noutside\_MG

- For a window W of duration max(TL1, MGRP\_max), where MGRP max is the maximum MGRP across all configured per-UE measurement gap and per-FR measurement gap within the same FR as serving cell, and starting at the beginning of any RLM-RS resource occasion:

- Ntotal is the total number of RLM-RS resource occasions within the window, including those overlapped with measurement gap occasions within the window, and

- Noutside\_MG is the number of RLM-RS resource occasions that are not overlapped with any measurement gap occasion within the window W

Otherwise, for a UE not supporting *concurrentMeasGap-r17* or when concurrent gaps are not configured,

For FR1,

- , when in the monitored cell there are GAPs configured for intra-frequency, inter-frequency or inter-RAT measurements, and these GAPs are overlapping with some but not all occasions of the SSB RLM-RS resources; and

- P=1 when in the monitored cell there are no GAPs overlapping with any occasion of the SSB RLM-RS resources.

When a measurement gap is configured and the measurement gap is not NCSG,

- an RLM-RS resource is considered to be overlapped with the GAP f it overlaps a measurement gap occasion, and

- xRP = MGRP

Otherwise, when NCSG measurement gap is configured,

- an RLM-RS resource is considered to be overlapped with the GAP if it overlaps the VIL1 or VIL2 of NCSG, and

- xRP = VIRP

If the UE is configured with Pre-MG, an RLM-RS resource is only considered to be overlapped by the Pre-MG if the Pre-MG is activated.

When concurrent gaps are configured, an RLM-RS is not considered to be overlapped by a gap occasion if the gap occasion is dropped according to 38.133 [6] section 9.1.8.

Longer evaluation period would be expected if the combination of RLM-RS resource, SMTC occasion and GAP configurations does not meet previous conditions.

Table 10.3.1.0.1.1-1: Evaluation period TEvaluate\_out\_SSB,CCA and TEvaluate\_in\_SSB,CCA for FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Configuration | TEvaluate\_out\_SSB,CCA (ms) | | TEvaluate\_in\_SSB,CCA (ms) |
|  | RLM-RS SSB Es/IotNote4 ≥-7 dB | RLM-RS SSB Es/Iot Note4 <-7 dB |  |
| no DRX | Max(200, Ceil(17\*P)\*TSSB) | Max(200, Ceil(24\*P)\*TSSB) | Max(100, Ceil((5+Lin)\*P)\*TSSB) |
| DRX cycle≤320 | Max(200, Ceil(1.5\*15\*P)\*Max(TDRX,TSSB)) | Max(200, Ceil(1.5\*20\*P)\*Max(TDRX,TSSB)) | Max(100, Ceil(1.5\*(5+Lin)\*P)\*Max(TDRX,TSSB)) |
| DRX cycle>320 | Ceil(13\*P)\*TDRX | Ceil(16\*P)\*TDRX | Ceil((5+Lin)\*P)\*TDRX |
| NOTE 1: TSSB is the periodicity of the SSB configured for RLM. TDRX is the DRX cycle length.  NOTE 2: When DRX is not configured, Lin is the number of RLM-RS SSB occasions which are not available at the UE during TEvaluate\_in\_SSB,CCA, where Lin ≤ Lin,max. When DRX is configured, Lin is the number of DRX cycles in which at least one RLM-RS SSB occasion is not available at the UE during TEvaluate\_in\_SSB,CCA, where Lin ≤ Lin,max. The UE is not required to determine the availability of SSB occasions more frequent than  Once per Max(10ms, P \* TSSB) if no DRX is used,  Once per Max(10ms, Ceil(1.5 \* P) \* Max(TDRX, TSSB)) if DRX cycle ≤ 320ms,  Once per P \* TDRX if DRX cycle > 320ms.  NOTE 3: Lin,max=7 for Max(TDRX,TSSB) ≤ 40 assuming TDRX=0 for non-DRX case,  Lin,max=5 for 40<Max(TDRX,TSSB)≤320,  Lin,max=3 for TDRX>320.  NOTE 4: RLM-RS SSB Es/Iot is the averaged Es/Iot over the most recent previous out-of-sync evaluation period. | | | |

The normative reference for this requirement is TS 38.133 [6] clause 8.1A.2.2.

10.3.1.0.1.2 Measurement restrictions for SSB based RLM under CCA

The UE is required to be capable of measuring SSB for RLM without measurement gaps. The UE is required to perform the SSB measurements with measurement restrictions as described in the following clauses.

For FR1, when the SSB for RLM is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement,

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for RLM without any restriction;

- If SSB and CSI-RS have different SCS,

- If UE supports *simultaneousRxDataSSB-DiffNumerology*, UE shall be able to measure the SSB for RLM without any restriction;

- If UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure SSB for RLM.

The normative reference for this requirement is TS 38.133 [6] clause 8.1A.2.3.

#### 10.3.1.1 Requirements for determining UE in-sync or out-of-sync status

In the test cases specified in clause 10.3.1, any uplink signal transmitted by the UE is used for detecting the in-/out-of-sync state of the UE. In terms of measurement, the uplink signal is verified based on the UE output power:

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-3 [4]) means uplink signal

- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-3 [4]) means no uplink signal.

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

The normative reference for this requirement is TS 38.133 [6] clause A.10.3.1.1.

#### 10.3.1.2 EN-DC FR1 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

Editor's Note:

* Statistical analysis to determine test case verdict is FFS

10.3.1.2.1 Test purpose

The purpose of this test is to verify that the UE properly detects the out-of-sync and in-sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 10.3.1.0

10.3.1.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier, and supporting UL and SSB-based RLM on shared channel access.

10.3.1.2.3 Minimum conformance requirement

The minimum requirements are specified in clause 10.3.1.0.1. The measurement restrictions for SSB based RLM under CCA are specified in clause 10.3.1.0.2. DRX configuration is not used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.10.3.1.2.

10.3.1.2.4 Test description

In the test, UE is configured to perform RLM based on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in Table 10.3.1.2.4.1-1. The test parameters are given in Tables 10.3.1.2.4.1-3, 10.3.1.2.5-1, and 10.3.1.2.5-2 below.

The test consists of three successive time periods, with time duration of T1, T2 and T3, respectively. Figure 10.3.1.2.4-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE transmits according to UL CCA model. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40 ms) in the test.

A picture containing diagram

Description automatically generated

Figure 10.3.1.2.4-1: SNR variation for EN-DC FR1 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

10.3.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.3.1.2.4.1-1.

Table 10.3.1.2.4.1-1: Supported test configurations for EN-DC FR1 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 10.3.1.2-1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.3.1.2-2 | LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| NOTE: The UE is only required to pass in one of the supported test configurations above. | |

Configure the test equipment and the DUT according to the parameters in Table 10.3.1.2.4.1-2.

Table 10.3.1.2.4.1-2: Initial conditions for EN-DC FR1 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.3.1.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. Message contents are defined in clause 10.3.1.2.4.3.

2. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is NR FR1 PSCell. The connection setup is done according to the settings in clause C.1.3, and the downlink signal levels as per clause C.1.2.

3. The test parameters are given in Table 10.3.1.2.4.1-3 below.

Table 10.3.1.2.4.1-3: General test parameters for EN-DC FR1 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
| Test 1 |
| Active E-UTRA PCell | | |  | Cell 1 |
| E-UTRA RF Channel Number | | |  | 1 |
| Active PSCell | | |  | Cell 2 |
| RF Channel Number | | |  | 2 |
| DL CCA model | | |  | As specified in clause D.7.2.1 |
| UL CCA model | | |  | As specified in clause D.7.2.2 |
| Duplex mode | | Config 1,2 |  | TDD |
| BWchannel | | Config 1,2 | MHz | 40: NRB,c = 106 |
| DL initial BWP configuration | | Config 1,2 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1,2 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1,2 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1,2 |  | ULBWP.1.1 |
| TDD configuration | | Config 1,2 |  | TDDConf.1.1 CCA |
| CORESET Reference Channel | | Config 1,2 |  | CR.1.1 CCA |
| SSB configuration for semi-static channel accessNote 4, 6 | | Config 1,2 |  | SSB.1 CCA |
| SSB configuration for dynamic channel accessNote 5, 6 | | Config 1,2 |  | SSB.2 CCA |
| DBT window configuration | | Config 1,2 |  | DBT.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 |  | 30 kHz |
| PRACH Configuration | | Config 1,2 |  | FR1 PRACH configuration 1 under CCA |
| SSB index assigned as RLM RS | | |  | 0 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |
| Out of sync transmission parameters | DCI format | |  | 1-0 |
| Number of Control OFDM symbols | |  | 2 |
| Aggregation level | | CCE | 8 |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
| DMRS precoder granularity | |  | REG bundle size |
| REG bundle size | |  | 6 |
| DRX | | |  | OFF |
| Gap pattern ID | | |  | gp0 |
| Layer 3 filtering | | |  | Enabled |
| T310 timer | | | ms | 0 |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS configuration for CSI reporting | | Config 1,2 |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1,2 |  | TRS.1.2 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 1.04 |
| T3 | | | s | 1.04 |
| D1 | | | s | 1 |
| NOTE 1: All configurations are assigned to the UE prior to the start of time period T1.  NOTE 2: UE-specific PDCCH is not transmitted after T1 starts.  NOTE 3: E-UTRAN is in non-DRX mode under test.  NOTE 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | |

10.3.1.2.4.2 Test Procedure

There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell which operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

Prior to the start of the time duration T1, the UE shall be fully synchronized to PSCell. The UE shall be configured for periodic CSI reporting in PUCCH format 2 with a reporting periodicity as mentioned in the above table 10.3.1.2.4.1-4. The UE transmits the reporting according to UL CCA model. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40 ms) in test 1. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508‑1 [6] clause 4.5.

2. The SS shall transmit an *RRCConnectionReconfiguration* message (embedded in *RRCConnectionReconfiguration* message) configuring the UE for inter-frequency measurements with the corresponding gap pattern and periodic CSI reporting.

3. The UE shall transmit *RRCReconfigurationComplete* message (embedded in *RRCConnectionReconfigurationComplete* message).

4. Set the parameters according to T1 in Table 10.3.1.2.5-1. Propagation conditions are set according to clause C.2.3. The SS shall enable DL and UL CCA model according to Table 10.3.1.2.5-1. T1 starts.

5. When T1 expires the SS shall change the SNR value to T2 as specified in Table 10.3.1.2.5-1

6. When T2 expires the SS shall change the SNR value to T3 as specified in Table 10.3.1.2.5-1

7. If the SS:

a) detects uplink power equal to or higher than minimum output power, according to section 10.3.1.1, in each uplink slot configured for CSI transmission (according to configured CSI periodicity on PUCCH format 2), provided that such slot is not subject to CCA failure (as determined by PCCA\_UL in Table 10.3.1.2.5-1), during the period from time point A to time point B; and

b) does not detect any uplink power higher than OFF power, according to section 10.3.1.1, from time point C (D1 after the start of T3) until T3 expires, the number of successful tests is increased by one.

Otherwise, the number of failed tests is increased by one and proceed to step 10.

8. When T3 expires the SS shall disable the DL and UL CCA model (i.e. PCCA\_DL\_i= PCCA\_UL=1) and change the SNR value to T1 as specified in Table 10.3.1.2.5-1.

9. If the UE has re-established the connection within 2 seconds, proceed with step 11. Otherwise, proceed with step 10.

10. The SS shall switch off and then on the UE and then proceed with step 1.

11. Repeat steps 4-9 until the confidence level according to [Tables G TBD in Annex G clause G. TBD] is achieved.

10.3.1.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clauses 4.6.1 and 7.3 with the following exceptions:

Table 10.3.1.2.4.3-1: Common Exception messages for EN-DC FR1 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition INTER-FREQ, L3 FILTERING NEEDED,  Table H.3.1-3 with Condition INTER-FREQ MO (where ssbFrequency is set to the ARFCN value of carrier centre of High range)  Table H.3.1-4 with A3-offset = 0  Table H.3.1-6 with conditions gapUE and RLM  Table H.3.1-8 with Condition SSB RLM  Table H.3.4-4 with Condition gapUE  Table H.3.5-4  Table H.3.5-9  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

Table 10.3.1.2.4.3-2: *RLF-TimersAndConstants* for EN-DC FR1 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-150 | | | |
| Information Element | Value/remark | Comment | Condition |
| RLF-TimersAndConstants ::= SEQUENCE { |  |  |  |
| t310 | ms0 |  |  |
| n310 | n1 |  |  |
| t311 | ms1000 |  |  |
| n311 | n1 |  |  |
| } |  |  |  |

10.3.1.2.5 Test Requirement

Table 10.3.1.2.5-1 and Table 10.3.1.2.5-2 define the cell specific primary level settings including test tolerances and the measurement gap configuration for EN-DC FR1 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA.

Table 10.3.1.2.5-1: Cell-specific test parameters for EN-DC FR1 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | |
| T1 | T2 | T3 |
| DL CCA probability PCCA\_DL | Note 6,8 | |  | PCCA\_DL=0.9375 | | |
|  | |
| Note 7,8 | |  | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | |
| UL CCA probability PCCA\_UL | | |  | 1 | | |
| EPRE ratio of PDCCH DMRS to SSS | | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | | dB | 0 | | |
| EPRE ratio of PBCH to PBCH DMRS | | | dB |
| EPRE ratio of PSS to SSS | | | dB |
| EPRE ratio of PDSCH DMRS to SSS | | | dB |
| EPRE ratio of PDSCH to PDSCH DMRS | | | dB |
| EPRE ratio of OCNG DMRS to SSS | | | dB |
| EPRE ratio of OCNG to OCNG DMRS | | | dB |
| SNRNote 3,4 on RLM-RS | | Config 1,2 | dB | 1.8 | -6.2 | -15.8 |
| SNR on other channels and signals | | Config 1,2 | dB | 1 | | |
|  | | Config 1,2 | dBm/SCS | -95 | | |
| Propagation condition | | |  | TDL-C 300 ns 100 Hz | | |
| NOTE 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in slots with RMC burst transmission and is not transmitted during muted slots or during DBT windows.  NOTE 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  NOTE 3: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT windows.  NOTE 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3, respectively, in Figure 10.3.1.2.4-1.  NOTE 5: The SNR values are specified for testing a UE which supports 2 RX on at least one band. For testing of a UE which supports 4 RX on all bands, the SNR during T3 is defined in section D.4A.  NOTE 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 8: For UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | |

Table 10.3.1.2.5-2: Measurement gap configuration for EN-DC FR1 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |
| --- | --- |
| Field | Test 1 |
| Value |
| *gapOffset* | 0 |
| NOTE 1: E-UTRAN PCell and PSCell are SFN-synchronous and frame boundary aligned.  NOTE 2: Ensure that RLM RS is partially overlapped with measurement gap. | |

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

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting, provided that such slots are not subject to CCA failure.

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

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

#### 10.3.1.3 EN-DC FR1 Radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

Editor's Note:

* Statistical analysis to determine test case verdict is FFS

10.3.1.3.1 Test purpose

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 10.3.1.0.

10.3.1.3.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting UL and SSB-based RLM on shared channel access.

10.3.1.3.3 Minimum conformance requirements

The minimum requirements are specified in clause 10.3.1.0.1. The measurement restrictions for SSB based RLM under CCA are specified in clause 10.3.1.0.2. DRX configuration is not used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.10.3.1.3.

10.3.1.3.4 Test description

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table10.3.1.3.4.1-1. The test parameters are given in Tables10.3.1.3.4.1-3, and 10.3.1.3.5-1 below.

The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 10.3.1.3.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE transmits according to UL CCA model.

Diagram

Description automatically generated

Figure 10.3.1.3.4-1: SNR variation for EN-DC FR1 Radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

10.3.1.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.3.1.3.4.1-1.

Table 10.3.1.3.4.1-1: Supported test configurations for EN-DC FR1 Radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 10.3.1.3-1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.3.1.3-2 | LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| NOTE: The UE is only required to pass in one of the supported test configurations above. | |

Configure the test equipment and the DUT according to the parameters in Table 10.3.1.3.4.1-2.

Table 10.3.1.3.4.1-2: Initial conditions for EN-DC FR1 Radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.3.1.3.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. Message contents are defined in clause 10.3.1.3.4.3.

2. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is NR FR1 PSCell. The connection setup is done according to the settings in clause C.1.3, and the downlink signal levels as per clause C.1.2

3. The general test parameters are given in Table 10.3.1.3.4.1-4.

Table 10.3.1.3.4.1-4: General test parameters for EN-DC FR1 Radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
| Test 1 |
| Active E-UTRA PCell | | |  | Cell 1 |
| E-UTRA RF Channel Number | | |  | 1 |
| Active PSCell | | |  | Cell 2 |
| RF Channel Number | | |  | 2 |
| DL CCA model | | |  | As specified in clause D.7.2.1 |
| UL CCA model | | |  | As specified in clause D.7.2.2 |
| Duplex mode | | Config 1,2 |  | TDD |
| BWchannel | | Config 1,2 | MHz | 40: NRB,c = 106 |
| DL initial BWP configuration | | Config 1,2 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1,2 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1,2 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1,2 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1,2 |  | TDDConf.1.1 CCA |
| CORESET Reference Channel | | Config 1,2 |  | CR.1.1 CCA |
| SSB configuration for semi-static channel accessNote 3, 5 | | Config 1,2 |  | SSB.1 CCA |
| SSB configuration for dynamic channel accessNote 4,5 | | Config 1,2 |  | SSB.2 CCA |
| DBT window configuration | | Config 1,2 |  | DBT.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 |  | 30 kHz |
| PRACH Configuration | | Config 1,2 |  | FR1 PRACH configuration 1 under CCA |
| SSB index assigned as RLM RS | | |  | 0 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |
| In sync transmission parameters | DCI format | |  | 1-0 |
| Number of Control OFDM symbols | |  | 2 |
| Aggregation level | | CCE | 4 |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 0 |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 0 |
| DMRS precoder granularity | |  | REG bundle size |
| REG bundle size | |  | 6 |
| Out of sync transmission parameters | DCI format | |  | 1-0 |
| Number of Control OFDM symbols | |  | 2 |
| Aggregation level | | CCE | 8 |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
| DMRS precoder granularity | |  | REG bundle size |
| REG bundle size | |  | 6 |
| DRX | | |  | *OFF* |
| Gap pattern ID | | |  | N/A |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | 2000 |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS configuration for CSI reporting | Config 1,2 | |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | Config 1,2 | |  | TRS.1.2 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.2 |
| T3 | | | s | 0.52 |
| T4 | | | s | 0.2 |
| T5 | | | s | 2.04 |
| D1 | | | s | 2 |
| NOTE 1: All configurations are assigned to the UE prior to the start of time period T1.  NOTE 2: UE-specific PDCCH is not transmitted after T1 starts.  NOTE 3: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 4: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 5: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | |

10.3.1.3.4.2 Test procedure

There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell which operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

Prior to the start of the time duration T1, the UE shall be fully synchronized to PSCell. The UE shall be configured for periodic CSI reporting in PUCCH format 2 with a reporting periodicity as mentioned in the above table 10.3.1.3.4.1-4. The UE transmits the reporting according to UL CCA model. In the test, DRX configuration is not enabled. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508‑1 [6] clause 4.5.

2. The SS shall transmit an *RRCConnectionReconfiguration* message (embedded in *RRCConnectionReconfiguration* message) to configure periodic CSI reporting.

3. The UE shall transmit *RRCReconfigurationComplete* message (embedded in *RRCConnectionReconfigurationComplete* message).

4. Set the parameters of NR Cell according to T1 in Table 10.3.1.3.5-1. Propagation conditions are set according to clause C.2.3. The SS shall enable DL and UL CCA model according to Table 10.3.1.3.5-1. T1 starts.

5. When T1 expires the SS shall change the SNR value to T2 as specified in Table 10.3.1.2.5-1. T2 starts.

6. When T2 expires the SS shall change the SNR value to T3 as specified in Table 10.3.1.2.5-1. T3 starts.

7. When T3 expires the SS shall change the SNR value to T4 as specified in Table 10.3.1.3.5-1. T4 starts.

8. When T4 expires the SS shall change the SNR value to T5 as specified in Table 10.3.1.3.5-1. T5 starts.

9. If the SS detects uplink power equal to or higher than minimum output power, according to section 10.3.1.1, in each uplink slot configured for CSI transmission (according to configured CSI periodicity on PUCCH format 2), provided that such slot is not subject to CCA failure (as determined by PCCA\_UL in Table 10.3.1.3.5-1), during the period from time point A to time point F (D1 seconds after the start of time duration T5), the number of successful tests is increased by one. After the expiration of T5, the SS shall disable the DL and UL CCA model (i.e. PCCA\_DL\_i= PCCA\_UL=1) and proceed with step 11 for the next iteration, or with step 10.

Otherwise, the number of failed tests is increased by one and proceed with step 10.

10. The SS shall switch off and then on the UE and then proceed with step 1.

11. Repeat steps 4-9 until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.10.3.1.3.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clauses 4.6.1 and 7.3 with the following exceptions:

Table 10.3.1.3.4.3-1: Common Exception messages for EN-DC FR1 Radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition INTER-FREQ, L3 FILTERING NEEDED,  Table H.3.1-3 with Condition INTER-FREQ MO (where ssbFrequency is set to the ARFCN value of carrier centre of [High] range)  Table H.3.1-4 with A3-offset = 0  Table H.3.1-8 with Condition SSB RLM  Table H.3.5-4  Table H.3.5-9  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

Table 10.3.1.3.4.3-2: *RLF-TimersAndConstants* for EN-DC FR1 Radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-150 | | | |
| Information Element | Value/remark | Comment | Condition |
| RLF-TimersAndConstants ::= SEQUENCE { |  |  |  |
| t310 | ms2000 |  |  |
| n310 | n1 |  |  |
| t311 | ms1000 |  |  |
| n311 | n1 |  |  |
| } |  |  |  |

10.3.1.3.5 Test Requirement

Table 10.3.1.3.5-1 defines the cell specific primary level settings including test tolerances for EN-DC FR1 Radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA.

Table 10.3.1.3.5-1: Cell-specific test parameters for EN-DC FR1 Radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | | | |
| T1 | T2 | T3 | T4 | T5 |
| DL CCA probability PCCA\_DL | | Note 6,8 |  | PCCA\_DL=0.9375 | | | | |
| Note 7,8 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | |
| UL CCA probability PCCA\_UL | | |  | 1 | | | | |
| LCCA\_DL | | |  | 7 | | | | |
| WCCA\_DL | | | ms | TEvaluate\_in\_SSB,CCANOTE 9 | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | dB | 4 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | | | dB | 0 | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | dB |
| EPRE ratio of PSS to SSS | | | dB |
| EPRE ratio of PDSCH DMRS to SSS | | | dB |
| EPRE ratio of PDSCH to PDSCH DMRS | | | dB |
| EPRE ratio of OCNG DMRS to SSS | | | dB |
| EPRE ratio of OCNG to OCNG DMRS | | | dB |
| SNR on RLM-RS | Config 1,2 | | dB | 1.8 | -6.2 | -15.8 | -5.3 | 1.8 |
| SNR on other channels and signals | Config 1,2 | | dB | 1 | | | | |
|  | Config 1,2 | | dBm/SCS | -95 | | | | |
| Propagation condition | | |  | TDL-C 300ns 100Hz | | | | |
| NOTE 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in slots with RMC burst transmission and is not transmitted during muted slots or during DBT windows.  NOTE 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  NOTE 3: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT windows.  NOTE 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure 10.3.1.3.4-1.  NOTE 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4 RX on all bands, the SNR during T3 and T4 is modified as specified in clause D.4A.  NOTE 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 8: For UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.  NOTE 9: As defined in Table 10.3.1.0.1.1-1. | | | | | | | | |

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

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting, provided that such slots are not subject to CCA failure.

The rate of correct events observed during repeated tests shall be at least 90% with a confidence interval of 95 %.

#### 10.3.1.4 Void

#### 10.3.1.5 Void

### 10.3.2 Interruption

#### 10.3.2.0 Minimum Conformance Requirements

Same minimum conformance as described in section 4.5.2.0 and 10.3.3.0

The normative reference for this requirement is TS 38.133 [6] clauses 8.2.1 and 8.3A.

#### 10.3.2.1 EN-DC FR1 E-UTRAN – NR interruptions during SCell operations with CCA

Editor's Note:

* MU and TT analysis is incomplete
* Message contents is FFS
* Call setup and test procedure need to be updated
* Applicability may need to be updated
* Statistical analysis to determine test case verdict is FFS

10.3.2.1.1 Test purpose

The purpose of this test is to verify that the E-UTRAN PCell and NR PSCell interruptions during Scell operations on an NR SCC under CCA, are within the requirements.

10.3.2.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting 2DL CA in NR.

10.3.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 10.3.2.0 for E-UTRAN PCell and NR PSCell interruptions during Scell operations on an NR SCC under CCA.

The normative reference for this requirement is TS 38.133 [6] clause A.10.3.2.1.

10.3.2.1.4 Test description

10.3.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in this clause. The supported test configurations for LTE PCell and NR PSCell and SCell are shown in Table 10.3.2.1.4.1-1.

This test shall be tested using any of the test configurations in Table 10.3.2.1.4.1-1.

Table 10.3.2.1.4.1-1: Supported test configurations for EN-DC FR1 E-UTRAN – NR interruptions during SCell operations with CCA

|  |  |
| --- | --- |
| Config | Description |
| 10.3.2.1-1 | LTE FDD  NR without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.3.2.1-2 | LTE TDD  NR without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 10.3.2.1.4.1-2.

Table 10.3.2.1.4.1-2: Initial conditions for EN-DC FR1 E-UTRAN – NR interruptions during SCell operations with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.3.2.1.4.1-1 | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | N/A | |  |

Table 10.3.2.1.4.1-3: General test parameters for EN-DC FR1 E-UTRAN – NR interruptions during SCell operations with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2, 3 | One is E-UTRAN RF channel and the other two are NR RF channels |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Configured PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell3 | Deactivated SCell on NR RF channel number 3. |
| CP length |  | Normal | Applicable to Cell1, Cell2 and Cell3 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| T1 | s | <10 |  |
| T2 | s | <10 |  |
| T3 | s | <10 |  |
| T4 | s | <10 |  |
| T5 | s | <10 |  |

1. Message contents are defined in clause 10.3.2.1.4.3.

2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR FR1 cells. Cell 2 is the PSCell and Cell 3 is the deactivated SCell.

3. There are one E-UTRAN carrier and two NR carriers and three cells specified in the test. Cell 1 is the PCell on E-UTRAN carrier, Cell 2 is the PSCell on one NR carrier and Cell 3 is the NR SCell on the other NR carrier. Both of cell 2 and cell 3 are subject to CCA. Cell 1 is the cell used for connection setup with the power level set according to clause A.6B. Cell 2 and Cell 3 shall be configured according to clauses C.1.1 and C.1.2.

10.3.2.1.4.2 Test procedure

The test consists of five time periods, with duration of T1, T2, T3, T4 and T5. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. Throughout the test, the LTE PCell and NR PSCell are continuously scheduled in DL. The power of signals on cell 1,2 and 3 is not modified during the test.

Prior to T1, a connection is started with cell 2 as the PSCell, and measurements of cell 3 are configured with gap pattern 0, such that cell 3 is reported. This ensures that cell 3 is known at the start of time period T1 and is not itself part of the tested requirement.

The point in time at which the RRC message implying SCell addition is received at the UE antenna connector, defines the start of time period T1. Measurement gap pattern 0 shall be stopped when the SCell is configured.

The point in time at which the RRC message implying SCell addition is received at the UE antenna connector, defines the start of time period T1.

The point in time at which the MAC-CE message implying SCell activation is received at the UE antenna connector, defines the start of time period T2.

The point in time at which the MAC-CE message implying SCell deactivation is received at the UE antenna connector, defines the start of time period T3.

The point in time at which deactivation delay requirement in TS 38.133 [6] section 8.3A are satisfied defines the start of time period T4

The point in time at which the RRC message implying SCell release is received at the UE antenna connector, defines the start of time period T5.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *EN-DC*, DC bearer *MCG*\_*and*\_*SCG*, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Configure MCG according to TS 36.521-3 [26] clause C.0, C.1 and SCG according to clause C.1.1 and C.1.2 for all downlink physical channels.

3. The SS shall configure SCell (Cell 3) on the SCC as per TS 38.508-1 [14] clause 7.5.2, with the message content exceptions defined in clause 10.3.2.1.4.3. NR RRCReconfiguration message is contained in RRCConnectionReconfiguration and NR RRCReconfigurationComplete message is contained in RRCConnectionReconfigurationComplete.

4. Set the parameters according to T1 in Table 10.3.2.1.5-1. Propagation conditions are set according to clause C.2.1. T1 starts.

5. SS schedules on PCell and PSCell continuously and UE shall start sending ACK/NACK reports. The SS shall monitor DTX on PCell and ACK/NACK/DTX on PSCell.

6. If more than 99.5% of uplink transmissions on PSCell are received by SS then count a success for the event "ACK/NACK". Otherwise count a fail for the event "ACK/NACK".

6a. If no longer than X consecutive DTX on PCell is observed by the SS, then count a success for the event “PCell DTX”. Otherwise count a fail for the event “PCell DTX”. Where,

- X = 1 for inter-band EN-DC, and X = 3 for intra-band EN-DC.7. If no longer than X consecutive DTX on PSCell is observed by the SS, then count a success for the event "PSCell DTX". Otherwise count a fail for the event "PSCell DTX". Where,

7. The SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message.

8. The SS then shall transmit *RRCConnectionReconfiguration* message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. If any the reconfiguration fails, switch off and on the UE and ensure the UE is in RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [14] clause 4.5

9. Repeat step 2-8 until a test verdict has been achieved.

Each of the events "ACK/NACK", "PCell DTX" and "PSCell DTX" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.TBD in Annex G.TBD is achieved. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

10.3.2.1.4.3 Message contents

FFS

10.3.2.1.5 Test requirements

Table 10.3.2.1.5-1 defines the primary level settings including test tolerances for all tests.

Table 10.3.2.1.5-1: Cell specific test parameters for known SCell activation case with NR PSCell and SCell under CCA, 160 ms SCell measurement cycle

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell2 | | | | | Cell3 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| TDD configuration | Config 1,2 |  | TDDConf.1.1 CCA | | | | | TDDConf.1.1 CCA | | | | |
| BWchannel | Config 1,2 | MHz | 40: NRB,c = 106 | | | | | 40: NRB,c = 106 | | | | |
| DL CCA model | Config 1,2 |  | As specified in clause D.7.2.1 | | | | | As specified in clause D.7.2.1 | | | | |
| DL CCA probabilityfor semi-static channel accessNote6,8 | PCCA\_DL |  | 0.9375 | | | | | 0.9375 | | | | |
| DL CCA probability for dynamic channel accessNote7,8 | PCCA\_DL\_1 |  | 0.75 | | | | | 0.75 | | | | |
| PCCA\_DL\_2 |  | 0.75 | | | | | 0.75 | | | | |
| UL CCA model | Config 1,2 |  | As specified in clause D.7.2.2 | | | | | --- | | | | |
| UL CCA probability for semi-static channel access | PCCA\_UL |  | 0.87 | | | | | --- | | | | |
| UL CCA probability for dynamic channel access | PCCA\_UL |  | 0.75 | | | | | --- | | | | |
| Initial BWP Configuration | Config 1,2 |  | DLBWP.0.1 | | | | | DLBWP.0.1 | | | | |
| Dedicated DL BWP Configuration | Config 1,2 |  | DLBWP.1.1 | | | | | DLBWP.1.1 | | | | |
| Initial UL BWP Configuration | Config 1,2 |  | ULBWP.0.1 | | | | | ULBWP.0.1 | | | | |
| Dedicated UL BWP Configuration | Config 1,2 |  | ULBWP.1.1 | | | | | ULBWP.1.1 | | | | |
| PDSCH reference measurement channel | Config 1,2 |  | SR.1.1 CCA | | | | | - | | | | |
| RMSI CORESET Parameters | Config 1,2 |  | CR.1.1 CCA | | | | | CR.1.1 CCA | | | | |
| PDCCH CORESET Parameters | Config 1,2 |  | CCR.1.1 CCA | | | | | CCR.1.1 CCA | | | | |
| TRS configuration | Config 1,2 |  | TRS.1.2 TDD | | | | | TRS.1.2 TDD | | | | |
| OCNG Patterns | |  | OP.1 | | | | | OP.1 | | | | |
| SSB configuration for semi-static channel accessNote6,8 | Config 1,2 |  | SSB.1 CCA | | | | | SSB.1 CCA | | | | |
| SSB configuration for dynamic channel accessNote7,8 | Config 1,2 |  | SSB.2 CCA | | | | | SSB.2 CCA | | | | |
| SMTC Configuration | Config 1,2 |  | SMTC.1 | | | | | SMTC.1 | | | | |
| DBT window configuration | Config 1,2 |  | DBT.1 | | | | | DBT.1 | | | | |
| TCI state | |  | TCI.State.0 | | | | | TCI.State.0 | | | | |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | | | | | 1x2 Low | | | | |
| EPRE ratio of PSS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  | | | | |  | | | | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PDSCH to PDSCH | |  |  | | | | |  | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  | | | | |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  | | | | |  | | | | |
| NocNote 2 | | dBm/15 kHz | -104+TT | | | | | -104+TT | | | | |
| SS-RSRP Note 3 | | dBm/15 kHz | -87+TT | | | | | -87+TT | | | | |
| Ês/Iot | | dB | 17+TT | | | | | 17+TT | | | | |
| Ês/Noc | | dB | 17+TT | | | | | 17+TT | | | | |
| IoNote3 | Config 1,2 | dBm/38.16MHz | -52.86+TT | | | | | -52.86+TT | | | | |
| Time offset to Cell1 Note 4 | | ms | 3 | | | | | 3 | | | | |
| Time offset to Cell2 Note 5 | | μs | - | | | | | 3 | | | | |
| Propagation Condition | |  | AWGN | | | | | 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 in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows.  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 modeled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells  Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 8: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | | | | | |

The UE shall meet the interruption requirements for SCell addition on both the victim PSCC in TS 38.133 [6] clause 8.2.1 and the vicitim LTE PCell in TS 36.133 [23] clause 7.32 of [15] during time T1.

The UE shall meet the interruption requirements for SCell activation on both the victim PSCell in TS 38.133 [6] clause 8.2.1 and the vicitim LTE PCell in TS 36.133 [23] clause 7.32 of [15] during time T2. There shall be a single interruption with time window as specified in TS 38.133 [6] clause 8.3A.2.

The UE shall meet the interruption requirements for SCell deactivation on both the victim PSCell in TS 38.133 [6] clause 8.2.1 and the vicitim LTE PCell in TS 36.133 [23] clause 7.32 of [15] during time T3. There shall be a single interruption with time window as specified in TS 38.133 [6] clause 8.3A.3.

The UE shall meet the interruption requirements for deactivated SCell measurements on both the victim PSCell in TS 38.133 [6] clause 8.2.1 and the vicitim LTE PCell in TS 36.133 [23] clause 7.32 of [15] during time T4. The interruptions shall be within the time window as specified in TS 38.133 [6] clause 8.3A.3.

The UE shall meet the interruption requirements for SCell release on both the victim PSCell in TS 38.133 [6] clause 8.2.1 and the vicitim LTE PCell in TS 36.133 [23] clause 7.32 of [15] during time T5.

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

### 10.3.3 SCell activation and deactivation delay

#### 10.3.3.0 Minimum Conformance Requirements

##### 10.3.3.0.1 SCell Activation Delay Requirement for Deactivated SCell under CCA

The requirements in this clause shall apply for the UE configured with one downlink SCell operating with CCA in EN-DC or in standalone NR carrier aggregation and when one SCell operating with CCA is being activated but none of the RRC parameters *CO-DurationPerCell-r16*, *SlotFormatIndicator*, and *CSI-RS-ValidationWith-DCI-r16* is configured and all of the CSI reporting resources for being-activated SCell are available.

The delay within which the UE shall be able to activate the deactivated SCell depends upon the specified conditions.

Upon receiving SCell activation command in slot *n*, the UE shall be capable to transmit valid CSI report and apply actions related to the activation command for the SCell being activated no later than in slot n + (THARQ + Tactivation\_time\_withCCA + TCSI\_reporting\_withCCA)/*NR\_slot\_length*, where:

- THARQ (in ms) is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3]. In the event of UE not being able to transmit the acknowledgment due to UL CCA failures: THARQ is extended to also include the time to all next HARQ feedback transmission and retransmission opportunities, until the time of its successful transmission, as specified in TS 38.213 [3]; no extension of THARQ due to UL CCA failures is allowed for Type 2C UL channel access procedure as defined in TS 37.213 [57].

- Tactivation\_time\_withCCA is the SCell activation delay in millisecond.

- If the SCell is known and belongs to FR1, Tactivation\_time\_withCCA is:

- TFirstSSB + L1\*Trs + 5ms, if the measurement period of the SCell being activated is equal to or smaller than 2400ms.

- TFirstSSB\_MAX + L2,1\*TSMTC\_MAX + (1 +L2,2)\*Trs + 5ms, if the measurement period of the SCell being activated is larger than 2400ms.

- If the SCell is unknown and belongs to FR1, provided that the side condition Ês/Iot ≥ -2 dB is fulfilled and the SCell can be successfully detected in one attempt, Tactivation\_time\_withCCA is:

- TFirstSSB\_MAX + (1 + L3,1)\*TSMTC\_MAX + (2 + L3,2)\*Trs + 5ms.- If the SCell being activated belongs to FR2-2 and if there is at least one active serving cell on that FR2-2 band, if the UE supporting *scellWithoutSSB* is not provided with any SMTC for the target SCell, Tactivation\_time\_withCCA is 3 ms, provided

- the RS (s) of SCell being activated is (are) QCL-TypeD with RS (s) of one active serving cell on that FR2-2 band.

- If the SCell being activated belongs to FR2-2 and if there is no active serving cell on that FR2-2 band provided that PCell or PSCell is in FR1 or in FR2-2:

- If the target SCell is known to UE and semi-persistent CSI-RS is used for CSI reporting, then Tactivation\_time\_withCCA is:

- 3ms + max(Tuncertainty\_MAC + TFineTiming + 2ms, Tuncertainty\_SP), where Tuncertainty\_MAC=0 and Tuncertainty\_SP=0 if UE receives the SCell activation command, semi-persistent CSI-RS activation command and TCI state activation command at the same time.

- If the target SCell is known to UE and periodic CSI-RS is used for CSI reporting, then Tactivation\_time is:

- max(Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay-THARQ), where Tuncertainty\_MAC=0 if UE receives the SCell activation command and TCI state activation commands at the same time.

- If the PCell/PSCell and the target SCell are configured as FR1-FR2-2 CA or if the PCell/PSCell and the target SCell are in a FR2-2 band pair with independent beam management, and the target SCell is unknown to UE and semi-persistent CSI-RS is used for CSI reporting, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, then Tactivation\_time\_withCCA is:

- 6ms + TFirstSSB\_MAX + (23+[N\*L4,1])\*TSMTC\_MAX + (12+[ N \*L4,2])\*Trs + TL1-RSRP, measure + TL1-RSRP, report + THARQ + max(Tuncertainty\_MAC + TFineTiming + 2ms, Tuncertainty\_SP).

- If the PCell/PSCell and the target SCell are configured as FR1-FR2-2 CA or if the PCell/PSCell and the target SCell are in a FR2-2 band pair with independent beam management, and the target SCell is unknown to UE and periodic CSI-RS is used for CSI reporting, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, then Tactivation\_time\_withCCA is:

- 3ms + TFirstSSB\_MAX + (23+[ N\*L5,1])\*TSMTC\_MAX + (12+[ N \*L5,2])\*Trs + TL1-RSRP, measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}.

Where,

TSMTC\_MAX:

- In case of intra-band SCell activation, TSMTC\_MAX is the longest SMTC periodicity between active serving cells and SCell being activated provided the cell specific reference signals from the active serving cells and the SCells being activated or released are available in the same slot;

- In case of inter-band SCell activation, TSMTC\_MAX is the SMTC periodicity of SCell being activated;

- TSMTC\_MAX is bounded to a minimum value of 10ms.

Trs is the SMTC periodicity of the SCell being activated if the UE has been provided with an SMTC configuration for the SCell in SCell addition message, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement which involves Trs is applied with Trs = 5ms assuming the SSB transmission periodicity is 5ms. There are no requirements if the SSB transmission periodicity is not 5ms

TFirstSSB: is the time to the end of the first complete configured SSB burst indicated by the SMTC after slot n + (THARQ+3ms)/*NR\_slot\_length*

TFirstSSB\_MAX: is the time to the end of first complete configured SSB burst indicated by the SMTC after slot n + (THARQ+3ms)/*NR\_slot\_length* when all active serving cells and SCells being activated or released have configured SSB bursts in the same slot for intra-band scenario. In case of inter-band SCell activation, TFirstSSB\_MAX is the time to the end of the first complete configured SSB burst of the SCell being activated. In FR2-2, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot.

L1 (L1 ≤ L1,max) is the number of configured SMTC occasions not available at the UE. L1,max = 2 if Trs ≤ 40 ms; otherwise L1,max = 1.

L2,1 (L2,1 ≤ L2,1,max) and L3,1 (L3,1 ≤ L3,1,max) are the numbers of configured SMTC occasions not available at the UE, for a known and unknown SCell activation respectively,

in the SCell being activated, for inter-band scenario, or

in any of the SCells already activated or being activated provided their cell specific reference signals are configured in the same slot, for intra-band scenario

and L2,1,max = 2 if TSMTC\_MAX ≤ 40 ms; otherwise L2,1,max = 1. L3,1,max = 2 if TSMTC\_MAX ≤ 40 ms; otherwise L3,1,max = 1.

L2,2 (L2,2 ≤ L2,2,max) and L3,2 (L3,2 ≤ L3,2,max)are the number of configured SMTC occasions not available at the UE in the SCell being activated. L2,2,max = 2 if Trs ≤ 40 ms; otherwise L2,2,max = 1. L3,2,max = 2 if Trs ≤ 40 ms; otherwise L3,2,max = 1.

N = TBD for an FR2-2 unknown SCell activation.

L4,1 (L4,1 ≤ L4,1,max) and L5,1 (L5,1 ≤ L5,1,max) are the numbers of SMTC occasions groups not available at the UE, for an FR2-2 unknown SCell activation,

in the SCell being activated, for inter-band scenario, or

in any of the SCells already activated or being activated provided their cell specific reference signals are configured in the same slot, for intra-band scenario

and L4,1,max = 2 if TSMTC\_MAX ≤ 40 ms; otherwise L4,1,max = 1. L5,1,max = 2 if TSMTC\_MAX ≤ 40 ms; otherwise L5,1,max = 1.

L4,2 (L4,2 ≤ L4,2,max) and L5,2 (L5,2 ≤ L5,2,max)are the number of SMTC occasions groups not available at the UE in the FR2-2 unknown SCell being activated. L4,2,max = 2 if Trs ≤ 40 ms; otherwise L4,2,max = 1. L5,2,max = 2 if Trs ≤ 40 ms; otherwise L5,2,max = 1.

TFineTiming is the time period between UE finish processing the last activation command for PDCCH TCI, PDSCH TCI (when applicable) and the timing of first complete available SSB corresponding to the TCI state.

TL1-RSRP, measure is L1-RSRP measurement delay TL1-RSRP\_Measurement\_Period\_SSB\_CCA msas defined in clause 9.5A.4.1 with the assumption of M=1.

TL1-RSRP, report is delay of acquiring CSI reporting resources.

Tuncertainty\_MAC is the time period between reception of the last activation command for PDCCH TCI, PDSCH TCI (when applicable) relative to

- SCell activation command for known case;

- First valid L1-RSRP reporting for unknown case.

Tuncertainty\_RRC is the time period between reception of the RRC configuration message for TCI of periodic CSI-RS for CQI reporting (when applicable) relative to

- SCell activation command for known case;

- First valid L1-RSRP reporting for unknown case.

Tuncertainty\_SP is the time period between reception of the activation command for semi-persistent CSI-RS resource set for CQI reporting relative to

- SCell activation command for known case;

- First valid L1-RSRP reporting for unknown case.

TRRC\_delay is the RRC procedure delay as specified in TS38.331 [2].

Longer delays for RRM measurement requirements, and in case of FR2-2 also SSB based RLM/BFD/CBD/L1-RSRP measurement requirements, can be expected during the cell detection time for unknown SCell activation.

When *absoluteFrequencySSB* is not configured in *DownlinkConfigCommon* for target SCell but SMTC for target SCell is configured, no requirement would be applied.

TCSI\_reporting\_withCCA = TCSI\_reporting + TCSI\_ReportingDelay , where

TCSI\_reporting is the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2].

TCSI\_ReportingDelay is the additional delay in transmission of CSI reporting due to UL CCA failures at the UE. If there are no uplink resources for reporting the valid CSI, then the UE shall use the next available opportunities for reporting the corresponding valid CSI as specified in TS 38.213 [3].

Upon exceeding any of the maximum numbers L1,max, L2,1,max, L2,2,max, L3,1,max, and L3,2,max of SMTC occasions or CSI-RS occasions, respectively, not available at the UE, the UE shall abandon the SCell activation procedure.

SCell operating with CCA in FR1 is known if it has been meeting the following conditions:

- During the period equal to max(5 measCycleSCell,  5 DRX cycles) before the reception of the SCell activation command:

- the UE has sent a valid measurement report for the SCell being activated and

- the SSB measured remains detectable in the SMTC occasions available at the UE, according to the cell identification conditions specified in clause 9.2A and 9.3A.

- the SSB measured during the period equal to max(5 measCycleSCell, 5 DRX cycles) also remains detectable - the SSB measured during the period equal to max(5 measCycleSCell, 5 DRX cycles) also remains detectable in the SMTC occasions available at the UE during the SCell activation delay according to the cell identification conditions specified in clause 9.2A and 9.3A.

Otherwise SCell operating with CCA in FR1 is unknown.

For the first SCell activation with CCA in FR2-2 bands, the SCell is known if it has been meeting the following conditions:

- During the period equal to 4s for UE supporting power class 1/5 and 3s for UE supporting power class 2/3/4 before UE receives the last activation command for PDCCH TCI, PDSCH TCI (when applicable) and semi-persistent CSI-RS for CQI reporting (when applicable):

- the UE has sent a valid L3-RSRP measurement report with SSB index

- SCell activation command is received after L3-RSRP reporting and no later than the time when UE receives MAC-CE command for TCI activation

- During the period from L3-RSRP reporting to the valid CQI reporting, the reported SSBs with indexes remain detectable according to the cell identification conditions specified in clauses 9.2 and 9.3, and the TCI state is selected based on one of the latest reported SSB indexes.

Otherwise, the first SCell with CCA in FR2-2 band is unknown. The requirement for unknown SCell applies provided that the activation commands for PDCCH TCI, PDSCH TCI (when applicable), semi-persistent CSI-RS for CQI reporting (when applicable), and configuration message for TCI of periodic CSI-RS for CQI reporting (when applicable) are based on the latest valid L1-RSRP reporting.

If the UE has been provided with higher layer in TS 38.331 [2] signalling of *smtc2*prior to the activation command, TSMTC\_Scell follows *smtc1* or *smtc2* according to the physical cell ID of the target cell being activated. TSMTC\_MAX follows *smtc1* or *smtc2* according to the physical cell IDs of the target cells being activated and the active serving cells.

In addition to CSI reporting defined above, UE shall also apply other actions related to the activation command specified in TS 38.331 [2] for a SCell at the first opportunities for the corresponding actions once the SCell is activated.

For intra-band CA, the starting point of an interruption window on SpCell or any activated SCell as specified in clause 8.2, shall not occur before slot n+1+ and not occur after slot n+1+ , where TX is:

- TFirstSSB, for known SCell activation when SCell measurement cycle is equal to or smaller than 160ms;

- TFirstSSB\_MAX + L2,1\* TSMTC\_MAX for known SCell activation when SCell measurement cycle is greater than 160ms;

- TFirstSSB\_MAX + L3,1\* TSMTC\_MAX for unknown SCell activation

For inter-band CA, the starting point of an interruption window on SpCell or any activated SCell as specified in clause 8.2, shall not occur before slot n+1+ and not occur after slot n+1+ , where TX is:

- TFirstSSB, for known SCell activation when SCell measurement cycle is equal to, or smaller than, 160ms.

For intra-band CA,

- While the SCell being activated is known with measurement cycle equal to or smaller than 160ms, no more than one interruption is allowed during SCell activation.

- While the SCell being activated is known with measurement cycle greater than 160ms, up to 1+L2,1 interruptions are allowed during SCell activation,

- While the SCell being activated is unknown, up to 1+L3,1 interruptions are allowed during SCell activation. When L3,1>0, performance degradation may be expected on any activated intra-band victim cells during the SCell activation

- For a single interruption (L=0), interruption window length at SCell activation does not depend on DL CCA failures.

For inter-band CA,

- For any active cell in the same band with the SCell being activated, the interruption requirements (i.e. number of interruptions and starting point of an interruption) for intra-band CA apply.

- For any active cell outside the band with the SCell being activated, a single interruption applies

The number of interruptions and length of each interruption window may be different for different victim cells and depends on the applicable scenario and on the frequency band relation between the aggressor cell and the victim cell. For a single interruption (L=0), the interruption window length at SCell activation does not depend on DL CCA failures.

Starting from slot *n* + THARQ + 3 ms where slot *n* is the slot where SCell activation command is received (as specified in clause 4.3 of TS 38.213 [3]) and until the SCell activation completion at UE, after at least one CSI-RS transmission occasion for the channel measurement and reporting (specified in clause 5.2.2.5 of TS 38.214 [26]), the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed a first L1-RSRP measurement, the UE shall report lowest valid L1 SS-RSRP range if the UE has available uplink resources to report L1-RSRP for the SCell.

The requirements in this section do not apply when *sCellDeactivationTimer* [2] is not configured and when Tactivation\_time\_withCCA exceeds 1280 ms.

The normative reference for this requirement is TS 38.133 [6] clause 8.3A.

##### 10.3.3.0.2 SCell Deactivation Delay Requirement for Activated SCell under CCA

The requirements in this clause shall apply for the UE configured with one downlink SCell operating with CCA in EN-DC or in standalone NR carrier aggregation.

Upon receiving SCell deactivation command in slot *n*, the UE shall accomplish the deactivation actions for the SCell being deactivated no later than in slot *n+*(THARQ +3ms)/*NR\_slot\_length*. The starting point of an interruption window on spCell or any activated SCell, as specified in clause 8.2, shall not occur before slot n+1+ and not occur after slot n+1+, where NR slot length is with respect to the numerology used in the SCell being deactivated.

Upon expiry of the *sCellDeactivationTimer* in slot *n*, the UE shall accomplish the deactivation actions for the SCell being deactivated no later than in slot *n +*. The starting point of an interruption window on spCell or any activated SCell, as specified in clause 8.2, shall not occur before slot n+1 and not occur after slot n+1+, where NR slot length is with respect to the numerology used in the SCell being deactivated.The length of the interruption window may be different for different victim cells, and depends on the applicable scenario and on the frequency band relation between the aggressor cell and the victim cell.

The requirements in this section do not apply when *sCellDeactivationTimer* [2] is not configured and when SCell deactivation delay exceeds 1280 ms.

The normative reference for this requirement is TS 38.133 [6] clause 8.3A.

#### 10.3.3.1 EN-DC FR1 SCell Activation and Deactivation of known NR SCell with NR PSCell and NR SCell under CCA, 160 ms SCell measurement cycle

Editor's Note:

* MU and TT analysis is incomplete
* Message contents is FFS
* Call setup and test procedure may need to be updated
* Applicability may need to be updated in 38.522
* Statistical analysis to determine test case verdict is FFS

10.3.3.1.1 Test purpose

The purpose of this test is to verify that the SCell activation and deactivation delays for NR SCell, with NR PSCell and NR SCell both under CCA, are within the requirements, when the SCell is known by the UE at the time of activation and the configured SCell measurement cycle is 160 ms.

10.3.3.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting 2DL CA in NR.

10.3.3.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 10.3.3.0.1 and 10.3.3.0.2 for SCell Activation Delay Requirement for Deactivated SCell under CCA and SCell Deactivation Delay Requirement for Activated SCell under CCA correspondingly.

The normative reference for this requirement is TS 38.133 [6] clause A.10.3.3.1.

10.3.3.1.4 Test description

10.3.3.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in this clause. The supported test configurations for LTE PCell and NR PSCell and SCell are shown in Table 10.3.3.1.4.1-1.

This test shall be tested using any of the test configurations in Table 10.3.3.1.4.1-1.

Table 10.3.3.1.4.1-1: Supported test configurations for EN-DC FR1 SCell Activation and Deactivation of known NR SCell with NR PSCell and NR SCell under CCA, 160 ms SCell measurement cycle

|  |  |
| --- | --- |
| Configuration | Description |
| 10.3.3.1-1 | PCC: LTE FDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.3.3.1-2 | PCC: LTE TDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 10.3.3.1.4.1-2.

Table 10.3.3.1.4.1-2: Initial conditions for EN-DC FR1 SCell Activation and Deactivation of known NR SCell with NR PSCell and NR SCell under CCA, 160 ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.3.3.1.4.1-1 | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.1 |
| Exceptions to connection diagram | N/A | |  |

Table 10.3.3.1.4.1-3: General test parameters for EN-DC FR1 SCell Activation and Deactivation of known NR SCell with NR PSCell and NR SCell under CCA, 160 ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2,3 | Three radio channels (1, 2, 3) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on E-UTRAN RF channel number 1. |
| Active PSCell |  | Cell 2 | Primary secondary cell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 3 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index |  | 0 | CQI reporting for SCell every second subframe |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell 3 timing offset to Cell 2 | μs | 0 |  |
| Time alignment error between Cell 3 and Cell 2 | μs | ≤ TAE as specified in TS 38.104 [28] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 7 | During this time PCell and PSCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [8] depends on UE’s capability |
| TCSI\_Reporting | ms |  | The delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214 [9]) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [13]  is the subcarrier spacing configuration for DL |

1. Message contents are defined in clause 10.3.3.1.4.3.

2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR FR1 cells. Cell 2 is the PSCell and Cell 3 is the deactivated SCell.

10.3.3.1.4.2 Test procedure

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell: Cell 1 (PCell) on radio channel 1 (PCC) in E-UTRA, Cell 2 (PSCell) on radio channel 2 (PSCC) in NR, and Cell3 (SCell) on radio channel 3 (SCC) in NR. Before the test starts the UE is connected to Cell 1 and Cell 2, but is not aware of Cell 3, as the UE is only monitoring PCC and PSCC. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

The point in time at which UE receives an RRC message by which the SCell (Cell 3) becomes configured on radio channel 2 defines the start of time period T1. During T1, UE starts monitoring the SCC. At the end of T1, the test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted *m*, defines the start of time period T2. The UE shall be able to report a valid CSI in PSCell for the activated SCell at latest in slot *m* + (THARQ+ Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, as defined in 38.133 [6] clause 8.3A.2. The UE shall start reporting CSI in PSCell in first available uplink resource for CSI reporting after at least one CSI-RS transmission occasion for channel measurement and reporting following slot *m+* and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption shall fall within the time window specified in TS 38.133 [6] clause 8.3A.2.

Time period T3 starts when the MAC message is received by at the UE antenna connector, in a slot # denoted *n*, The UE shall complete the activation at latest in slot . Any PSCell interruption shall fall within the time window specified in TS 38.133 [6] clause 8.3A.3.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to T1 in Tables 10.3.3.1.5**-**1 and A.6B.1.1. Propagation conditions are set according to Annex C clauses C.2.2.

3. T1 starts. Immediately after, the SS shall configure SCell (Cell 3) on the SCC as per TS 38.508-1 [14] clause 7.5.2, with the message content exceptions defined in clause 10.3.3.1.4.3. NR RRCReconfiguration message is contained in RRCConnectionReconfiguration and NR RRCReconfigurationComplete message is contained in RRCConnectionReconfigurationComplete.

3a. The UE send a *MeasurementReport* message embedded in *ULInformationTransferMRDC.*

4. The SS shall configure transmission of PDSCH with a maximum number of 1 HARQ transmission.

5. The SS activates SCC by sending the activation MAC-CE (Refer TS 38.321 [12], clauses 5.9, 6.1.3.10) in a slot # denoted m and T2 starts in slot m. If the SS receives ACK for MAC-CE sent by the UE, the test proceeds to step 6, otherwise go to step 9.

After at least one CSI-RS transmission occasion for channel measurement, the UE shall start sending CSI reports for SCell and the SS shall monitor CSI reports for SCell sent from the UE and ACK/NACK sent in PSCell according to the following criteria:

- If the first CSI report for SCell is received by the SS no later than slot ,

- or slot if the slot was subject to interruption,

- or the next CSI report occasion if there is no CSI report occasion in slots or ,

- and CSI report with non-zero CQI index is received by the SS earlier than or equal to slot ,

- or slot if slot was subject to interruption,

- or the next available CSI report occasion if there is no CSI report occasion for reporting the valid CSI in slot , or slot if was subject to interruption,

- and DTX is not observed by the SS outside the slot to up to the end of T2

- Then the number of successes for the event "Activation" is increased by one. Otherwise, count a fail for the event "Activation" and go to step 9.

7. When T2 expires, the SS deactivate SCC by sending the deactivation MAC-CE (Refer TS 38.321 [12], clauses 5.9, 6.1.3.10) in a slot # denoted n and T3 starts in slot n. If the SS receives ACK for MAC-CE sent by the UE, the test proceeds to step 8, otherwise go to step 9.

8. The UE shall stop sending CSI reports for SCell and the SS shall monitor CSI reports for SCell sent from the UE and ACK/NACK sent in PSCell during SCell deactivation.

- If the last CSI report is received by the SS earlier than or equal to slot

- and DTX is not observed by the SS outside the slot to up to the end of T3,

- Then the number of successes for the event "Deactivation" is increased by one. Otherwise, count a fail for the event "Deactivation".

9. When T3 expires, or Activation in step 5 was not acknowledged, or a fail was counted for the event "Activation" in step 6, or Deactivation in step 7 was not acknowledged, the SS shall transmit an *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508[25] Table 4.6.1-8 to release NR PSCell. The UE shall transmit an *RRCConnectionReconfigurationComplete* message.

10. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

11. The SS shall transmit an *RRCConnectionReconfiguration* message with condition MCG and SCG according to TS 36.508 [25] Table 4.6.1-8 to ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5. The UE shall transmit an RRCConnectionReconfigurationComplete message.

12. Repeat steps 2-11 until a test verdict has been achieved.

Each of the events "Activation" and "Deactivation" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.TBD in Annex G.TBD is achieved. Different events may require different times for a verdict. If all events pass, the test passes. If one event fails, the test fails.

10.3.3.1.4.3 Message contents

FFS

10.3.3.1.5 Test requirements

Table 10.3.3.1.5-1 defines the primary level settings including test tolerances for all tests.

Table 10.3.3.1.5-1: Cell specific test parameters for EN-DC FR1 SCell Activation and Deactivation of known NR SCell with NR PSCell and NR SCell under CCA, 160 ms SCell measurement cycle

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | | | Cell 3 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| Duplex mode | Config 1,2 |  | TDD | | | TDD | | |
| TDD configuration | Config 1,2 |  | TDDConf.1.1 CCA | | | TDDConf.1.1 CCA | | |
| BWchannel | Config 1,2 | MHz | 40: NRB,c = 106 | | | 40: NRB,c = 106 | | |
| DL CCA model | |  | As specified in clause D.7.2.1 | | | As specified in clause D.7.2.1 | | |
| UL CCA model | |  | As specified in clause D.7.2.2 | | | As specified in clause D.7.2.2 | | |
| DL CCA probability for semi-static channel accessNote5,7 | PCCA\_DL |  | 0.9375 | | | 0.9375 | | |
| DL CCA probability for dynamic channel accessNote6,7 | PCCA\_DL\_1 |  | 0.75 | | | 0.75 | | |
| PCCA\_DL\_2 |  | 0.75 | | | 0.75 | | |
| UL CCA probability for semi-static channel access | PCCA\_UL |  | 0.87 | | | 0.87 | | |
| UL CCA probability for dynamic channel access | PCCA\_UL |  | 0.75 | | | 0.75 | | |
| LCCA\_DL Note 8 | |  | 2 | | | 2 | | |
| WCCA\_DL Note 8 | |  | Tactivation\_time\_withCCA | | | Tactivation\_time\_withCCA | | |
| Initial downlink BWP configuration | |  | DLBWP.0.2 | | | DLBWP.0.2 | | |
| Initial uplink BWP configuration | |  | ULBWP.0.1 | | | ULBWP.0.1 | | |
| Dedicated downlink BWP configuration | |  | DLBWP.0.2 | | | DLBWP.0.2 | | |
| Dedicated uplink BWP configuration | |  | ULBWP.0.1 | | | ULBWP.0.1 | | |
| TCI state | |  | TCI.State.0 | | | TCI.State.0 | | |
| TRS Configuration | Config 1,2 |  | TRS.1.2 TDD | | | TRS.1.2 TDD | | |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.1.1 CCA | | | SR.1.1 CCA | | |
| Dedicated CORESET parameters | Config 1,2 |  | CCR.1.3 CCA | | | CCR.1.3 CCA | | |
| RMSI CORESET parameters | Config 1,2 |  | CR.1.1 CCA | | | CR.1.1 CCA | | |
| OCNG Patterns Note1 | |  | OP.1 | | | OP.1 | | |
| SSB Configuration for semi-static channel accessNote5,7 | Config 1,2 |  | SSB.1 CCA | | | SSB.1 CCA | | |
| SSB Configuration for dynamic channel accessNote6,7 | Config 1,2 |  | SSB.2 CCA | | | SSB.2 CCA | | |
| SMTC configuration | |  | SMTC.1 | | | SMTC.1 | | |
| DBT window configuration | |  | DBT.1 | | | DBT.1 | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSSNote1 | |
| EPRE ratio of OCNG to OCNG DMRSNote1 | |
| *Noc* Note2 | Config 1,2 | dBm/15kHz | -104+TT | | | -104+TT | | |
| *Noc* Note2 | Config 1,2 | dBm/SCS | -101+TT | | | -101+TT | | |
| *Ês/Iot* | | dB | 17+TT | | | 17+TT | | |
| *Ês/Noc* | | dB | 17+TT | | | 17+TT | | |
| SS-RSRP Note3 | Config 1,2 | dBm/SCS | -84+TT | | | -84+TT | | |
| IoNote3 | Config 1,2 | dBm/  38.16MHz | -52.87+TT | | | -52.87+TT | | |
| Propagation condition | | - | AWGN | | | | | |
| Note 1: OCNG shall be used such that resources in the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for *Noc*to be fulfilled.  Note 3: SS-RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.  Note 8: As specified in 38.133 [6] clause 8.3A for L1,max, L2,1,max, L2,2,max, L3,1,max, andL3,2,max | | | | | | | | |

During T2, starting after at least one CSI-RS transmission occasion for channel measurement and reporting from the slot specified in clause 4.3 of TS 38.213 [8] and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

During T2, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in first available uplink resource for CSI reporting no later than slot *m +* (THARQ+ Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, where Tactivation\_time\_withCCA = TFirstSSB + L1\*Trs + 5ms, as specified in TS 38.133 [6] clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot , as defined in TS 38.133 [6] clause 8.3A.3.

During T2, interruption on PSCell shall not occur outside slot *m* +1+ to slot *m* +1+ with TX = TFirstSSB.

During T3, interruption on PSCell shall not occur outside slot *n* +1+THARQ/NR\_slot\_length to slot *n*+1+(THARQ +3ms)/NR\_slot\_length.

The interruption on PSCell shall not be more than specified for EN-DC in TS 38.133 [6] clause 8.2.1.2.4.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

#### 10.3.3.2 EN-DC FR1 SCell Activation and Deactivation of known NR SCell with NR PSCell and NR SCell under CCA, 640 ms SCell measurement cycle

Editor's Note:

* MU and TT analysis is incomplete
* Message contents is FFS
* Call setup and test procedure may need to be updated
* Applicability may need to be updated
* Statistical analysis to determine test case verdict is FFS

10.3.3.2.1 Test purpose

The purpose of this test is to verify that the SCell activation and deactivation delays for NR SCell, with NR PSCell and NR SCell both under CCA, are within the requirements, when the SCell is known by the UE at the time of activation and the configured SCell measurement cycle is 640 ms.

10.3.3.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting 2DL CA in NR.

10.3.3.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 10.3.3.0.1 and 10.3.3.0.2 for SCell Activation Delay Requirement for Deactivated SCell under CCA and SCell Deactivation Delay Requirement for Activated SCell under CCA correspondingly.

The normative reference for this requirement is TS 38.133 [6] clause A.10.3.3.2.

10.3.3.2.4 Test description

10.3.3.2.4.1 Initial conditions

Same initial conditions as described in section 10.3.3.1.4.1 with following exception:

- The listed parameter values in Tables 10.3.3.2.4.1-3 will replace the values of corresponding parameters in Tables 10.3.3.1.4.1-3.

Table 10.3.3.2.4.1-3: General test parameters for EN-DC FR1 SCell Activation and Deactivation of known NR SCell with NR PSCell and NR SCell under CCA, 640 ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| SCell measurement cycle (measCycleSCell) | ms | 640 |  |

10.3.3.2.4.2 Test procedure

Same test procedure as described in section 10.3.3.1.4.2.

10.3.3.2.4.3 Message contents

FFS

10.3.3.2.5 Test requirements

Table 10.3.3.2.5-1 defines the primary level settings including test tolerances for all tests.

Table 10.3.3.2.5-1: Cell specific test parameters for EN-DC FR1 SCell Activation and Deactivation of known NR SCell with NR PSCell and NR SCell under CCA, 640 ms SCell measurement cycle

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | | | Cell 3 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| Duplex mode | Config 1,2 |  | TDD | | | TDD | | |
| TDD configuration | Config 1,2 |  | TDDConf.1.1 CCA | | | TDDConf.1.1 CCA | | |
| BWchannel | Config 1,2 | MHz | 40: NRB,c = 106 | | | 40: NRB,c = 106 | | |
| DL CCA model | |  | As specified in clause D.7.2.1 | | | As specified in clause D.7.2.1 | | |
| UL CCA model | |  | As specified in clause D.7.2.2 | | | As specified in clause D.7.2.2 | | |
| DL CCA probability for semi-static channel accessNote5,7 | PCCA\_DL |  | 0.9375 | | | 0.9375 | | |
| DL CCA probability for dynamic channel accessNote6,7 | PCCA\_DL\_1 |  | 0.75 | | | 0.75 | | |
| PCCA\_DL\_2 |  | 0.75 | | | 0.75 | | |
| UL CCA probability for semi-static channel access | PCCA\_UL |  | 0.87 | | | 0.87 | | |
| UL CCA probability for dynamic channel access | PCCA\_UL |  | 0.75 | | | 0.75 | | |
| LCCA\_DL Note 8 | |  | 2 | | | 2 | | |
| WCCA\_DL Note 8 | |  | Tactivation\_time\_withCCA | | | Tactivation\_time\_withCCA | | |
| Initial downlink BWP configuration | |  | DLBWP.0.2 | | | DLBWP.0.2 | | |
| Initial uplink BWP configuration | |  | ULBWP.0.1 | | | ULBWP.0.1 | | |
| Dedicated downlink BWP configuration | |  | DLBWP.0.2 | | | DLBWP.0.2 | | |
| Dedicated uplink BWP configuration | |  | ULBWP.0.1 | | | ULBWP.0.1 | | |
| TCI state | |  | TCI.State.0 | | | TCI.State.0 | | |
| TRS Configuration | Config 1,2 |  | TRS.1.2 TDD | | | TRS.1.2 TDD | | |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.1.1 CCA | | | SR.1.1 CCA | | |
| Dedicated CORESET parameters | Config 1,2 |  | CCR.1.3 CCA | | | CCR.1.3 CCA | | |
| RMSI CORESET parameters | Config 1,2 |  | CR.1.1 CCA | | | CR.1.1 CCA | | |
| OCNG Patterns Note1 | |  | OP.1 | | | OP.1 | | |
| SSB Configuration for semi-static channel accessNote5,7 | Config 1,2 |  | SSB.1 CCA | | | SSB.1 CCA | | |
| SSB Configuration for dynamic channel accessNote6,7 | Config 1,2 |  | SSB.2 CCA | | | SSB.2 CCA | | |
| SMTC configuration | |  | SMTC.1 | | | SMTC.1 | | |
| DBT window configuration | |  | DBT.1 | | | DBT.1 | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSSNote1 | |
| EPRE ratio of OCNG to OCNG DMRSNote1 | |
| *Noc* Note2 | Config 1,2 | dBm/15kHz | -104+TT | | | -104+TT | | |
| *Noc* Note2 | Config 1,2 | dBm/SCS | -101+TT | | | -101+TT | | |
| *Ês/Iot* | | dB | 17+TT | | | 17+TT | | |
| *Ês/Noc* | | dB | 17+TT | | | 17+TT | | |
| SS-RSRP Note3 | Config 1,2 | dBm/SCS | -84+TT | | | -84+TT | | |
| IoNote3 | Config 1,2 | dBm/  38.16MHz | -52.87+TT | | | -52.87+TT | | |
| Propagation condition | | - | AWGN | | | | | |
| Note 1: OCNG shall be used such that resources in the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for *Noc*to be fulfilled.  Note 3: SS-RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.  Note 8: As specified in 38.133 [6] clause 8.3A for L1,max, L2,1,max, L2,2,max, L3,1,max, andL3,2,max | | | | | | | | |

During T2, starting after at least one CSI-RS transmission occasion for channel measurement and reporting from the slot specified in clause 4.3 of TS 38.213 [8] and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

During T2, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in first available uplink resource for CSI reporting no later than slot *m +* (THARQ+ Tactivation\_time\_withCCA + TCSI\_reporting\_withCCA)/NR\_slot\_length, where Tactivation\_time\_withCCA = TFirstSSB\_MAX + L2,1\*TSMTC\_MAX + (1 +L2,2)\*Trs + 5ms, as specified in TS 38.133 [6] clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot , as defined in TS 38.133 [6] clause 8.3A.3.

During T2, interruption on PSCell shall not occur outside slot *m* +1+ to slot *m* +1+ with TX = TFirstSSB\_MAX + L2,1\* TSMTC\_MAX.

During T3, interruption on PSCell shall not occur outside slot *n* +1+THARQ/NR\_slot\_length to slot *n*+1+(THARQ +3ms)/NR\_slot\_length.

The interruption on PSCell shall not be more than specified for EN-DC in TS 38.133 [6] clause 8.2.1.2.4.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

#### 10.3.3.3 EN-DC FR1 SCell Activation and Deactivation of unknown NR SCell with NR PSCell and NR SCell under CCA

Editor's Note:

* MU and TT analysis is incomplete
* Message contents is FFS
* Call setup and test procedure may need to be updated
* Applicability may need to be updated
* Statistical analysis to determine test case verdict is FFS

10.3.3.3.1 Test purpose

The purpose of this test is to verify that the SCell activation and deactivation delays for NR SCell, with NR PSCell and NR SCell both under CCA, are within the requirements, when the when the SCell is unknown to the UE at the time of activation.

10.3.3.3.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting 2DL CA in NR.

10.3.3.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 10.3.3.3.1 and 10.3.3.3.2 for SCell Activation Delay Requirement for Deactivated SCell under CCA and SCell Deactivation Delay Requirement for Activated SCell under CCA correspondingly.

The normative reference for this requirement is TS 38.133 [6] clause A.10.3.3.3.

10.3.3.3.4 Test description

10.3.3.3.4.1 Initial conditions

Same initial conditions as described in section 10.3.3.1.4.1 with following exception:

- The listed parameter values in Tables 10.3.3.3.4.1-3 will replace the values of corresponding parameters in Tables 10.3.3.1.4.1-3.

Table 10.3.3.3.4.1-3: General test parameters for EN-DC FR1 SCell Activation and Deactivation of unknown NR SCell with NR PSCell and NR SCell under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| T1 | ms | 100 | During this time the PSCell shall be known and the SCell configured, but not detected. |

10.3.3.3.4.2 Test procedure

Same test procedure as described in section 10.3.3.3.4.2, except step 3 and step 5 are replaced by following steps:

3. T1 starts. Immediately after, the SS shall configure SCell (Cell 3) on the SCC as per TS 38.508-1 [14] clause 7.5.2, with the message content exceptions defined in clause 10.3.3.3.4.3. NR RRCReconfiguration message is contained in RRCConnectionReconfiguration and NR RRCReconfigurationComplete message is contained in RRCConnectionReconfigurationComplete. The SCell (Cell 3) shall be powered OFF till T2 starts.

5. The SS activates SCC by sending the activation MAC-CE (Refer TS 38.321 [12], clauses 5.9, 6.1.3.10) in a slot # denoted m, power ON the SCell (Cell3), T2 starts in slot m. If the SS receives ACK for MAC-CE sent by the UE, the test proceeds to step 6, otherwise go to step 9.

and:

* Step 3a is removed.

10.3.3.3.4.3 Message contents

FFS

10.3.3.3.5 Test requirements

Table 10.3.3.3.5-1 defines the primary level settings including test tolerances for all tests.

Table 10.3.3.3.5-1: Cell specific test parameters for EN-DC FR1 SCell Activation and Deactivation of unknown NR SCell with NR PSCell and NR SCell under CCA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | | | Cell 3 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| Duplex mode | Config 1,2 |  | TDD | | | TDD | | |
| TDD configuration | Config 1,2 |  | TDDConf.1.1 CCA | | | TDDConf.1.1 CCA | | |
| BWchannel | Config 1,2 | MHz | 40: NRB,c = 106 | | | 40: NRB,c = 106 | | |
| DL CCA model | |  | As specified in clause D.7.2.1 | | | As specified in clause D.7.2.1 | | |
| UL CCA model | |  | As specified in clause D.7.2.2 | | | As specified in clause D.7.2.2 | | |
| DL CCA probability for semi-static channel accessNote5,7 | PCCA\_DL |  | 0.9375 | | | 0.9375 | | |
| DL CCA probability for dynamic channel accessNote6,7 | PCCA\_DL\_1 |  | 0.75 | | | 0.75 | | |
| PCCA\_DL\_2 |  | 0.75 | | | 0.75 | | |
| UL CCA probability for semi-static channel access | PCCA\_UL |  | 0.87 | | | 0.87 | | |
| UL CCA probability for dynamic channel access | PCCA\_UL |  | 0.75 | | | 0.75 | | |
| LCCA\_DL Note 8 | |  | 2 | | | 2 | | |
| WCCA\_DL Note 8 | |  | Tactivation\_time\_withCCA | | | Tactivation\_time\_withCCA | | |
| Initial downlink BWP configuration | |  | DLBWP.0.2 | | | DLBWP.0.2 | | |
| Initial uplink BWP configuration | |  | ULBWP.0.1 | | | ULBWP.0.1 | | |
| Dedicated downlink BWP configuration | |  | DLBWP.0.2 | | | DLBWP.0.2 | | |
| Dedicated uplink BWP configuration | |  | ULBWP.0.1 | | | ULBWP.0.1 | | |
| TCI state | |  | TCI.State.0 | | | TCI.State.0 | | |
| TRS Configuration | Config 1,2 |  | TRS.1.2 TDD | | | TRS.1.2 TDD | | |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.1.1 CCA | | | SR.1.1 CCA | | |
| Dedicated CORESET parameters | Config 1,2 |  | CCR.1.3 CCA | | | CCR.1.3 CCA | | |
| RMSI CORESET parameters | Config 1,2 |  | CR.1.1 CCA | | | CR.1.1 CCA | | |
| OCNG Patterns Note1 | |  | OP.1 | | | OP.1 | | |
| SSB Configuration for semi-static channel accessNote5,7 | Config 1,2 |  | SSB.1 CCA | | | SSB.1 CCA | | |
| SSB Configuration for dynamic channel accessNote6,7 | Config 1,2 |  | SSB.2 CCA | | | SSB.2 CCA | | |
| SMTC configuration | |  | SMTC.1 | | | SMTC.1 | | |
| DBT window configuration | |  | DBT.1 | | | DBT.1 | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSSNote1 | |
| EPRE ratio of OCNG to OCNG DMRSNote1 | |
| *Noc* Note2 | Config 1,2 | dBm/15kHz | -104+TT | | | -104+TT | | |
| *Noc* Note2 | Config 1,2 | dBm/SCS | -101+TT | | | -101+TT | | |
| *Ês/Iot* | | dB | 17+TT | | | 17+TT | | |
| *Ês/Noc* | | dB | 17+TT | | | 17+TT | | |
| SS-RSRP Note3 | Config 1,2 | dBm/SCS | -84+TT | | | -84+TT | | |
| IoNote3 | Config 1,2 | dBm/  38.16MHz | -52.87+TT | | | -52.87+TT | | |
| Propagation condition | | - | AWGN | | | | | |
| Note 1: OCNG shall be used such that resources in the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for *Noc*to be fulfilled.  Note 3: SS-RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.  Note 8: As specified in 38.133 [6] clause 8.3A for L1,max, L2,1,max, L2,2,max, L3,1,max, andL3,2,max | | | | | | | | |

During T2, starting after at least one CSI-RS transmission occasion for channel measurement and reporting from the slot specified in clause 4.3 of TS 38.213 [8] and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

During T2, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in first available uplink resource for CSI reporting no later than slot *m +* (THARQ+ Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, where Tactivation\_time\_withCCA = TFirstSSB + L1\*Trs + 5ms, as specified in TS 38.133 [6] clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot , as defined in TS 38.133 [6] clause 8.3A.3.

During T2, interruption on PSCell shall not occur outside slot *m* +1+ to slot *m* +1+ with TX = TFirstSSB.

During T3, interruption on PSCell shall not occur outside slot *n* +1+THARQ/NR\_slot\_length to slot *n*+1+(THARQ +3ms)/NR\_slot\_length.

The interruption on PSCell shall not be more than specified for EN-DC in TS 38.133 [6] clause 8.2.1.2.4.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

### 10.3.4 Beam failure detection and link recovery procedures

#### 10.3.4.0 General

The requirements for link recovery procedure in the clause apply when CCA is used on a serving frequency on the downlink.

The UE shall assess the downlink radio link quality of a serving cell based on the reference signal in the set as specified in TS 38.213 [8] in order to detect beam failure on:

- PCell in SA operation mode,

- PSCell in EN-DC operation mode.

- PSCell in NR-DC operation mode.

The RS resource configurations in the set can be periodic SSBs. UE is not required to perform beam failure detection outside the active DL BWP. UE is not required to meet the requirements in clause 10.3.4.0.1 and 10.3.4.0.2 if UE does not have set .

On each RS resource configuration in the set , the UE shall estimate the radio link quality and compare it to the threshold Qout\_LR,CCA for the purpose of accessing downlink radio link quality of the serving cell beams.

The threshold Qout\_LR,CCA is defined as the level at which the downlink radio level link of a given resource configuration on set cannot be reliably received and shall correspond to the BLERout,CCA = 10% block error rate of a hypothetical PDCCH transmission. For SSB based beam failure detection, Qout\_LR\_SSB,CCA is derived based on the hypothetical PDCCH transmission parameters listed in Table 10.3.4.0.1-1.

Upon request the UE shall deliver configuration indexes from the set as specified in TS 38.213 [8] , to higher layers, and the corresponding L1-RSRP measurement provided that the measured L1-RSRP is equal to or better than the threshold Qin\_LR,CCA, which is indicated by higher layer parameter *rsrp-ThresholdSSB*. The UE applies the Qin\_LR,CCA threshold to the L1-RSRP measurement obtained from an SSB. The RS resource configurations in the set can be periodic SSBs. UE is not required to perform candidate beam detection outside the active DL BWP.

In the requirements of this clause, the term CBD-RS SSB occasions not available at the UE refers to when the CBD-RS SSB is configured by gNB in a cell on a carrier frequency subject to CCA, but the first two successive candidate SSB positions for the same SSB index within the set of configured CBD-RS resources are not available at the UE due to DL CCA failures at gNB during the corresponding evaluation period; otherwise the CBD-RS SSB is considered as available at the UE.

The requirements in this clause apply for any *channelAccessMode* configuration [TS 38.331, 13].

The normative reference for this requirement is TS 38.133 [6] clause 8.5A.1.

##### 10.3.4.0.1 Minimum conformance requirements for SSB based Beam Failure Detection under CCA

The requirements in this clause apply for each SSB resource in the set configured for a serving cell, provided that the SSB configured for beam failure detection is actually transmitted within the UE active DL BWP during the entire evaluation period specified in clause 10.3.4.0.1, but occasionally may not be transmitted due to CCA operation.

Table 10.3.4.0.1-1: PDCCH transmission parameters for beam failure instance under CCA

|  |  |
| --- | --- |
| Attribute | Value for BLER |
| DCI format | 1-0 |
| Number of control OFDM symbols | 2 |
| Aggregation level (CCE) | 8 |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 0dB |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 0dB |
| Bandwidth (PRBs) | 24 |
| Sub-carrier spacing (kHz) | Same as the SCS of RMSI CORESET |
| DMRS precoder granularity | REG bundle size |
| REG bundle size | 6 |
| CP length | Normal |
| Mapping from REG to CCE | Distributed |

The normative reference for this requirement is TS 38.133 [6] clause 8.5A.2.

10.3.4.0.1.1 Minimum requirement for SSB based Beam Failure Detection under CCA

UE shall be able to evaluate whether the downlink radio link quality on the configured BFD-RS SSB resource in set estimated over the last TEvaluate\_BFD\_SSB\_CCA ms period becomes worse than the threshold Qout\_LR\_SSB,CCA within TEvaluate\_BFD\_SSB\_CCA ms period.

The value of TEvaluate\_BFD\_SSB\_CCA is defined in Table 10.3.4.0.1.1-1 for FR1.

When concurrent gaps are configured,

- P value for a BFD-RS resource to be measured is defined as Ntotal / Noutside\_MG

- For a window W of duration max(TL1, MGRP\_max), where MGRP max is the maximum MGRP across all configured per-UE measurement gap and per-FR measurement gap within the same FR as serving cell, and starting at the beginning of any BFD-RS resource occasion:

- Ntotal is the total number of BFD-RS resource occasions within the window, including those overlapped with measurement gap occasions within the window, and

- Noutside\_MG is the number of BFD-RS resource occasions that are not overlapped with any measurement gap occasion within the window W

- Otherwise, for a UE not supporting *concurrentMeasGap-r17* or when concurrent gaps are not configured,

- , when in the monitored cell there are GAPs configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the BFD-RS SSB.

- P=1 when in the monitored cell there are no GAPs overlapping with any occasion of the BFD-RS SSB.

- When a measurement gap is configured and the measurement gap is not NCSG,

- a BFD-RS resource is considered to be overlapped with the GAP if it overlaps a measurement gap occasion, and

- xRP = MGRP

- Otherwise, when NCSG measurement gap is configured,

- a BFD-RS resource is considered to be overlapped with the GAP if it overlaps the VIL1 or VIL2 of NCSG, and

- xRP = VIRP

- When concurrent gaps are configured, a BFD-RS is not considered to be overlapped by a gap occasion if the gap occasion is dropped according to 38.133 [6] section 9.1.8.

Longer evaluation period would be expected if the combination of BFD-RS SSB resource, SMTC occasion and GAP configurations does not meet pervious conditions.

Table 10.3.4.0.1-1: Evaluation period TEvaluate\_BFD\_SSB\_CCA for FR1

|  |  |  |
| --- | --- | --- |
| Configuration | TEvaluate\_BFD\_SSB\_CCA (ms) | |
|  | BFD-RS SSB Es/Iot Note2 ≥ -7 dB | BFD-RS SSB Es/Iot Note2 < -7 dB |
| no DRX | Max(50, Ceil((10 × P) × TSSB)) | Max(50, Ceil((12 × P) × TSSB)) |
| DRX cycle ≤ 320ms | Max(50, Ceil(1.5 × 8 × P) × Max(TDRX,TSSB)) | Max(50, Ceil(1.5 × 10 × P) × Max(TDRX,TSSB)) |
| DRX cycle > 320ms | Ceil(7 × P) × TDRX | Ceil(8 × P) × TDRX |
| Note 1: TSSB is the periodicity of SSB in the set . TDRX is the DRX cycle length.  Note 2: BFD-RS SSB Es/Iot is the averaged BFD-RS SSB Es/Iot over the most recent previous evaluation period. | | |

The normative reference for this requirement is TS 38.133 [6] clause 8.5A.2.2.

10.3.4.0.1.2 Measurement restriction for SSB based Beam Failure Detection under CCA

The UE is required to be capable of measuring SSB for BFD without measurement gaps. The UE is required to perform the SSB measurements with measurement restrictions as described in the following clauses.

For FR1, when the SSB for BFD measurement is in the same OFDM symbol as CSI-RS for BFD, CBD or L1-RSRP measurement,

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for BFD measurement without any restriction;

- If SSB and CSI-RS have different SCS,

- If UE supports *simultaneousRxDataSSB-DiffNumerology*, UE shall be able to measure the SSB for BFD measurement without any restriction;

- If UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure SSB for BFD measurement.

The normative reference for this requirement is TS 38.133 [6] clause 8.5A.2.3.

10.3.4.0.2 Void

##### 10.3.4.0.3 Scheduling availability of UE during beam failure detection under CCA

10.3.4.0.3.1 Scheduling availability of UE performing beam failure detection under CCA with a same subcarrier spacing as PDSCH/PDCCH

In this clause, the same requirements apply as in Clause 4.5.5.0.3.

The normative reference for this requirement is TS 38.133 [6] clause 8.5A.7.1.

##### 10.3.4.0.4 Scheduling availability of UE during candidate beam detection under CCA

10.3.4.0.4.1 Scheduling availability of UE performing L1-RSRP measurement under CCA with a same subcarrier spacing as PDSCH/PDCCH on FR1

In this clause, the same requirements apply as in Clause 4.5.5.0.3.

The normative reference for this requirement is TS 38.133 [6] clause 8.5A.8.1.

#### 10.3.4.1 EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in non-DRX mode

Editor's Note:

* Statistical analysis to determine test case verdict is FFS

10.3.4.1.1 Test purpose

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 10.3.4.0.1.

10.3.4.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting UL and SSB-based RLM and link recovery on shared channel access.

10.3.4.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.3.4.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.10.3.4.1.

10.3.4.1.4 Test description

The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 10.3.4.1.4-1 shows the variation of the downlink SNR of the PSCell and the SNR of the SSB in set q0 in the active PSCell to emulate SSB based beam failure. Figure 10.3.4.1.4-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery.

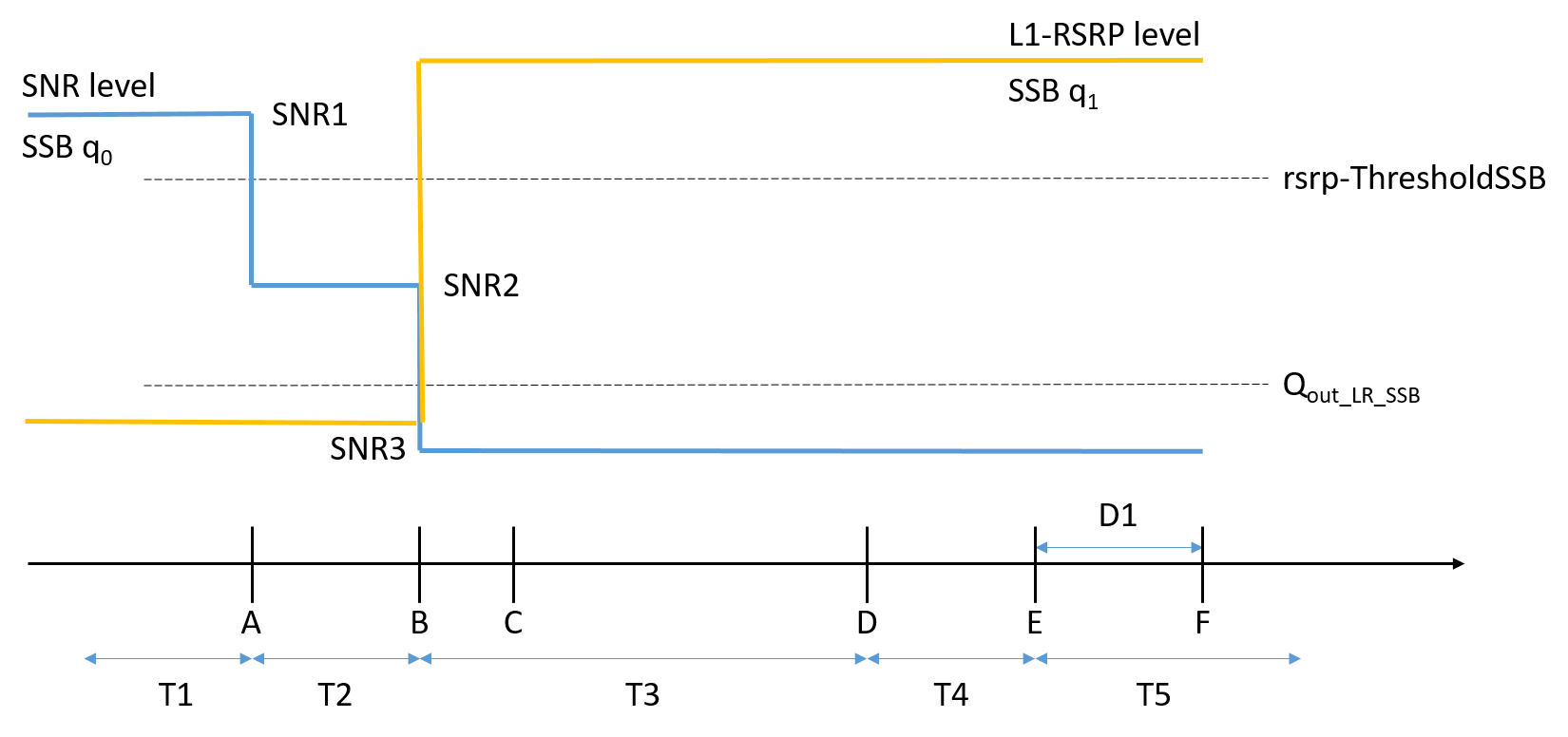


Figure 10.3.4.1.4-1: SNR and L1-RSRP variation for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in non-DRX mode

10.3.4.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.3.4.1.4.1-1.

Table 10.3.4.1.4.1-1: Supported test configurations for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in non-DRX mode

|  |  |
| --- | --- |
| Configuration | Description |
| 10.3.4.1-1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.3.4.1-2 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Configure the test equipment and the DUT according to the parameters in Table 10.3.4.1.4.1-2.

Table 10.3.4.1.4.1-2: Initial conditions for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.3.4.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.3.4.1.4.1-3.

2. Message contents are defined in clause 10.3.4.1.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is the NR cell (PSCell) with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 10.3.4.1.4.1-3: General test parameters for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in non-DRX mode

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Value** | **Comment** |
|  | | | |  | **Test 1** |  |
| Active E-UTRA PCell | | | |  | Cell 1 |  |
| E-UTRA RF Channel Number | | | |  | 1 |  |
| Active PSCell | | | |  | Cell 2 |  |
| RF Channel Number | | | |  | 2 |  |
| DL CCA model | | | |  | As specified in D.7.2.1 |  |
| UL CCA model | | | |  | As specified in D.7.2.2 |  |
| Duplex mode | | | Config 1, 2 |  | TDD |  |
| BWchannel | | | Config 1, 2 | MHz | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | | Config 1, 2 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | Config 1, 2 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | | Config 1, 2 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | Config 1, 2 |  | ULBWP.1.1 |  |
| TDD configuration | | | Config 1, 2 |  | TDDConf.1.1 CCA |  |
| CORESET Reference Channel | | | Config 1, 2 |  | CR.1.1 CCA |  |
| SSB Configuration | | | Config 1, 2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |  |
| DBT Window Configuration | | | Config 1, 2 |  | DBT.1 |  |
| PDSCH/PDCCH subcarrier spacing | | | Config 1, 2 |  | 30 KHz |  |
| PRACH Configuration | | | Config 1, 2 |  | Table A.7.1A.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | | |  | 0 |  |
| SSB Index assigned as CBD RS (q1) | | | |  | 1 |  |
| OCNG parameters | | | |  | OP.1 |  |
| CP length | | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |  |
| Beam failure | | DCI format | |  | 1-0 |  |
| detection transmission parameters | | Number of Control OFDM symbols | |  | 2 |  |
|  | | Aggregation level | | CCE | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 0 |  |
|  | | DMRS precoder granularity | |  | REG bundle size |  |
|  | | REG bundle size | |  | 6 |  |
| DRX | | | |  | OFF |  |
| Gap pattern ID | | | |  | gp0 |  |
| gapOffset | | | |  | 0 |  |
| rlmInSyncOutOfSyncThreshold | | | |  | absent | When the field is absent, the UE applies the value 0. (38.133 [6] Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1, 2 | | | dBm/SCS kHz | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | |  | n1 | see TS 38.321 [12], clause 5.17 |
| beamFailureDetectionTimer | | | |  | pbfd4 | see TS 38.321 [12], clause 5.17 |
| CSI-RS configuration for CSI reporting | | Config 1, 2 | |  | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | | Config 1, 2 | |  | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS | | | |  | 0,1 |  |
| T310 timer | | | | ms | 1000 |  |
| N310 | | | |  | 2 |  |
| T1 | | | | s | 0.2 | During this time the UE shall be fully synchronized to cell 1 |
| T2 | | | | s | 0.93 |  |
| T3 | | | | s | 0.52 |  |
| T4 | | | | s | 0 |  |
| T5 | | | | s | 0.45 |  |
| D1 | | | | s | 0.41 |  |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts.  Note 3: E-UTRAN is in non-DRX mode under test. | | | | | | |

10.3.4.1.4.2 Test procedure

There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell which operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. The UE transmits the reporting according to UL CCA model. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40 ms) in test 1. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *EN-DC*, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. The SS sends an *RRCReconfiguration* (embedded in *RRCConnectionReconfiguration* message) message to the UE to configure inter-frequency measurement with the corresponding gap pattern.

3. The UE sends an RRCReconfigurationComplete (embedded in RRCConnectionReconfigurationComplete message) message.

4. Set the parameters of NR Cell according to T1 in Table 10.3.4.1.5-1. Propagation conditions are set according to clause C.2.3. The SS shall enable DL and UL CCA model according to Table 10.3.4.1.5-1. T1 starts.

5. When T1 expires the SS shall change the SNR value to T2 as specified in Table 10.3.4.1.5-1. T2 starts.

6. When T2 expires the SS shall change the SNR value to T3 as specified in Table 10.3.4.1.5-1. T3 starts.

7. When T3 expires the SS shall change the SNR value to T4 as specified in Table 10.3.4.1.5-1. T4 starts.

8. When T4 expires the SS shall change the SNR value to T5 as specified in Table 10.3.4.1.5-1. T5 starts.

9. If the SS:

a) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in each slot configured for CSI transmission (according to CSI reporting on PUCCH), provided that such slot is not subject to CCA failure (as determined by PCCA\_UL in Table 10.3.4.1.5-1), during the period from time point A to time point B; and

b) does not detect preamble on a beam associated with the candidate beam set q1 before time point B; and

c) detects preamble on a beam associated with the candidate beam set q1 before time point F (D1 after the start of T5), the number of successful tests is increased by one.

Otherwise, the number of failed tests is increased by one.

10. The SS shall first attempt to release and add the PSCell, by disabling the CCA model (i.e. PCCA\_DL\_i= PCCA\_UL=1) and then proceeding with step 1. Otherwise, the UE is switched OFF/ON, then proceed with step 1.

11. Repeat steps 2-10 for all subtests until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

10.3.4.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.3.4.1.4.3-1: Common Exception messages for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in non-DRX mode

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition INTER-FREQ, L3 FILTERING NEEDED,  Table H.3.1-3 with Condition INTER-FREQ MO (where ssbFrequency is set to the ARFCN value of carrier centre of High range)  Table H.3.1-4 with A3-offset = 0  Table H.3.1-8 with Condition SSB BFD  Table H.3.1-10 with Condition SSB  Table H.3.1-10A  Table H.3.4-4 with Condition gapUE  Table H.3.4-5 with Condition BFD  Table H.3.5-4  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access |

Table 10.3.4.1.4.3-2: PDCCH *Search Space* for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in non-DRX mode

| Derivation Path: TS 38.508-1 [14], Table 4.6.3-162 | | | |
| --- | --- | --- | --- |
| Information Element | Value/remark | Comment | Condition |
| SearchSpace ::= SEQUENCE { |  |  |  |
| searchSpaceId | 3 | BFR |  |
| controlResourceSetId | 2 | BFR |  |
| monitoringSlotPeriodicityAndOffset CHOICE { |  |  |  |
| sl1 | NULL |  |  |
| } |  |  |  |
| monitoringSymbolsWithinSlot | 10000000000000 | Symbols 0 and 1 |  |
| nrofCandidates SEQUENCE { |  |  |  |
| aggregationLevel1 | n0 |  |  |
| aggregationLevel2 | n0 |  |  |
| aggregationLevel4 | n0 |  |  |
| aggregationLevel8 | n1 | AL8 |  |
| aggregationLevel16 | n0 |  |  |
| } |  |  |  |
| searchSpaceType CHOICE { |  |  |  |
| ue-Specific SEQUENCE { |  |  | USS |
| dci-Formats | formats0-0-And-1-0 | DCI Format 1\_0 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.4.1.4.3-3: *RLF-TimersAndConstants* for EN-D FR1 C Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-150 | | | |
| Information Element | Value/remark | Comment | Condition |
| RLF-TimersAndConstants ::= SEQUENCE { |  |  |  |
| n310 | n2 |  |  |
| } |  |  |  |

Table 10.3.4.1.4.3-4: *PDCCH-Config* for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.501-1 [14],Table 4.6.3-95 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDCCH-Config ::= SEQUENCE { |  |  |  |
| controlResourceSetToAddModList SEQUENCE(SIZE (1..3)) OF ControlResourceSet { | 2 entries |  |  |
| ControlResourceSet[2] | ControlResourceSet | entry 2, BFR |  |
| } |  |  |  |
| controlResourceSetToReleaseList | Not present |  |  |
| searchSpacesToAddModList SEQUENCE(SIZE (1..10)) OF SearchSpace { | 2 entries |  |  |
| SearchSpace[2] | SearchSpace | entry 2, BFR |  |
| } |  |  |  |
| searchSpacesToReleaseList | Not present |  |  |
| downlinkPreemption | Not present |  |  |
| tpc-PUSCH | Not present |  |  |
| tpc-PUCCH | Not present |  |  |
| tpc-SRS | Not present |  |  |
| } |  |  |  |

Table 10.3.4.1.4.3-5: *ControlResourceSet* for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.501-1 [14],Table 7.3.1-15 | | | |
| Information Element | Value/remark | Comment | Condition |
| ControlResourceSet ::= SEQUENCE { |  |  |  |
| controlResourceSetId | 2 |  |  |
| duration | 2 |  |  |
| cce-REG-MappingType CHOICE { |  |  |  |
| interleaved ::= SEQUENCE { |  |  |  |
| reg-BundleSize | n6 |  |  |
| interleaverSize | n2 |  |  |
| shiftIndex | 0 |  |  |
| } |  |  |  |
| tci-StatesPDCCH-ToAddList | Not present |  |  |
| } |  |  |  |

10.3.4.1.5 Test requirements

Tables 10.3.4.1.4.1-3 and 10.3.4.1.5-1 define the primary level settings including test tolerances for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in non-DRX mode

Table 10.3.4.1.5-1: Cell specific test parameters for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | | | | |
|  | | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| DL CCA probability PCCA,DL | Note 10, 12 | |  | 1.0 | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
|  | Note 11, 12 | |  | 1.0/1.0 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA,UL | | |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LCCA\_DL | | |  | N/A | 7 | | | |
| WCCA\_DL | | | ms | N/A | TEvaluate\_CBD\_SSB\_CCA Note 13 | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | | dB |  | | | | |
| SNR\_SSB of set q0 | | Config 1, 2 | dB | 5.8 | -2.2 | -12.8 | -12.8 | -12.8 |
| SNR\_SSB of set q1 | | Config 1, 2 | dB | -10.2 | -10.2 | 10.2 | 10.2 | 10.2 |
| SSB\_RP of set q1 | | Config 1, 2 | dBm/SCS kHz | -105.2 | -105.2 | -84.8 | -84.8 | -84.8 |
|  | | Config 1, 2 | dBm/15 KHz | -98 | | | | |
| Propagation condition | | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT window.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure 10.3.4.1.4-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause D.4A.  Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2.  Note 12: For UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.  Note 13: As defined in 38.133 [6] Table 8.5A.5.2-1. | | | | | | | | |

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

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1, provided that such slots are not subject to CCA failure.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1, provided that such slots are not subject to CCA failure.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 410 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

#### 10.3.4.2 EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in DRX mode

Editor's Note:

* Statistical analysis to determine test case verdict is FFS

10.3.4.2.1 Test purpose

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 10.3.4.0.1.

10.3.4.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier, and supporting UL and SSB-based RLM and link recovery on shared channel access.

10.3.4.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.3.4.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.10.3.4.2.

10.3.4.2.4 Test description

The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 10.3.4.2.4-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q0 in the active PSCell to emulate SSB based beam failure. Figure 10.3.4.2.4-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery.

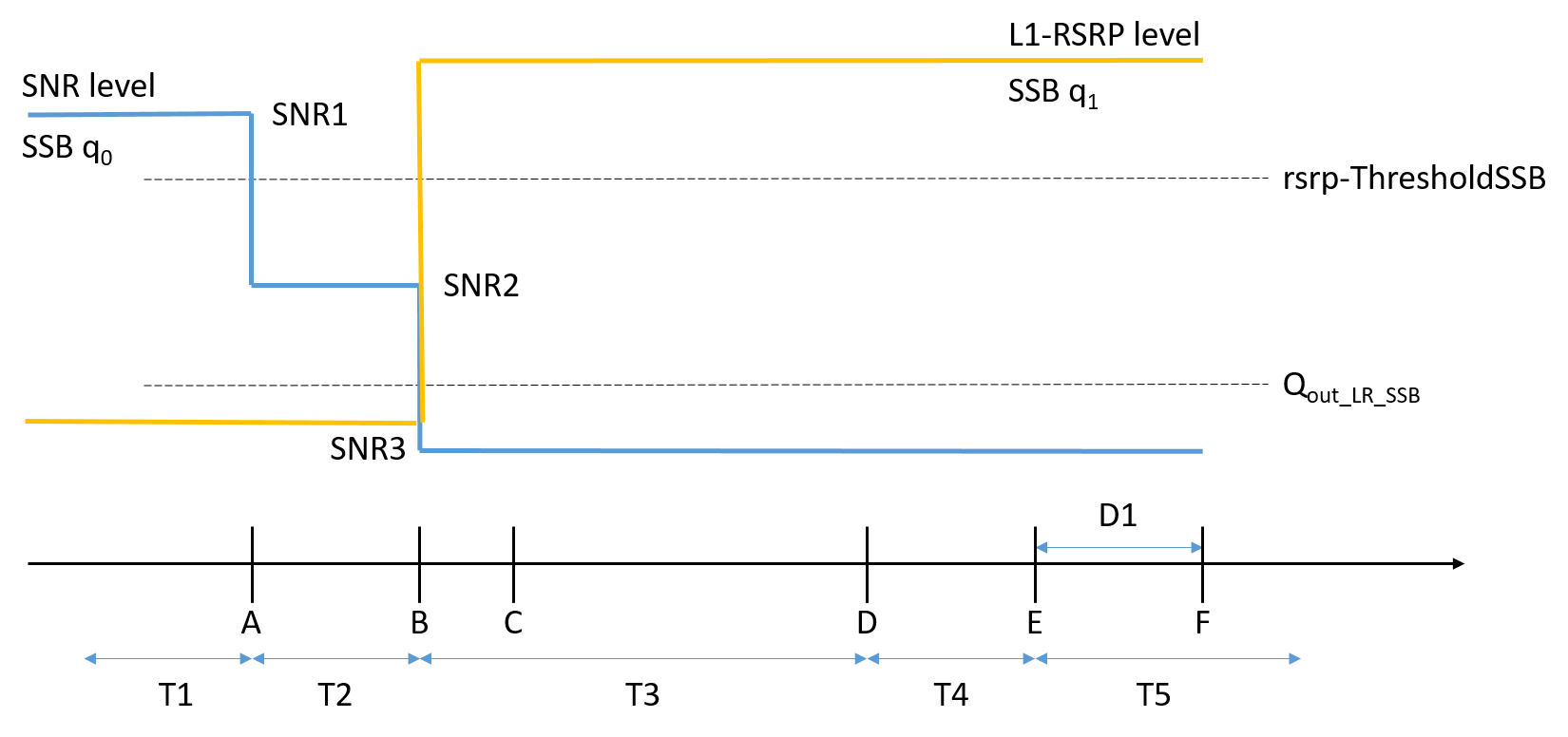


Figure 10.3.4.2.4-1: SNR and L1-RSRP variation for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in DRX mode

10.3.4.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.3.4.2.4.1-1.

Table 10.3.4.2.4.1-1: Supported test configurations for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in DRX mode

|  |  |
| --- | --- |
| Configuration | Description |
| 10.3.4.2-1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.3.4.2-2 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Configure the test equipment and the DUT according to the parameters in Table 10.3.4.2.4.1-2.

Table 10.3.4.2.4.1-2: Initial conditions for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.3.4.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.3.4.2.4.1-3.

2. Message contents are defined in clause 10.3.4.2.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is the NR cell (PSCell) with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 10.3.4.2.4.1-3: General test parameters for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in DRX mode

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Value** | **Comment** |
| **Test 1** |
| Active E-UTRA PCell | | | |  | Cell 1 |  |
| E-UTRA RF Channel Number | | | |  | 1 |  |
| Active PSCell | | | |  | Cell 2 |  |
| RF Channel Number | | | |  | 2 |  |
| DL CCA model | | | |  | As specified in D.7.2.1 |  |
| UL CCA model | | | |  | As specified in D.7.2.2 |  |
| Duplex mode | | | Config 1, 2 |  | TDD |  |
| BWchannel | | | Config 1, 2 | MHz | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | | Config 1, 2 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | Config 1, 2 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | | Config 1, 2 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | Config 1, 2 |  | ULBWP.1.1 |  |
| TDD configuration | | | Config 1, 2 |  | TDDConf.1.1 CCA |  |
| CORESET Reference Channel | | | Config 1, 2 |  | CR.1.1 CCA |  |
| SSB Configuration | | | Config 1, 2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |  |
| DBT Window Configuration | | | Config 1, 2 |  | DBT.1 |  |
| PDSCH/PDCCH subcarrier spacing | | | Config 1, 2 |  | 30 KHz |  |
| PRACH Configuration | | | Config 1, 2 |  | Table A.7.1A.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | | |  | 0 |  |
| SSB Index assigned as CBD RS (q1) | | | |  | 1 |  |
| OCNG parameters | | | |  | OP.1 |  |
| CP length | | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |  |
| Beam failure | | DCI format | |  | 1-0 |  |
| detection transmission parameters | | Number of Control OFDM symbols | |  | 2 |  |
|  | | Aggregation level | | CCE | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 0 |  |
|  | | DMRS precoder granularity | |  | REG bundle size |  |
|  | | REG bundle size | |  | 6 |  |
| DRX | | | |  | DRX.7 | Table A.5-1 |
| Gap pattern ID | | | |  | N.A. |  |
| gapOffset | | | |  | N.A. |  |
| rlmInSyncOutOfSyncThreshold | | | |  | absent | When the field is absent, the UE applies the value 0. (38.133 [6] Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1, 2 | | | dBm/SCS kHz | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | |  | n1 | see TS 38.321 [12], clause 5.17 |
| beamFailureDetectionTimer | | | |  | pbfd4 | see TS 38.321 [12], clause 5.17 |
| CSI-RS configuration for CSI reporting | | Config 1, 2 | |  | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | | Config 1, 2 | |  | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS | | | |  | 0,1 |  |
| T310 timer | | | | ms | 1000 |  |
| N310 | | | |  | 2 |  |
| T1 | | | | s | 1 | During this time the UE shall be fully synchronized to cell 1 |
| T2 | | | | s | 9.01 |  |
| T3 | | | | s | 5.16 |  |
| T4 | | | | s | 0 |  |
| T5 | | | | s | 3.89 |  |
| D1 | | | | s | 3.85 |  |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts.  Note 3: E-UTRAN is in non-DRX mode under test. | | | | | | |

10.3.4.2.4.2 Test procedure

There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell which operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. The UE transmits the reporting according to UL CCA model. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test. No inter-frequency gap is configured on the UE. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *EN-DC*, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters of NR Cell according to T1 in Table 10.3.4.2.5-1. Propagation conditions are set according to clause C.2.3. The SS shall enable DL and UL CCA model according to Table 10.3.4.2.5-1. T1 starts.

3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 10.3.4.2.5-1. T2 starts.

4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 10.3.4.2.5-1. T3 starts.

5. When T3 expires the SS shall change the SNR value to T4 as specified in Table 10.3.4.2.5-1. T4 starts.

6. When T4 expires the SS shall change the SNR value to T5 as specified in Table 10.3.4.2.5-1. T5 starts.

7. If the SS:

a) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in each slot configured for CSI transmission (according to CSI reporting on PUCCH), provided that such slot is not subject to CCA failure (as determined by PCCA\_UL in Table 10.3.4.2.5-1), during the period from time point A to time point B; and

b) does not detect preamble on a beam associated with the candidate beam set q1 before time point B; and

c) detects preamble on a beam associated with the candidate beam set q1 before time point F (D1 after the start of T5), the number of successful tests is increased by one.

Otherwise, the number of failed tests is increased by one.

8. The SS shall first attempt to release and add the PSCell, by disabling the CCA model (i.e. PCCA\_DL\_i= PCCA\_UL=1) and then proceeding with step 1. Otherwise, the UE is switched OFF/ON, then proceed with step 1.

9. Repeat steps 2-8 for all subtests until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

10.3.4.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.3.4.2.4.3-1: Common Exception messages for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in DRX mode

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-8 with Condition SSB BFD  Table H.3.1-10 with Condition SSB  Table H.3.1-10A  Table H.3.4-5 with Condition BFD  Table H.3.5-4  Table H.3.7-1 with Condition DRX.7  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access |

Table 10.3.4.2.4.3-2: PDCCH *Search Space* for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in DRX mode

| Derivation Path: TS 38.508-1 [14], Table 4.6.3-162 | | | |
| --- | --- | --- | --- |
| Information Element | Value/remark | Comment | Condition |
| SearchSpace ::= SEQUENCE { |  |  |  |
| searchSpaceId | 3 | BFR |  |
| controlResourceSetId | 2 | BFR |  |
| monitoringSlotPeriodicityAndOffset CHOICE { |  |  |  |
| sl1 | NULL |  |  |
| } |  |  |  |
| monitoringSymbolsWithinSlot | 10000000000000 | Symbols 0 and 1 |  |
| nrofCandidates SEQUENCE { |  |  |  |
| aggregationLevel1 | n0 |  |  |
| aggregationLevel2 | n0 |  |  |
| aggregationLevel4 | n0 |  |  |
| aggregationLevel8 | n1 | AL8 |  |
| aggregationLevel16 | n0 |  |  |
| } |  |  |  |
| searchSpaceType CHOICE { |  |  |  |
| ue-Specific SEQUENCE { |  |  | USS |
| dci-Formats | formats0-0-And-1-0 | DCI Format 1\_0 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.4.2.4.3-3: *RLF-TimersAndConstants* for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-150 | | | |
| Information Element | Value/remark | Comment | Condition |
| RLF-TimersAndConstants ::= SEQUENCE { |  |  |  |
| n310 | n2 |  |  |
| } |  |  |  |

Table 10.3.4.2.4.3-4: *PDCCH-Config* for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.501-1 [14],Table 4.6.3-95 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDCCH-Config ::= SEQUENCE { |  |  |  |
| controlResourceSetToAddModList SEQUENCE(SIZE (1..3)) OF ControlResourceSet { | 2 entries |  |  |
| ControlResourceSet[2] | ControlResourceSet | entry 2, BFR |  |
| } |  |  |  |
| controlResourceSetToReleaseList | Not present |  |  |
| searchSpacesToAddModList SEQUENCE(SIZE (1..10)) OF SearchSpace { | 2 entries |  |  |
| SearchSpace[2] | SearchSpace | entry 2, BFR |  |
| } |  |  |  |
| searchSpacesToReleaseList | Not present |  |  |
| downlinkPreemption | Not present |  |  |
| tpc-PUSCH | Not present |  |  |
| tpc-PUCCH | Not present |  |  |
| tpc-SRS | Not present |  |  |
| } |  |  |  |

Table 10.3.4.2.4.3-5: *ControlResourceSet* for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.501-1 [14],Table 7.3.1-15 | | | |
| Information Element | Value/remark | Comment | Condition |
| ControlResourceSet ::= SEQUENCE { |  |  |  |
| controlResourceSetId | 2 |  |  |
| duration | 2 |  |  |
| cce-REG-MappingType CHOICE { |  |  |  |
| interleaved ::= SEQUENCE { |  |  |  |
| reg-BundleSize | n6 |  |  |
| interleaverSize | n2 |  |  |
| shiftIndex | 0 |  |  |
| } |  |  |  |
| tci-StatesPDCCH-ToAddList | Not present |  |  |
| } |  |  |  |

10.3.4.2.5 Test requirements

Tables 10.3.4.2.4.1-3 and 10.3.4.2.5-1 define the primary level settings including test tolerances for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in DRX mode.

Table 10.3.4.2.5-1: Cell specific test parameters for EN-DC FR1 Beam Failure Detection and Link Recovery Test for PSCell configured with SSB-based BFD and LR in DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | | | | |
|  | | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| DL CCA probability PCCA,DL | Note 10, 12 | |  | 1.0 | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
|  | Note 11, 12 | |  | 1.0/1.0 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA,UL | | |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| EPRE ratio of PDCCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | | dB |  | | | | |
| SNR\_SSB of set q0 | | Config 1, 2 | dB | 5.8 | -2.2 | -12.8 | -12.8 | -12.8 |
| SNR\_SSB of set q1 | | Config 1, 2 | dB | -10.2 | -10.2 | 10.2 | 10.2 | 10.2 |
| SSB\_RP of set q1 | | Config 1, 2 | dBm/SCS kHz | -105.2 | -105.2 | -84.8 | -84.8 | -84.8 |
|  | | Config 1, 2 | dBm/15 KHz | -98 | | | | |
| Propagation condition | | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT window.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure 10.3.4.2.4-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause D.4A.  Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2.  Note 12: For UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | |

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

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1, provided that such slots are not subject to CCA failure.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1, provided that such slots are not subject to CCA failure.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 3850 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

### 10.3.5 Active BWP switching

#### 10.3.5.1 EN-DC FR1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA

Editor's Note:

* Statistical analysis to determine test case verdict is FFS

10.3.5.1.1 Test purpose

The purpose of this test is to verify the UL BWP switch delay requirement defined in 38.133 [6] clause 8.6.4.

10.3.5.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 onwards, supporting EN-DC, RRM measurements and UL with a shared spectrum NR carrier, BWP adaptation of at least 2BWPs, DCI and timer-based active BWP switching delay Type1 or Type2 on shared channel access, and UL LBT detection and recovery.

10.3.5.1.3 Minimum conformance requirements

Upon detection of consistent UL CCA failure is slot#n in SpCell when UE detects *lbt-FailureInstanceMaxCount* number ofCCA failure within *lbt-FailureDetectionTimer*, the UE shall switch the active UL BWP to an UL BWP configured with PRACH occasion and for which consistent CCA failure has not been triggered as defined in TS 38.321 [12] clause 5.21. The UE shall be ready to transmit PRACH on the new UL BWP of the SpCell on the first UL slot occurs right after slot n+TBWPswitchDelay +1, where TBWPswitchDelay is defined in 38.133 [6] Table 8.6.2-1. The UE shall finish the UL BWP switch within the time duration TBWPswitchDelay depending on UE capability *bwp-SwitchingDelay* [13].

Note: Additional delay in acquiring the first available RACH occasion will be derived in a way similar to that in handover in 38.133 [6] clause 6.1B.1.

The UE is not required to transmit UL signals or receive DL signals during time duration TBWPswitchDelay on the SpCell in the UL BWP switch. The UE is not required to follow the requirements defined in this clause when performing a UL BWP switch between the UL BWPs in disjoint channel bandwidths or in partially overlapping channel bandwidths.

The normative reference for this requirement is TS 38.133 [6] clause 8.6.4.

10.3.5.1.4 Test description

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in 10.3.5.1.4.1-3. Cell-specific parameters of E-UTRA Pcell are specified in Table A.6B-1 and Cell-specific parameters of NR PSCell is specified in Table 10.3.5.1.5-1. SRS configuration used in the test is specified in Table 10.3.5.1.5-2.

The UE shall be configured with PRACH configuration on UL BWP on which the UE shall switch after the consistent UL LBT failure detection.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1 and Cell 2 on radio channel 2.

- UE is configured with 2 different UE-specific downlink and uplink bandwidth parts on Cell 2: DL BWP-1, DL BWP-2, UL BWP-1 and UL BWP-2 before starting the test. DL BWP-1 and DL BWP-2 always include bandwidth of the initial DL BWP and SSB. UL BWP-1 and UL BWP-2 always include bandwidth of the SRS.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis DL BWP-1.

- UE is indicated in *firstActiveUplinkBWP-Id* that the active UL BWPis UL BWP-1.

- UE is configured with *LBT-FailureRecoveryConfig* parameters for Cell 2.

The cell has constant signal levels throughout the test. The test consists of 2 successive time periods, with durations of T1 and T2, respectively.

During T1,

- Time period T1 starts when the UE has received the SRS configuration for periodic SRS transmission on active UL BWP-1.

- The UE shall perform UL CCA before SRS transmission.

- The parameter UL CCA probability PCCA is set to 0 during T1. This requires the test system to set energy level above the detection level during portion of the UL slot where the UE performs UL CCA. This in turn forces the UE to fail the UL CCA. The UE consistently fails UL CCA during T1 and is therefore unable to transmit SRS.

During T2,

- T2 starts when the UE detects consistent UL LBT failures i.e. when total number of UL LBT failures in Cell 2 on active UL BWP-1 exceeds *lbt-FailureInstanceMaxCount* during *lbt-FailureDetectionTimer.*

- The UE upon detected consistent UL LBT failure starts the LBT recovery mechanism, which requires the UE to switch to active UL BWP-2 in Cell 2 and to send PRACH in the active UL BWP-2.

- Staring from T2, the UE shall be able to send PRACH in the active UL BWP-2 within the delay specified in 38.133 [6] clause 8.6.4.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

10.3.5.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.3.5.1.4.1-1.

Table 10.3.5.1.4.1-1: Supported test configurations for EN-DC FR1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC

|  |  |
| --- | --- |
| Config | Description |
| 10.3.5.1-1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.3.5.1-2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test equipment and the DUT according to the parameters in Table 10.3.5.1.4.1-2.

Table 10.3.5.1.4.1-2: Initial conditions for EN-DC FR1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.3.5.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | - For 4Rx capable Ues without any 2Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE part. | |  |

1. The general test parameter settings are set up according to Table 10.3.5.1.4.1-3.

2. Message contents are defined in clause 10.3.5.1.4.3.

3. The test scenario comprises of one E-UTRA Pcell (Cell 1), and one NR PSCell (Cell 2) with CCA transmitting SSBs in DBT windows according to DL CCA model. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is configured according to clause C.1.2 and C.1.3.

Table 10.3.5.1.4.1-3: General test parameters for EN-DC FR1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2 | One NR radio channel is used for this test |
| Active Pcell |  | Cell 1 | Pcell on RF channel number 1. |
| Active PSCell |  | Cell 2 | PSCell on RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| *lbt-FailureDetectionTimer* | ms | 80 | Parameter configured by IE: *LBT-FailureRecoveryConfig* [13] |
| *lbt-FailureInstanceMaxCount* |  | 4 | Parameter configured by IE: *LBT-FailureRecoveryConfig* [13] |
| T1 | s | 0.1 | During T1 consistent LBT failure is detected on active UL BWP-1 |
| T2 | s | 0.1 | During T2 UE sends PRACH on active UL BWP-2 |

10.3.5.1.4.2 Test procedure

All cells have constant signal levels throughout the test. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *EN-DC*, DC bearer *MCG*\_*and*\_*SCG*, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Tables 10.3.5.1.4.1-3 and 10.3.5.1-5-1. Propagation conditions are set according to Annex C clauses C.2.2.

3. The SS shall transmit an *RRCConnectionReconfiguration* message releasing the dedicated configuration of the *initialDownlinkBWP* and the *initialUplinkBWP*. This message also configures 2 different UE-specific bandwidth parts, BWP-1 and BWP-2, which always include the bandwidth of the initial DL BWP and SSB. The SS indicates BWP-1 as the active DL BWP using *firstActiveDownlinkBWP-Id*, and as the active UL BWP using *firstActiveUplinkBWP-Id* according to Table 10.3.5.1.4.3-2. UE is configured with *LBT-FailureRecoverConfig* parameters for Cell 2 according to Table 10.3.5.1.4.3-5, PRACH configuration on UL BWP-2 according to Table 10.3.5.1.4.3-4 and periodic SRS transmissions on UL BWP-1 according to Tables 10.3.5.1.4.3-4 and 10.3.5.1.5-2.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 10.3.5.1.5-1. T1 starts.

5. During T1 the UE shall perform UL CCA before each SRS transmission. The parameter UL CCA probability PCCA is set to 0 during T1. This requires the test system to set energy level above the detection level during portion of the UL slot where the UE performs UL CCA. This in turn forces the UE to fail the UL CCA. The UE consistently fails UL CCA during T1 and is therefore unable to transmit SRS.

6. When T1 expires T2 starts. The SS shall change the UL CCA probability PCCA to 1 during T2. This will make the SS to not occupy the channel anymore.

7. The UE shall attempt to recover the link by transmitting PRACH on UL BWP-2. If the UE transmits PRACH on UL BWP-2 within 21.5ms from the start of T2 (for UE capable of *bwp-SwitchingDelay* *type1*) or within 23ms from the start of T2 (for UE capable of *bwp-SwitchingDelay* *type2*), then the number of successful tests is increased by one. If the UE does not transmit PRACH on UL BWP-2 during the required time, the number of failures is increased by one.

8. The SS shall first attempt to release and add the PSCell, by disabling the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1) and then ensuring the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On and Test Mode On according to TS 38.508-1 [6] clause 4.5, then proceed with step 2. Otherwise, the UE is switched OFF/ON, then proceed with step 1.

9. Repeat steps 2-8 for until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

10.3.5.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.3.5.1.4.3-1: Common Exception messages for EN-DC FR1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-1  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

Table 10.3.5.1.4.3-1A: *RRCReconfiguration* (Step3) for EN-DC FR1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1-13 with condition EN-DC | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReconfiguration ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcReconfiguration SEQUENCE { |  |  |  |
| secondaryCellGroup | CellGroupConfig | Table 10.3.5.1.4.3-1B |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.1.4.3-1B: *CellGroupConfig* (Table 10.3.5.1.4.3-1A) forEN-DC FR1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| CellGroupConfig ::= SEQUENCE { |  |  |  |
| cellGroupId | 1 |  |  |
| spCellConfig SEQUENCE { |  |  |  |
| servCellIndex | ServCellIndex of NR PSCell |  |  |
| spCellConfigDedicated | ServingCellConfig | Table 10.3.5.1.4.3-2 |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.1.4.3-2: *ServingCellConfig* (Table 10.3.5.1.4.3-1B) for EN-DC FR1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-167 | | | |
| Information Element | Value/remark | Comment | Condition |
| ServingCellConfig ::= SEQUENCE { |  |  |  |
| initialDownlinkBWP SEQUENCE { |  |  |  |
| pdcch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| pdsch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| radioLinkMonitoringConfig CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
|  |  |  |  |
| downlinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF SEQUENCE { | 2 entries |  |  |
| BWP-Downlink[1] | BWP-Downlink with condition BWP1 | entry 1  Table 10.3.5.1.4.3-3 | BWP1 |
| BWP-Downlink[2] | BWP-Downlink with condition BWP2 | entry 2  Table 10.3.5.1.4.3-3 | BWP2 |
| } |  |  |  |
| firstActiveDownlinkBWP-Id | 1 | According to BWP-1 |  |
| defaultDownlinkBWP-Id | 1 | According to BWP-1 |  |
| uplinkConfig SEQUENCE { |  |  |  |
| initialUplinkBWP SEQUENCE { |  |  |  |
|  |  |  |  |
| pucch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| pusch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| srs-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| uplinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF SEQUENCE { | 2 entries |  |  |
| BWP-Uplink[1] | BWP-Uplink with condition BWP1 | entry 1  Table 10.3.5.1.4.3-4 | BWP1 |
| BWP-Uplink[2] | BWP-Uplink with condition BWP2 | entry 2  Table 10.3.5.1.4.3-4 | BWP2 |
| firstActiveUplinkBWP-Id | 1 | According to BWP-1 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.1.4.3-3: *BWP-Downlink* (Table 10.3.5.1.4.3-2) for EN-DC FR1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| BWP-Downlink ::= SEQUENCE { |  |  |  |
| bwp-Id | 1 | BWP-1 | BWP1 |
|  | 2 | BWP-2 | BWP2 |
| bwp-Common SEQUENCE { |  |  |  |
| genericParameters | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.1 |  | BWP1 |
|  | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.3 |  | BWP2 |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.1.4.3-4: *BWP-Uplink* (Table 10.3.5.1.4.3-2) for EN-DC FR1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-13 | | | |
| Information Element | Value/remark | Comment | Condition |
| BWP-Uplink ::= SEQUENCE { |  |  |  |
| bwp-Id | 1 | BWP-1 | BWP1 |
|  | 2 | BWP-2 | BWP2 |
| bwp-Common SEQUENCE { |  |  |  |
| genericParameters | RIV defined in TS 38.214 [9] that corresponds to ULBWP.1.1 | BWP-1 | BWP1 |
|  | RIV defined in TS 38.214 [9] that corresponds to ULBWP.1.3 | BWP-2 | BWP2 |
| rach-ConfigCommon CHOICE { |  |  |  |
| setup | RACH-ConfigCommon | Table A.7.1A.1-1 | BWP2 |
| } |  |  |  |
| } |  |  |  |
| bwp-Dedicated SEQUENCE { |  |  |  |
| srs-Config CHOICE { |  |  | BWP1 |
| setup | SRS-Config | Table 10.3.5.1.5-2 |  |
| } |  |  |  |
| lbt-FailureRecoveryConfig-r16 CHOICE { |  |  | BWP2 |
| setup | LBT-FailureRecoveryConfig-r16 | Table 10.3.5.1.4.3-5 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.1.4.3-5: *LBT-FailureRecoveryConfig* for EN-DC FR1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-64A | | | |
| Information Element | Value/remark | Comment | Condition |
| LBT-FailureRecoveryConfig-r16 ::= SEQUENCE { |  |  |  |
| lbt-FailureInstanceMaxCount-r16 | n4 |  |  |
| lbt-FailureDetectionTimer-r16 | ms80 |  |  |
| } |  |  |  |

10.3.5.1.5 Test requirements

Tables 10.3.5.1.5-1 and 10.3.5.1.5-2 define the primary level settings including test tolerances for EN-DC FR1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC.

Table 10.3.5.1.5-1: NR Cell specific test parameters for EN-DC FR1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 | |
| T1 | T2 |
| TDD configuration | | Config 1, 2 |  | TDDConf.1.1 CCA | |
| BWchannel | | Config 1, 2 |  | 40 MHz: NRB,c = 106 | |
| DL CCA model | | Config 1, 2 |  | As specified in clause D.7.2.1 | |
| UL CCA model | | Config 1, 2 |  | As specified in clause D.7.2.2 | |
| Active BWP ID | | Config 1, 2 |  | 1, 2 | |
| Initial DL BWP Configuration | | Config 1, 2 |  | DLBWP.0.2 Note 4 | |
| Active DL BWP-1 Configuration | | Config 1, 2 |  | DLBWP.1.1 Note 4 | |
| Active DL BWP-2 Configuration | | Config 1, 2 |  | DLBWP.1.3 Note 4 | |
| Initial UL BWP Configuration | | Config 1, 2 |  | ULBWP.0.2 Note 4 | |
| Active UL BWP-1 Configuration | | Config 1, 2 |  | ULBWP.1.1 Note 4 | |
| Active UL BWP-2 Configuration | | Config 1, 2 |  | ULBWP.1.3 Note 4 | |
| PDSCH Reference measurement channel | | Config 1, 2 |  | SR.1.1 CCA | |
| RMSI CORESET parameters | | Config 1, 2 |  | CR.1.1 CCA | |
| Dedicated CORESET parameters | | Config 1, 2 |  | CCR.1.1 CCA | |
| OCNG Patterns | | Config 1, 2 |  | OP.1 | |
| SSB Configuration | Semi- static channel access | Config 1, 2 |  | SSB.1 CCA | |
| Dynamic channel access | Config 1, 2 |  | SSB.2 CCA | |
| SMTC Configuration | | Config 1, 2 |  | SMTC.1 FR1 | |
| Correlation Matrix and Antenna Configuration | | Config 1, 2 |  | 1x2 Low | |
| TRS Configuration | | Config 1, 2 |  | TRS.1.2 TDD | |
| DL CCA probability for semi-static channel access (PCCA\_DL) | | Config 1, 2 |  | 1 | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_1) | | Config 1, 2 |  | 1 | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_2) | | Config 1, 2 |  | 1 | 1 |
| UL CCA probability (PCCA\_UL) | | Config 1, 2 |  | 0 | 1 |
| PRACH configuration | | Config 1, 2 |  | N/A | Table A.7.1A.1-1 |
| EPRE ratio of PSS to SSS | | | dB | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | |  |  | |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  | |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  | |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  | |
| EPRE ratio of PDSCH to PDSCH | | |  |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  | |
| NocNote 2 | | Config 1, 2 | dBm/SCS | -101 | |
| SS-RSRP Note 3 | | Config 1, 2 | dBm/SCS | -84 | |
| Ês/Iot | | Config 1, 2 | dB | 17 | |
| Ês/Noc | | Config 1, 2 | dB | 17 | |
| IoNote3 | | Config 1, 2 | dBm/  38.16MHz | -52.86 | |
| Propagation Condition | | |  | AWGN | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [8].  Note 5: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in section D.7.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | |

Table 10.3.5.1.5-2: Sounding Reference Symbol Configuration for EN-DC FR1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| c-SRS | 24 | Frequency hopping is disabled |
| b-SRS | 0 |  |
| b-hop | 0 |  |
| freqDomainPosition | 0 | Frequency domain position of SRS |
| freqDomainShift | 0 |  |
| groupOrSequenceHopping | neither | No group or sequence hopping |
| SRS-PeriodicityAndOffset | sl5=4 for SCS 30kHz | Once every 5 slots |
| pathlossReferenceRS | ssb-Index=0 | SSB #0 is used for SRS path loss estimation |
| usage | Codebook | Codebook based UL transmission |
| startPosition | 0 | resourceMapping setting: SRS on last symbol of slot, and 1symbols for SRS without repetition. |
| nrofSymbols | n1 |  |
| repetitionFactor | n1 |  |
| combOffset-n2 | 0 | transmissionComb setting |
| cyclicShift-n2 | 0 |  |
| nrofSRS-Ports | port1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 38.331 [13]. | | |

The UE capable of *bwp-SwitchingDelay* *type1* [13] shall start to transmit the PRACH on active UL BWP-2 of Cell 2 (PSCell) less than 21.5 ms from the beginning of time period T1.

The UE capable of *bwp-SwitchingDelay* *type2* [13] shall start to transmit the PRACH on active UL BWP-2 of Cell 2 (PSCell) less than 23 ms from the beginning of time period T1.

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

NOTE: The above delay is calculated as follows:’

The active UL BWP switch delay from UL BWP-1 to UL BWP-2 can be expressed as:

TBWPswitchDelay\*Tslot +1\*Tslot + (1+ L3)\*TSSB,RO + 10 ms

Where:

- TBWPswitchDelay = 1 ms (2 slots) and 2.5 ms (5 slots) for *bwp-SwitchingDelay* [13] *type1* and *type2* UE capabilities according to 38.133 [6] clause 8.6.4.

- Tslot = It is the slot length. It is 0.5 ms for 30 kHz.

- L3 = It is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. L3= 0 during T2 since PCCA = 1.

- TSSB,RO = 10 ms according to FR1 PRACH configuration 1.

This gives a total of 21.5 ms and 23 ms for *type1* and *type2* UE respectively.

#### 10.3.5.2 DCI-based and Timer-based Active BWP Switch

##### 10.3.5.2.0 Minimum conformance requirements

10.3.5.2.0.1 Minimum conformance requirements for DCI-based and timer-based active BWP switch

For DCI-based BWP switch, after the UE receives BWP switching request at DL slot n on a serving cell, UE shall be able to receive PDSCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch on the first DL or UL slot occurs right after a time duration of TBWPswitchDelay + Y which starts from the beginning of DL slot n. Where,

- Y=0, if the serving cell where UE receives DCI for BWP switch request is same as the serving cell on which BWP switch occurs.

- Y equals to the length of 1 slot, if the serving cell where UE receives DCI for BWP switch is different from the serving cell on which BWP switch occurs for any involved serving cell. In this scenario, TBWPswitchDelay + Y shall follow the smaller SCS of scheduling cell, scheduled cells before and scheduled cells after active BWP change.If both scheduling cell and scheduled cell are in FR2-2, Y shall follow the SCS of 120 KHz.

The UE is not required to transmit UL signals or receive DL signals until the first DL or UL slot occurs right after a time duration of TBWPswitchDelay which starts from the beginning of DL slot n except DCI triggering BWP switch on the cell where DCI-based BWP switch occurs. The UE is not required to follow the requirements defined in this clause when performing a DCI-based BWP switch between the BWPs in disjoint channel bandwidths or in partially overlapping channel bandwidths.

For timer-based BWP switch, the UE shall start BWP switch at DL slot n, where slot n is the first slot of a DL subframe (FR1) or DL half-subframe (FR2) immediately after a BWP-inactivity timer *bwp-InactivityTimer* [13] expires on a serving cell, and the UE shall be able to receive PDSCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch on the first DL or UL slot occurs right after a time duration of TBWPswitchDelay which starts from the beginning of DL slot n.

The UE is not required to transmit UL signals or receive DL signals during time duration TBWPswitchDelay after *bwp-InactivityTimer* [13] expires on the cell where timer-based BWP switch occurs.

Depending on UE capability *bwp-SwitchingDelay* [13], UE shall finish BWP switch within the time duration TBWPswitchDelay defined in Table 10.3.5.2.0.1-1.

Table 10.3.5.2.0.1-1: BWP switch delay

|  |  |  |  |
| --- | --- | --- | --- |
|  | NR Slot length | BWP switch delay TBWPswitchDelay (slots) | |
|  | (ms) | Type 1Note 1 | Type 2Note 1 |
| 0 | 1 | 1 | 3 |
| 1 | 0.5 | 2 | 5 |
| 2 | 0.25 | 3 | 9 |
| 3 | 0.125 | 6 | 18 |
| 5 | 0.03125 | 20 | 65 |
| 6 | 0.015625 | 39 | 129 |
| Note 1: Depends on UE capability.  Note 2: If the BWP switch involves changing of SCS, the BWP switch delay is determined by the smaller SCS between the SCS before BWP switch and the SCS after BWP switch. | | | |

Provided the UE does not have the required TCI-state information to receive PDCCH and PDSCH in the new BWP, the UE shall use old TCI-states before the BWP switch until a new MAC CE updating the required TCI-state information for PDCCH and PDSCH is received after the BWP switch.

If UE has the information on the required TCI-state information to receive PDCCH and PDSCH in the new BWP,

- UE shall be able to receive PDCCH and PDSCH with old TCI-states before the delay as specified in 38.133 [6] Clause 8.10 in the new BWP.

- UE shall be able to receive PDCCH and PDSCH with new TCI-states after the delay as specified in 38.133 [6] Clause 8.10 in the new BWP.

Provided the UE does not have the required activated TCI-state(s) information to receive PDCCH/ PDSCH and to transmit PUSCH/PUCCH/SRS in the new BWP, the UE shall use old TCI-state(s) before the BWP switch until a new MAC CE updating the required activated TCI-state(s) information is received after the BWP switch.

If the BWP switch is triggered within or outside DRX active time, and one of the two BWPs in a BWP switching is a dormant BWP [TS 38.321, 12], UE shall be able to complete active BWP switching within the time duration of

- TdormantBWPswitchDelay =TBWPswitchDelay+ X, provided that the dormancy indication is received in any of the first 3 OFDM symbols of a slot in the serving cell where DCI for dormancy indication is receiveds, or

- TdormantBWPswitchDelay =TBWPswitchDelay + X + Z, provided that the dormancy indication is received after the first 3 OFDM symbols of a slot in the serving cell where DCI for dormancy indication is received, where

- TBWPswitchDelay is defined in Table 10.3.5.2.0.1-1 corresponding to the smallest value among the SCS of the serving cell where UE receives dormancy indication and the SCSs of the dormant BWP and the active BWP immediately before or after switching the BWP of the serving cell where BWP switching occurs;

- X equals to the length of 1 slot corresponding to the smallest value among the SCS of the serving cell where UE receives dormancy indication and the SCSs of the dormant BWP and the active BWP immediately before or after switching the BWP of the serving cell where BWP switching occurs. If both scheduling cell and scheduled cell are in FR2-2, X shall follow the SCS of 120 KHz.

- Z equals to the length of 1 slot corresponding to the SCS of the serving cell where UE receives dormancy indication.

When either of the DCI-based, timer-based or RRC-based downlink BWP switch and/or uplink BWP switch occur on multiple CCs simultaneously or over partially overlapping period, the interruption requirements described in this clause apply for each BWP switch.

When UE receives a DCI indicating UE to switch its active BWP involving changes in any of the parameters listed in Table 10.3.5.2.0.1-3, the UE is allowed to cause interruption of up to X slot to other active serving cells if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 10.3.5.2.0.1-3 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 10.3.5.2.0.1-2. The starting time of interruption is only allowed within the BWP switching delay TBWPswitchDelay as defined in 38.133 [6] clause 8.6.2 when BWP switch occurs on a single CC. The starting time of interruption caused by each BWP switch is only allowed within the BWP switch delay TMultipleBWPswitchDelay +Y as defined in 38.133 [6] clause 8.6.2A.1 when BWP switch occurs on multiple CCs. Interruptions are not allowed during BWP switch involving any other parameter change.

When a BWP timer *bwp-InactivityTimer* defined in TS 38.331 [13] expires, UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 10.3.5.2.0.1-3 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 10.3.5.2.0.1-3 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 10.3.5.2.0.1-2. The starting time of interruption is only allowed within the BWP switching delay TBWPswitchDelay as defined in 38.133 [6] clause 8.6.2 when BWP switch occurs on a single CC. The starting time of interruption caused by each BWP switch is only allowed within the BWP switch delay TMultipleBWPswitchDelay as defined in 38.133 [6] clause 8.6.2B.1 when BWP switch occurs on multiple CCs simultaneously or TMultipleBWPswitchDelayTotal as defined in 38.133 [6] clause 8.6.2B.2 when BWP switch occurs on multiple CCs over partially overlapping time period. Interruptions are not allowed during BWP switch involving any other parameter change.

When UE receives an RRC reconfiguration that only requests UE to switch its active BWP on one single CC, the UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 10.3.5.2.0.1-3 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 10.3.5.2.0.1-3 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 10.3.5.2.0.1-2. The interruption is only allowed within the delay TRRCprocessingDelay + TBWPswitchDelayRRC defined in 38.133 [6] clause 8.6.3 when BWP switch occurs on a single CC. The interruption is only allowed within the delay TRRCprocessingDelay + TBWPswitchDelayRRC + DRRC\*(N-1) as defined in 38.133 [6] clause 8.6.3A when BWP switch occurs on multiple CCs.

When UL BWP switch is triggered by consistent uplink CCA failures [12], the UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active UL BWP involving changes in any of the parameters listed in Table 10.3.5.2.0.1-3 if the UE is not capable of per-FR gap, or if the UL BWP switching involves SCS changing. When the UL BWP switch imposes changes in any of the parameters listed in Table 10.3.5.2.0.1-3 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing UL BWP switching. X is defined in Table 10.3.5.2.0.1-2. The starting time of interruption is only allowed within the UL BWP switching delay TBWPswitchDelay as defined in 38.133 [6] clause 8.6.2. Interruptions are not allowed during UL BWP switch involving other parameter change.

Table 10.3.5.2.0.1-2: interruption length X

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length X (slots) |
| 0 | 1 | 1 |
| 1 | 0.5 | 1 |
| 2 | 0.25 | 3 |
| 3 | 0.125 | 5 |
| Note1: void | | |

Table 10.3.5.2.0.1-3: Parameters which cause interruption other than SCS

|  |  |
| --- | --- |
| Parameters | Comment |
| *locationAndBandwidth* | From TS 38.331 [13] |
| *nrofSRS-Ports* |  |
| *maxMIMO-Layers-r16* |  |

DCI-based or timer-based downlink BWP and/or uplink BWP switching due to change in any of the parameters listed in Table 8.2.1.2.7-2 of TS 38.133 [6] or SCS in NR PSCell or in any NR SCell may cause an interruption on PCell or on activated SCell(s) in the MCG. Interruptions are not allowed during BWP switch involving other parameter change.

Uplink BWP switching on a NR PSCell triggered by consistent uplink LBT failures on the NR PSCell may cause an interruption on PCell or on activated SCell(s) in the MCG.

The starting time of interruption due to DCI-based or timer-based downlink BWP and/or uplink BWP switching or due to uplink BWP switching on a NR PSCell triggered by consistent uplink LBT failures on the NR PSCell is only allowed within the BWP switching delay TBWPswitchDelay as defined in clause 8.6.2 of TS 38.133 [6].

The normative reference for this requirement is TS 38.133 [6] clauses 8.6.2, 8.2.1.2.7 and TS 36.133 [23] clause 7.32.2.7.

##### 10.3.5.2.1 EN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

Editor's Note:

* Statistical analysis to determine test case verdict is FFS

10.3.5.2.1.1 Test purpose

The purpose of this test is to verify the DL BWP switch delay requirement defined in TS 38.133 [6] clause 8.6 with NR PSCell under CCA, and interruption requirement for E-UTRA victim cell defined in TS 36.133 [23] clause 7.32.2.7.

10.3.5.2.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 onwards, supporting EN-DC, RRM measurements and UL with a shared spectrum NR carrier, BWP adaptation of at least 2BWPs, DCI and timer-based active BWP switching delay Type1 or Type2 on shared channel access.

10.3.5.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.3.5.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.3.5.2.1.

10.3.5.2.1.4 Test description

Two cells are deployed in the test, which are E-UTRAN PCell (Cell 1) and PSCell (Cell 2) with CCA transmitting SSBs in DBT windows according to DL CCA model: PSCell (Cell 2). The test parameters for the two cells are given in Table 10.3.5.2.1.4.1-1 and 10.3.5.2.1.4.1-3 below.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

10.3.5.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.3.5.2.1.4.1-1.

Table 10.3.5.2.1.4.1-1: Supported test configurations for EN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |
| --- | --- |
| Config | Description |
| 10.3.5.2.1-1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.3.5.2.1-2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations.  Note 2: A UE which fulfils the requirements in test case 10.3.5.2.2 can skip the test cases in 10.3.5.2.1.  Note 3: The UE supporting EN-DC with only NR band(s) with shared spectrum access is required to be tested. | |

Configure the test equipment and the DUT according to the parameters in Table 10.3.5.2.1.4.1-2.

Table 10.3.5.2.1.4.1-2: Initial conditions for EN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.3.5.2.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | - For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE part. | |  |

1. The general test parameter settings are set up according to Table 10.3.5.2.1.4.1-3.

2. Message contents are defined in clause 10.3.5.2.1.4.3.

3. The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) with CCA transmitting SSBs in DBT windows according to DL CCA model. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is configured according to clause C.1.2 and C.1.3.

4. By step 4 of the test procedure:

- UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).

- UE is configured with 2 different UE-specific downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in PSCell.

- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

Table 10.3.5.2.1.4.1-3: General test parameters for EN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active PSCell |  | Cell 2 | PSCell on RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF | For both PCell and PSCell |
| DL CCA model |  | As specified in clause D.7.2.1 |  |
| UL CCA model |  | As specified in clause D.7.2.2 |  |
| *bwp-InactivityTimer* | ms | 200 |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on PSCC. |
| Cell2 timing offset to cell1 | μs | 3 | Synchronous EN-DC |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |
| T3 | s | 0.2 |  |

10.3.5.2.1.4.2 Test procedure

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

The SS verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or bwp-InactivityTimer timer expires till an ACK/NACK is received.

The SS verifies that potential interruption to E-UTRA PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of PSCell, respectively.

"k" is the length (slot) between E-UTRA PCell PDSCH and its corresponding ACK/NACK as specified in TS 36.213 [33].

All cells have constant signal levels throughout the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *EN-DC*, DC bearer *MCG*\_*and*\_*SCG*, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Tables 10.3.5.2.1.4.1-3 and 10.3.5.2.1.5-1. Propagation conditions are set according to Annex C clauses C.2.2.

3. The SS shall transmit an *RRCConnectionReconfiguration* message releasing the dedicated configuration of the *initialDownlinkBWP* and the *initialUplinkBWP*. This message also configures 2 different UE-specific bandwidth parts, BWP-1 and BWP-2, which always include the bandwidth of the initial DL BWP and SSB. The SS indicates BWP-1 as the active DL BWP using *firstActiveDownlinkBWP-Id*, according to Table 10.3.5.2.1.4.3-2. UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 10.3.5.2.1.5-1.

5. The SS shall send a DCI format 1\_1 command for PSCell DL BWP switch.

6. The UE shall receive the DCI format 1\_1 command in PSCell's slot # denoted i, then T1 starts and the UE switch its bandwidth part from BWP-1 to BWP-2:

a) If the UE starts to report valid ACK/NACK for PSCell from the first UL slot that occurs after the beginning of the DL slot (*i+*TBWPswitchDelay+k1); and

b) If the UE starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of the DL slot (*i+*TBWPswitchDelay+ 1 subframe + k); and

c) If the number of consecutive missing ACK/NACK for PCell is no more than 1.

Then, the number of successful subtests is increased by one. Otherwise, count a fail for the test, switch off/on the UE and go to step 1.

7. If the UE sends valid ACK/NACK for the PSCell on BWP-2, T2 starts. During T2, the SS shall not transmit DCI format for PDSCH reception on PSCell.

8. T3 starts from the first slot #j of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires and the SS restarts to send DCI format for PDSCH reception on PSCell. Then, the UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part - BWP-1 on PSCell:

a) If the UE starts to report valid ACK/NACK for PSCell from the first UL slot that occurs after the beginning of the DL slot (*j+*TBWPswitchDelay+k1); and

b) If the UE starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of the DL slot (*j+*TBWPswitchDelay+ 1 subframe + k); and

c) If the number of consecutive missing ACK/NACK for PCell is no more than 1

Then, the number of successful subtests is increased by one. Otherwise, count a fail for the test, switch off/on the UE and go to step 1. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

9. Repeat steps 5-8 until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved. If all subtests pass, the test passes. If one subtest fails, the test fails.

10.3.5.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.3.5.2.1.4.3-1: Common Exception messages for EN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-1  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

Table 10.3.5.2.1.4.3-1A: *RRCReconfiguration* (Step3) for EN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1-13 with condition EN-DC | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReconfiguration ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcReconfiguration SEQUENCE { |  |  |  |
| secondaryCellGroup | CellGroupConfig | Table 10.3.5.2.1.4.3-1B |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.2.1.4.3-1B: *CellGroupConfig* (Table 10.3.5.2.1.4.3-1A) forEN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| CellGroupConfig ::= SEQUENCE { |  |  |  |
| cellGroupId | 1 |  |  |
| spCellConfig SEQUENCE { |  |  |  |
| servCellIndex | ServCellIndex of NR PSCell |  |  |
| spCellConfigDedicated | ServingCellConfig | Table 10.3.5.2.1.4.3-2 |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.2.1.4.3-2: *ServingCellConfig* (Table 10.3.5.2.1.4.3-1B) for EN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-167 | | | |
| Information Element | Value/remark | Comment | Condition |
| ServingCellConfig ::= SEQUENCE { |  |  |  |
| initialDownlinkBWP SEQUENCE { |  |  |  |
| pdcch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| pdsch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| radioLinkMonitoringConfig CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
|  |  |  |  |
| downlinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF SEQUENCE { | 2 entries |  |  |
| BWP-Downlink[1] | BWP-Downlink with condition BWP1 | entry 1  Table 10.3.5.2.1.4.3-3 |  |
| BWP-Downlink[2] | BWP-Downlink with condition BWP2 | entry 2  Table 10.3.5.2.1.4.3-3 |  |
| } |  |  |  |
| firstActiveDownlinkBWP-Id | 1 | According to BWP-1 |  |
| bwp-InactivityTimer | ms200 |  |  |
| defaultDownlinkBWP-Id | 1 | According to BWP-1 |  |
| uplinkConfig SEQUENCE { |  |  |  |
| initialUplinkBWP SEQUENCE { |  |  |  |
|  |  |  |  |
| pucch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| pusch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| srs-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| uplinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF SEQUENCE { | 2 entries |  |  |
| BWP-Uplink[1] | BWP-Uplink with condition BWP1 | entry 1  Table 10.3.5.2.1.4.3-4 |  |
| BWP-Uplink[2] | BWP-Uplink with condition BWP2 | entry 2  Table 10.3.5.2.1.4.3-4 |  |
| firstActiveUplinkBWP-Id | 1 | According to BWP-1 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.2.1.4.3-3: *BWP-Downlink* (Table 10.3.5.2.1.4.3-2) for EN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| BWP-Downlink ::= SEQUENCE { |  |  |  |
| bwp-Id | 1 | BWP-1 | BWP1 |
|  | 2 | BWP-2 | BWP2 |
| bwp-Common SEQUENCE { |  |  |  |
| genericParameters | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.1 |  | BWP1 |
|  | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.3 |  | BWP2 |
| pdsch-ConfigCommon CHOICE { |  |  |  |
| setup | PDSCH-ConfigCommon | Table 10.3.5.2.1.4.3-6 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.2.1.4.3-4: *BWP-Uplink* (Table 10.3.5.2.1.4.3-2) for EN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-13 | | | |
| Information Element | Value/remark | Comment | Condition |
| BWP-Uplink ::= SEQUENCE { |  |  |  |
| bwp-Id | 1 | BWP-1 | BWP1 |
|  | 2 | BWP-2 | BWP2 |
| bwp-Common SEQUENCE { |  |  |  |
| genericParameters | RIV defined in TS 38.214 [9] that corresponds to ULBWP.1.1 | BWP-1 | BWP1 |
|  | RIV defined in TS 38.214 [9] that corresponds to ULBWP.1.3 | BWP-2 | BWP2 |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.2.1.4.3-5: *PDSCH-TimeDomainResourceAllocationList* (Table 10.3.5.2.1.4.3-6) for EN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

| Derivation Path: TS 38.508-1 [14], Table 4.6.3-103 | | | |
| --- | --- | --- | --- |
| Information Element | Value/remark | Comment | Condition |
| PDSCH-TimeDomainResourceAllocationList ::= SEQUENCE(SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation { | 4 entries |  |  |
| PDSCH-TimeDomainResourceAllocation[1] SEQUENCE { |  | entry 1 |  |
| k0 | Not present |  |  |
| mappingType | typeA |  |  |
| startSymbolAndLength | 53 | Start symbol(S)=2, Length(L)=12 |  |
| } |  |  |  |
| PDSCH-TimeDomainResourceAllocation[2] SEQUENCE { |  | entry 2 |  |
| k0 | Not present |  |  |
| mappingType | typeA |  |  |
| startSymbolAndLength | 72 | S=2, L=6 |  |
| } |  |  |  |
| PDSCH-TimeDomainResourceAllocation[3] SEQUENCE { |  | entry 3 |  |
| k0 | TBWPswitchDelay | Defined in Table 10.3.5.2.0.1-1 | The DCI indicating BWP switch |
| mappingType | typeA |  |  |
| startSymbolAndLength | 53 | Start symbol(S)=2, Length(L)=12 |  |
| } |  |  |  |
| PDSCH-TimeDomainResourceAllocation[4] SEQUENCE { |  | entry 4 |  |
| k0 | 1 |  | First DCI right after DCI-based BWP switch |
| mappingType | typeA |  |  |
| startSymbolAndLength | 53 | Start symbol(S)=2, Length(L)=12 |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.2.1.4.3-6: *PDSCH-ConfigCommon* (Table 10.3.5.2.1.4.3-3) for EN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-101 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDSCH-ConfigCommon ::= SEQUENCE { |  |  |  |
| pdsch-TimeDomainAllocationList | PDSCH-TimeDomainResourceAllocationList | Table 10.3.5.2.1.4.3-5 |  |
| } |  |  |  |

10.3.5.2.1.5 Test requirements

Tables 10.3.5.2.1.4.1-3 and 10.3.5.2.1.5-1 define the primary level settings including test tolerances for EN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA.

Table 10.3.5.2.1.5-1: NR Cell specific test parameters for EN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 |
| Frequency Range | | |  | FR1 |
| Duplex mode | | Config 1,2 |  | TDD |
| TDD configuration | | Config 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | | Config 1,2 |  | 40 MHz: NRB,c = 106 |
| Active BWP ID | | |  | 1, 2 |
| Initial DL BWP Configuration | | Config 1,2 |  | DLBWP.0.2 Note 4 |
| Active DL BWP-1 Configuration | | Config 1,2 |  | DLBWP.1.1 Note 4 |
| Active DL BWP-2 Configuration | | Config 1,2 |  | DLBWP.1.3 Note 4 |
| Initial UL BWP Configuration | | Config 1,2 |  | ULBWP.0.2 Note 4 |
| Active UL BWP-1 Configuration | | Config 1,2 |  | ULBWP.1.1 Note 4 |
| Active UL BWP-2 Configuration | | Config 1,2 |  | ULBWP.1.3 Note 4 |
| PDSCH Reference measurement channel | | Config 1,2 |  | SR.1.1 CCA |
| RMSI CORESET parameters | | Config 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET parameters | | Config 1,2 |  | CCR.1.1 CCA |
| OCNG Patterns | | Config 1,2 |  | OP.1 |
| SSB Configuration | Semi- static channel access | Config 1,2 |  | SSB.1 CCA |
| Dynamic channel access | Config 1,2 |  | SSB.2 CCA |
| SMTC Configuration | | Config 1,2 |  | SMTC.1 |
| TRS Configuration | | Config 1,2 |  | TRS.1.2 TDD |
| DL CCA probabilityfor semi-static channel access (PCCA\_DL) | | Config 1,2 |  | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_1) | | Config 1,2 |  | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_2) | | Config 1,2 |  | 1 |
| DL CCA probabilityfor semi-static channel access (PCCA\_DL) | | Config 1,2 |  | 1 |
| Correlation Matrix and Antenna Configuration | | |  | 1x2 Low |
| EPRE ratio of PSS to SSS | | |  |  |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) | | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |
| NocNote 2 | | Config 1,2 | dBm/SCS | -101 |
| SS-RSRP Note 3 | | Config 1,2 | dBm/SCS | -84 |
| Ês/Iot | | Config 1,2 | dB | 17 |
| Ês/Noc | | Config 1,2 | dB | 17 |
| IoNote3 | | Config 1,2 | dBm/38.16MHz | -59 |
| 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].  Note 5: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in clause D.7.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | |

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot (*i+TBWPswitchDelay*+*k1*).

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot (*j+TBWPswitchDelay*+*k1*).

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in 38.214 [9].

Depending on UE capability *bwp-SwitchingDelay* [13], UE shall finish BWP switch within the time duration *TBWPswitchDelay* defined in TS 38.133 [6] Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

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

During T1, the start time of PCell interruption during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start time of PCell interruption of during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in TS 36.133 [23] Clause 7.32.2.7.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

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

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after DL slot (*i+TBWPswitchDelay*+*k1*), (*j+TBWPswitchDelay*+*k1*), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

k1 is the timing between DL data receiving and acknowledgement as specified in [12].

##### 10.3.5.2.2 EN-DC FR1 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC under CCA

Editor's Note:

* Statistical analysis to determine test case verdict is FFS
* Test requirements is still FFS in 38.133 [6]

10.3.5.2.2.1 Test purpose

The purpose of this test is to verify the DL BWP switch delay requirement defined in TS 38.133 [6] clause 8.6 with NR PSCell and SCell under CCA, and interruption requirements for NR victim cell defined in TS 38.133 [6] clause 8.2.1.2.7 and interruption requirement for E-UTRA victim cell defined in clause 7.32.2.7 of TS 36.133 [23].

10.3.5.2.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 onwards, supporting EN-DC, RRM measurements and UL with a shared spectrum NR carrier, BWP adaptation of at least 2BWPs, DCI and timer-based active BWP switching delay Type1 or Type2 and 2DL CA on shared channel access.

10.3.5.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.3.5.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.3.5.2.2.

10.3.5.2.2.4 Test description

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1) and PSCell (Cell 2) on one NR carrier and NR SCell (Cell 3) on the other NR carrier with CCA transmitting SSBs in DBT windows according to DL CCA model. The test parameters for the three cells are given in Table 10.3.5.2.2.4.1-1 and 10.3.5.2.2.4.1-3 below.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

10.3.5.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in this clause. Supported test configurations for LTE PCell and NR PSCell are shown in Table 10.3.5.2.2.4.1-1. Test configuration for LTE PCell and NR PSCell and test configuration for NR SCell are chosen independently.

Table 10.3.5.2.2.4.1-1: Supported test configurations for EN-DC FR1 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC under CCA

|  |  |
| --- | --- |
| Config | Description |
| 10.3.5.2.2-1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.3.5.2.2-2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: A UE which fulfils the requirements in test case 10.3.5.2.2 can skip the test cases in 10.3.5.2.1.  Note 3: NR configuration is the same for PSCell and SCells.  Note 4: The UE supporting EN-DC with only NR band(s) with shared spectrum access is required to be tested. | |

Configure the test equipment and the DUT according to the parameters in Table 10.3.5.2.2.4.1-2.

Table 10.3.5.2.2.4.1-2: Initial conditions for EN-DC FR1 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.3.5.2.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | - For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE part. | |  |

1. The general test parameter settings are set up according to Table 10.3.5.2.2.4.1-3.

2. Message contents are defined in clause 10.3.5.2.2.4.3.

3. There are one E-UTRAN carrier and two NR carriers and three cells specified in the test. Cell 1 is the PCell on E-UTRAN carrier, Cell 2 is the PSCell on one NR carrier and Cell 3 is the NR SCell on the other NR carrier. Cell 1 is the cell used for connection setup with the power level set according to Annex A.6B. Cell 2 and Cell 3 are configured according to clauses C.1.2 and C.1.3.

4. By step 4 of the test procedure:

- UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC), Cell 2 (PSCell) on radio channel 2 (PSCC) and Cell 3 (SCell) on radio channel 3 (SCC).

- UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 3 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PSCell, BWP-0 in Cell 2 before starting the test.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in SCell.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-0 in PSCell.

- UE is configured with a *bwp-InactivityTimer* timer value for SCell.

Table 10.3.5.2.2.4.1-3: General test parameters for EN-DC FR1 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2, 3 | Two NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active PSCell |  | Cell 2 | PSCell on RF channel number 2. |
| Active SCell |  | Cell 3 | SCell on RF channel number 3. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| DL CCA model |  | As specified in clause D.7.2.1 |  |
| UL CCA model |  | As specified in clause D.7.2.2 |  |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on PSCC. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC. |
| Cell2 timing offset to cell1 | μs | 3 | Synchronous EN-DC |
| Cell3 timing offset to cell2 | μs | 3 | Synchronous cells |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |
| T3 | s | 0.2 |  |

10.3.5.2.2.4.2 Test procedure

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) and PSCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 3) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 3 and the time duration of T2.

The SS verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The SS verifies that potential interruption to E-UTRA PCell and NR PSCell is carried out in the correct time span by monitoring ACK/NACK sent in E-UTRA PCell and PSCell during BWP switch of SCell, respectively.

Interruption length is defined in TS 38.133 [6] Table 8.2.1.2.7-1.

*k* is the length (slot) between E-UTRA PCell PDSCH and its corresponding ACK/NACK as specified in TS 36.213 [33].

k1 is the timing between NR DL data receiving and acknowledgement as specified in TS 38.214 [9].

All cells have constant signal levels throughout the test:

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *EN-DC*, DC bearer *MCG*\_*and*\_*SCG*, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. The SS shall configure SCell (Cell 3) on the SCC as per TS 38.508-1 [14] clause 7.5.1. Set the parameters according to Tables 10.3.5.2.2.4.1-3 and 10.3.5.2.2.5-1. Propagation conditions are set according to Annex C clauses C.2.2.

3. The SS shall transmit an *RRCConnectionReconfiguration* message releasing the dedicated configuration of the *initialDownlinkBWP* and the *initialUplinkBWP* of Cell 3. This message also configures 2 different UE-specific bandwidth parts for Cell 3, BWP-1 and BWP-2,which always include the bandwidth of the initial DL BWP and SSB. The SS indicates BWP-1 as the active DL BWP using *firstActiveDownlinkBWP-Id* in SCell, and BWP-0 as the active DL BWP using *firstActiveDownlinkBWP-Id* in PSCell, according to Table 10.3.5.2.2.4.3-2. UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 10.3.5.2.2.5-1.

5. The SS shall send a DCI format 1\_1 command for SCell DL BWP switch.

6. The UE shall receive the DCI format 1\_1 command in SCell's slot # denoted i, then T1 starts and the UE switch its bandwidth part from BWP-1 to BWP-2:

a) If the UE starts to report valid ACK/NACK for SCell on PSCell from the first UL slot that occurs after the beginning of the DL slot (*i+*TBWPswitchDelay+k1); and

b) If the UE starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of the DL slot (*i+*TBWPswitchDelay+ 1 subframe + *k*); and

c) If the UE starts to report valid ACK/NACK for PSCell from the first UL slot that occurs after the beginning of DL slot (*i+*TBWPswitchDelay+ Interruption length + k1); and

d) If the number of consecutive missing ACK/NACK for PCell is no more than 1; and

e) If the number of consecutive missing ACK/NACK for PSCell is no more than 1.

Then, the number of successful subtests is increased by one. Otherwise, count a fail for the test, switch off/on the UE and go to step 1.

7. If the UE sends valid ACK/NACK for the SCell on PSCell on BWP-2, T2 starts. During T2, the SS shall not transmit DCI format for PDSCH reception on SCell.

8. T3 starts from the first slot #j of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires and the SS restarts to send DCI format for PDSCH reception on SCell. Then, the UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part, BWP-1, on SCell:

a) If the UE starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of the DL slot (*j+*TBWPswitchDelay+ 1 subframe + *k*); and

b) If the UE starts to report valid ACK/NACK for SCell on PSCell from the first UL slot that occurs after the beginning of the DL slot (*j+*TBWPswitchDelay+k1); and

c) If the UE starts to report valid ACK/NACK for PSCell from the first UL slot that occurs after the beginning of DL slot (*i+*TBWPswitchDelay+ Interruption length + k1); and

d) If the number of consecutive missing ACK/NACK for PCell is no more than 1; and

e) If the number of consecutive missing ACK/NACK for PSCell is no more than 1.Then, the number of successful subtests is increased by one. Otherwise, count a fail for the test, switch off/on the UE and go to step 1. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

9. Repeat steps 5-8 until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved. If all subtests pass, the test passes. If one subtest fails, the test fails.

10.3.5.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.3.5.2.2.4.3-1: Common Exception messages for EN-DC FR1 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-1  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access. |

Table 10.3.5.2.2.4.3-1A: *RRCReconfiguration* (Step 3) for EN-DC FR1 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1-13 with condition EN-DC\_SCell\_add | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReconfiguration ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcReconfiguration SEQUENCE { |  |  |  |
| secondaryCellGroup | CellGroupConfig | Table 10.3.5.2.2.4.3-1B |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.2.2.4.3-1B: *CellGroupConfig* (Table 10.3.5.2.2.4.3-1A) for EN-DC FR1 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-19 with condition SCell\_add | | | |
| Information Element | Value/remark | Comment | Condition |
| CellGroupConfig ::= SEQUENCE { |  |  |  |
| cellGroupId | 1 |  |  |
| sCellToAddModList SEQUENCE (SIZE (1..maxNrofSCells)) OF SCellConfig { | 1 entry |  |  |
| SCellConfig[1] SEQUENCE { |  | entry 1 |  |
| sCellConfigDedicated | ServingCellConfig | Table 10.3.5.2.2.4.3-2 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.2.2.4.3-2: *ServingCellConfig* (Table 10.3.5.2.2.4.3-1B) for EN-DC FR1 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-167 | | | |
| Information Element | Value/remark | Comment | Condition |
| ServingCellConfig ::= SEQUENCE { |  |  |  |
| initialDownlinkBWP SEQUENCE { |  |  |  |
| pdcch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| pdsch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| radioLinkMonitoringConfig CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
|  |  |  |  |
| downlinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF SEQUENCE { | 2 entries |  |  |
| BWP-Downlink[1] | BWP-Downlink with condition BWP1 | entry 1  Table 10.3.5.2.2.4.3-3 |  |
| BWP-Downlink[2] | BWP-Downlink with condition BWP2 | entry 2  Table 10.3.5.2.2.4.3-3 |  |
| } |  |  |  |
| firstActiveDownlinkBWP-Id | 1 | According to BWP-1 |  |
| bwp-InactivityTimer | ms200 |  |  |
| defaultDownlinkBWP-Id | 1 | According to BWP-1 |  |
| } |  |  |  |

Table 10.3.5.2.2.4.3-3: *BWP-Downlink* (Table 10.3.5.2.2.4.3-2) for EN-DC FR1 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| BWP-Downlink ::= SEQUENCE { |  |  |  |
| bwp-Id | 1 | BWP-1 | BWP1 |
|  | 2 | BWP-2 | BWP2 |
| bwp-Common SEQUENCE { |  |  |  |
| genericParameters | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.3 |  | BWP1 |
|  | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.1 |  | BWP2 |
| pdsch-ConfigCommon CHOICE { |  |  |  |
| setup | PDSCH-ConfigCommon | Table 10.3.5.2.2.4.3-5 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.2.2.4.3-4: *PDSCH-TimeDomainResourceAllocationList* (Table 10.3.5.2.2.4.3-5) for EN-DC FR1 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-103 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDSCH-TimeDomainResourceAllocationList ::= SEQUENCE(SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation { | 4 entries |  |  |
| PDSCH-TimeDomainResourceAllocation[1] SEQUENCE { |  | entry 1 |  |
| k0 | Not present |  |  |
| mappingType | typeA |  |  |
| startSymbolAndLength | 53 | Start symbol(S)=2, Length(L)=12 |  |
| } |  |  |  |
| PDSCH-TimeDomainResourceAllocation[2] SEQUENCE { |  | entry 2 |  |
| k0 | Not present |  |  |
| mappingType | typeA |  |  |
| startSymbolAndLength | 72 | S=2, L=6 |  |
| } |  |  |  |
| PDSCH-TimeDomainResourceAllocation[3] SEQUENCE { |  | entry 3 |  |
| k0 | TBWPswitchDelay | Defined in Table 10.3.5.2.0.1-1 | The DCI indicating BWP switch |
| mappingType | typeA |  |  |
| startSymbolAndLength | 53 | Start symbol(S)=2, Length(L)=12 |  |
| } |  |  |  |
| PDSCH-TimeDomainResourceAllocation[4] SEQUENCE { |  | entry 4 |  |
| k0 | 1 |  | First DCI right after DCI-based BWP switch |
| mappingType | typeA |  |  |
| startSymbolAndLength | 53 | Start symbol(S)=2, Length(L)=12 |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.2.2.4.3-5: *PDSCH-ConfigCommon* (Table 10.3.5.2.2.4.3-3) for EN-DC FR1 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-101 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDSCH-ConfigCommon ::= SEQUENCE { |  |  |  |
| pdsch-TimeDomainAllocationList | PDSCH-TimeDomainResourceAllocationList | Table 10.3.5.2.2.4.3-4 |  |
| } |  |  |  |

10.3.5.2.2.5 Test requirements

Tables 10.3.5.2.2.4.1-3 and 10.3.5.2.2.5-1 define the primary level settings including test tolerances for EN-DC FR1 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC under CCA.

Table 10.3.5.2.2.5-1: NR Cell specific test parameters for EN-DC FR1 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 | Cell 3 |
| Frequency Range | | |  | FR1 | |
| Duplex mode | | Config 1,2 |  | TDD | |
| TDD configuration | | Config 1,2 |  | TDDConf.1.1 CCA | |
| BWchannel | | Config 1,2 |  | 40 MHz: NRB,c = 106 | |
| Active BWP ID | | |  | 1, 2 | 0 |
| Initial BWP Configuration | | Config 1,2 |  | DLBWP.0.2 | DLBWP.0.2 |
| Active BWP-0 Configuration | | Config 1,2 |  | NA | DLBWP.0.2 |
| Active BWP-1 Configuration | | Config 1,2 |  | DLBWP.1.3 | NA |
| Active BWP-2 Configuration | | Config 1,2 |  | DLBWP.1.1 | NA |
| PDSCH Reference measurement channel | | Config 1,2 |  | SR.1.1 CCA | |
| RMSI CORESET parameters | | Config 1,2 |  | CR.1.1 CCA | |
| Dedicated CORESET parameters | | Config 1,2 |  | CCR.1.1 CCA | |
| OCNG Patterns | | Config 1,2 |  | OP.1 | |
| SSB Configuration | Semi- static channel access | Config 1,2 |  | SSB.1 CCA | |
| Dynamic channel access | Config 1,2 |  | SSB.2 CCA | |
| SMTC Configuration | | Config 1,2 |  | SMTC.1 | |
| TRS Configuration | | Config 1,2 |  | TRS.1.2 TDD | |
| DL CCA probabilityfor semi-static channel access (PCCA\_DL) | | Config 1,2 |  | 1 | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_1) | | Config 1,2 |  | 1 | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_2) | | Config 1,2 |  | 1 | 1 |
| DL CCA probabilityfor semi-static channel access (PCCA\_DL) | | Config 1,2 |  | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | |  | 1x2 | |
| Propagation Condition | | |  | AWGN | |
| EPRE ratio of PSS to SSS | | |  |  |  |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB | 0 | 0 |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |
| EPRE ratio of OCNG DMRS to SSS Note 1 | | |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | | |  |  |  |
| NocNote 2 | | Config 1,2 | dBm/SCS kHz | -101 | -101 |
| SS-RSRP Note 3 | | Config 1,2 | dBm/SCS kHz | -84 | -84 |
| Ês/Iot | | Config 1,2 | dB | 17 | 17 |
| Ês/Noc | | Config 1,2 | dB | 17 | 17 |
| IoNote3 | | Config 1,2 | dBm/38.16MHz | -59 | -59 |
| 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].  Note 5: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in clause D.7.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | |

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after slot (*i+TBWPswitchDelay+k1*).

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after slot (*j+TBWPswitchDelay+k11*).

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

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

During T1, the start of the interruption of PCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of PCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in clause 7.32.2.7 of TS 36.133 [15].

During T1, the start of the interruption of SCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of SCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in TS 38.133 [6] clause 8.6.2.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

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

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after slot (*i+TBWPswitchDelay+k1*), (*j+TBWPswitchDelay+k1*), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

k1 is the timing between DL data receiving and acknowledgement as specified in [12].

#### 10.3.5.3 RRC-based Active BWP Switch

##### 10.3.5.3.0 Minimum conformance requirements

10.3.5.3.0.1 Minimum conformance requirements for RRC-based active BWP switch

For RRC-based BWP switch, after the UE receives RRC reconfiguration involving active BWP switching or parameter change of its active BWP, UE shall be able to receive PDSCH/PDCCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch occurs on the first DL or UL slot right after a time duration of slots which begins from the beginning of DL slot n, where:

DL slot n is the last slot overlapping with the PDSCH containing the RRC command, and

NR Slot length is determined by the smaller SCS between the SCS before BWP switch and the SCS after BWP switch if the BWP switch involves changing of SCS.

is the length of the RRC procedure delay in ms as defined in clause 11.2 in TS 36.331 [29] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the length of the RRC procedure delay in ms as defined in clause 12 in TS 38.331 [13], and

is the time used by the UE to perform BWP switch.

The UE is not required to transmit UL signals or receive DL signals during the time defined by on the cell where RRC-based BWP switch occurs. When a longer switching delay is allowed. Where is the time between DL data transmission and acknowledgement as specified in TS 38.213 [8].

The normative reference for this requirement is TS 38.133 [6] clauses 8.6.3.

##### 10.3.5.3.1 EN-DC FR1 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

Editor's Note:

* Statistical analysis to determine test case verdict is FFS

10.3.5.3.1.1 Test purpose

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch under CCA defined in TS 38.133 [6] clause 8.6.3.

10.3.5.3.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 onwards supporting EN-DC, RRM measurements and UL with a shared spectrum NR carrier, BWP adaptation of at least 2BWPs on shared channel access.

10.3.5.3.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.3.5.3.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.10.3.5.3.1.

10.3.5.3.1.4 Test description

Two cells are deployed in the test, which are E-UTRAN PCell (Cell 1) and PSCell (Cell 2) with CCA transmitting SSBs in DBT windows according to DL CCA model: PSCell (Cell 2). The test parameters for the two cells are given in Table 10.3.5.3.1.4.1-1 and 10.3.5.3.1.4.1-3 below.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

10.3.5.3.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.3.5.3.1.4.1-1.

Table 10.3.5.3.1.4.1-1: Supported test configurations for EN-DC FR1 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |
| --- | --- |
| Config | Description |
| 10.3.5.3.1-1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.3.5.3.1-2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations.  Note 2: The UE supporting EN-DC with only NR band(s) with shared spectrum access is required to be tested. | |

Configure the test equipment and the DUT according to the parameters in Table 10.3.5.3.1.4.1-2.

Table 10.3.5.3.1.4.1-2: Initial conditions for EN-DC FR1 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.3.5.3.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | - For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE part. | |  |

1. The general test parameter settings are set up according to Table 10.3.5.3.1.4.1-3.

2. Message contents are defined in clause 10.3.5.3.1.4.3.

3. The test scenario comprises of one E-UTRA PCell (Cell 1) and one NR PSCell (Cell 2). The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 are configured according to clause C.1.2 and C.1.3.

4. By step 4 of the test procedure:

- UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) and to Cell 2 (PSCell) on radio channel 2 (PSCC).

- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 2 (PSCell).

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in PSCell

Table 10.3.5.3.1.4.1-3: General test parameters for EN-DC FR1 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active PSCell |  | Cell 2 | PSCell on RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| DL CCA model |  | As specified in clause D.7.2.1 |  |
| UL CCA model |  | As specified in clause D.7.2.2 |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on PSCC. |
| Cell2 timing offset to cell1 | μs | 3 | Synchronous EN-DC |
| T1 | s | 0.2 |  |

10.3.5.3.1.4.2 Test procedure

The test consists of 1 time period, with duration of T1. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

The SS verifies the DL BWP switch time in PSCell by counting the slots from the time when the RRCConnectionReconfiguration message including updated BWP configuration is sent till the time when a valid ACK/NACK is received.

All cells have constant signal levels throughout the test:

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *EN-DC*, DC bearer *MCG*\_*and*\_*SCG*, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Tables 10.3.5.3.1.4.1-3 and 10.3.5.3.1.5-1. Propagation conditions are set according to Annex C clauses C.2.2.

3. The SS shall send an *RRCConnectionReconfiguration* message releasing the dedicated configuration of the *initialDownlinkBWP* and the *initialUplinkBWP*. This message also configures another UE-specific bandwidth part, BWP-1, and indicates BWP-1 as the active DL BWP using *firstActiveDownlinkBWP-Id*, according to the initial condition of Active BWP-1 in Table 10.3.5.3.1.5-1.

4. The UE shall transmit an *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 10.3.5.3.1.5-1.

5. The SS shall send an *RRCConnectionReconfiguration* message with updated bandwidth part configuration for PSCell DL BWP switch, changing the BWP according to the final condition of Active BWP-1 in Table 10.3.5.3.1.5-1. T1 starts.

6. The UE shall receive the *RRCConnectionReconfiguration* in PSCell's slot # denoted i and reconfigure its bandwidth part with the updated bandwidth part configuration:

7 If the UE starts to report valid ACK/NACK for PSCell from the first UL slot that occurs after the beginning of DL slot i+X+k1 then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one. Where,

- X = 52 for test configuration 10.3.5.3.1-1 and 10.3.5.3.1-2;

8. After the SS receives the ACK/NACK in step 5) or when T1 expires, the SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message.

9. The SS shall transmit RRCConnectionReconfiguration message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1). If either of the reconfiguration in step 6 or step 7 fails, switch off and on the UE and go to step 1.

10. Repeat steps 2-9 until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

10.3.5.3.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.3.5.3.1.4.3-1: Common Exception messages for EN-DC FR1 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-1  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

Table 10.3.5.3.1.4.3-1A: *RRCReconfiguration* (Step 3, Step 5) EN-DC FR1 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1-13 with condition EN-DC | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReconfiguration ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcReconfiguration SEQUENCE { |  |  |  |
| secondaryCellGroup | CellGroupConfig | Table 10.3.5.3.1.4.3-1B |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.3.1.4.3-1B: *CellGroupConfig* (Table 10.3.5.3.1.4.3-1A) EN-DC FR1 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| CellGroupConfig ::= SEQUENCE { |  |  |  |
| cellGroupId | 1 |  |  |
| spCellConfig SEQUENCE { |  |  |  |
| servCellIndex | ServCellIndex of NR PSCell |  |  |
| spCellConfigDedicated | ServingCellConfig | Table 10.3.5.3.1.4.3-1C |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.3.1.4.3-1C: *ServingCellConfig* (Table 10.3.5.3.1.4.3-1B) EN-DC FR1 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-167 | | | |
| Information Element | Value/remark | Comment | Condition |
| ServingCellConfig ::= SEQUENCE { |  |  |  |
| initialDownlinkBWP SEQUENCE { |  |  |  |
| pdcch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| pdsch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| radioLinkMonitoringConfig CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
|  |  |  |  |
| downlinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Downlink { | 1 entry |  |  |
| BWP-Downlink[1] SEQUENCE { | BWP-Downlink | entry 1  Table 10.3.5.3.1.4.3-1D |  |
| } |  |  |  |
| firstActiveDownlinkBWP-Id | 1 | BWP-1 |  |
| defaultDownlinkBWP-Id | 1 | BWP-1 |  |
| uplinkConfig SEQUENCE { |  |  |  |
| initialUplinkBWP SEQUENCE { |  |  |  |
| pucch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| pusch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| srs-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
|  |  |  |  |
| uplinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Uplink { | 1 entry |  |  |
| BWP-Uplink[1] | BWP-Uplink | entry 1  10.3.5.3.1.4.3-1E |  |
| } |  |  |  |
| firstActiveUplinkBWP-Id | 1 | BWP-1 |  |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.3.1.4.3-1D: *BWP-Downlink* (Table 10.3.5.3.1.4.3-1C) EN-DC FR1 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| BWP-Downlink ::= SEQUENCE { |  |  |  |
| bwp-Id | 1 |  |  |
| bwp-Common SEQUENCE { |  |  |  |
| genericParameters | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.3 |  | Step 3 |
|  | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.1 |  | Step 5 |
| } |  |  |  |
| } |  |  |  |

Table 10.3.5.3.1.4.3-1E: *BWP-Uplink* (Table 10.3.5.3.1.4.3-1C) EN-DC FR1 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-13 | | | |
| Information Element | Value/remark | Comment | Condition |
| BWP-Uplink ::= SEQUENCE { |  |  |  |
| bwp-Id | 1 |  |  |
| bwp-Common SEQUENCE { |  |  |  |
| genericParameters | RIV defined in TS 38.214 [9] that corresponds to ULBWP.1.3 |  | Step 3 |
|  | RIV defined in TS 38.214 [9] that corresponds to ULBWP.1.1 |  | Step 5 |
| } |  |  |  |
| } |  |  |  |

10.3.5.3.1.5 Test requirements

Tables 10.3.5.3.1.4.1-3 and 10.3.5.3.1.5-1 define the primary level settings including test tolerances for EN-DC FR1 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA.

Table 10.3.5.3.1.5-1: NR Cell specific test parameters for EN-DC FR1 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC under CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Cell 2 |
| Frequency Range | | | |  | FR1 |
| Duplex mode | | | Config 1,2 |  | TDD |
| TDD configuration | | | Config 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | | | Config 1,2 |  | 40 MHz: NRB,c = 106 |
| Active DL BWP ID | | | |  | 1, 2 |
| Initial DL BWP Configuration | | | Config 1,2 |  | DLBWP.0.2 |
| Initial UL BWP Configuration | | | Config 1,2 |  | ULBWP.0.2 |
| Initial Condition | | Active DL BWP-1 Configuration | Config 1,2 |  | DLBWP.1.3 |
| Final Condition | | Active DL BWP-1 Configuration | Config 1,2 |  | DLBWP.1.1 |
| Initial UL BWP Configuration | | | Config 1,2 |  | ULBWP.0.2 |
| Active UL BWP-1 Configuration | | | Config 1,2 |  | ULBWP.1.3 |
| Active UL BWP-2 Configuration | | | Config 1,2 |  | ULBWP.1.1 |
| PDSCH Reference measurement channel | | | Config 1,2 |  | SR.1.1 CCA |
| RMSI CORESET parameters | | | Config 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET parameters | | | Config 1,2 |  | CCR.1.1 CCA |
| OCNG Patterns | | | Config 1,2 |  | OP.1 |
| SSB Configuration | Semi- static channel access | | Config 1,2 |  | SSB.1 CCA |
| Dynamic channel access | | Config 1,2 |  | SSB.2 CCA |
| SMTC Configuration | | | Config 1,2 |  | SMTC.1 |
| TRS Configuration | | | Config 1,2 |  | TRS.1.2 TDD |
| DL CCA probabilityfor semi-static channel access (PCCA\_DL) | | | Config 1,2 |  | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_1) | | | Config 1,2 |  | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_2) | | | Config 1,2 |  | 1 |
| DL CCA probabilityfor semi-static channel access (PCCA\_DL) | | | Config 1,2 |  | 1 |
| Antenna Configuration | | | |  | 1x2 |
| Propagation Condition | | | |  | AWGN |
| EPRE ratio of PSS to SSS | | | |  |  |
| EPRE ratio of PBCH DMRS to SSS | | | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS | | | |  |  |
| EPRE ratio of PDSCH to PDSCH | | | |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | |  |  |
| NocNote 2 | | | Config 1,2 | dBm/SCS kHz | -101 |
| SS-RSRPNote 3 | | | Config 1,2 | dBm/SCS kHz | -84 |
| Ês/Iot | | | Config 1,2 | dB | 17 |
| Ês/Noc | | | Config 1,2 | dB | 17 |
| IoNote3 | | | Config 1,2 | dBm/38.16MHz | -59 |
| 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].  Note 5: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in clause D.7.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | |

During T1, the UE shall be ready for the reception of uplink grant on PSCell from the first DL slot occurs after the beginning of DL slot , and starts to report valid ACK/NACK for the PSCell from the first UL slot that occurs after the beginning of DL slot

Where,

TRRCprocessingDelay = 20 ms, is the RRC procedure delay in ms as defined in clause 11.2 in TS 36.331 [29];

TBWPSwitchDelayRRC = 6 ms, is the time used by the UE to perform BWP switch;

NR slot length = 1ms for SCS = 15kHz, and NR slot length = 0.5 ms for SCS = 30kHz.

*k1* is the timing between DL data receiving and acknowledgement as specified in [12].

Which gives

26 slots, for SCS = 15kHz,

52 slots, for SCS = 30kHz.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

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

## 10.4 Measurement procedures

### 10.4.1 Intra-frequency measurements

#### 10.4.1.0 Minimum conformance requirements

10.4.1.0.1 Minimum conformance requitements for intra-frequency measurements without measurement gaps

10.4.1.0.1.1 Intra-frequency cell identification

The UE shall be able to identify a new detectable intra frequency cell within Tidentify\_intra\_without\_index\_CCA if UE is not indicated to report SSB based RRM measurement result with the associated SSB index(*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured), or the UE is indicated that the neighbour cell is synchronous with the serving cell (*deriveSSB-IndexFromCell* is enabled). Otherwise UE shall be able to identify a new detectable intra frequency cell within Tidentify\_intra\_with\_index\_CCA. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within Tidentify\_intra\_without\_index\_CCA.

Tidentify\_intra\_without\_index\_CCA = (TPSS/SSS\_sync\_intra\_CCA + T SSB\_measurement\_period\_intra\_CCA) ms

Tidentify\_intra\_with\_index CCA = (TPSS/SSS\_sync\_intra\_CCA + T SSB\_measurement\_period\_intra\_CCA + TSSB\_time\_index\_intra\_CCA) ms

Where:

TPSS/SSS\_sync\_intra\_CCA: it is the time period used in PSS/SSS detection given in table 10.4.1.0.1.1-1, 10.4.1.0.1.1-3 (deactivated Scell) .

TSSB\_time\_index\_intra\_CCA: it is the time period used to acquire the index of the SSB being measured given in table 10.4.1.0.1.1-2 or 10.4.1.0.1.1-4 (deactivated SCell).

T SSB\_measurement\_period\_intra\_CCA: equal to a measurement period of SSB based measurement given in table 10.4.1.0.1.2-1, 10.4.1.0.1.2-2 (deactivated Scell). CSSFintra: it is a carrier specific scaling factor and is determined

- according to CSSFoutside\_gap,i in 38.133 [6] clause 9.1.5.1 for measurement conducted outside measurement gaps, i.e. when intra-frequency SMTC is fully non overlapping or partially overlapping with measurement gaps, or according to CSSFwithin\_gap,i in 38.133 [6] clause 9.1.5.2 for measurement conducted within measurement gaps, i.e. when intra-frequency SMTC is fully overlapping with measurement gaps.

- Mpss/sss\_sync\_w/o\_gaps\_CCA: For a UE supporting FR2-2 power class 1, Mpss/sss\_sync\_w/o\_gaps CCA = 60. For a UE supporting FR2-2 power class 2, Mpss/sss\_sync\_w/o\_gaps CCA = 36. For a UE supporting FR2-2 power class 3, Mpss/sss\_sync\_w/o\_gaps CCA = 36.

- Mmeas\_period\_w/o\_gaps\_CCA: For a UE supporting FR2-2 power class 1, Mmeas\_period\_w/o\_gaps CCA = 60. For a UE supporting FR2-2 power class 2, Mmeas\_period\_w/o\_gaps CCA = 36. For a UE supporting FR2-2 power class 3, Mmeas\_period\_w/o\_gaps CCA = 36.

- MSSB\_index\_intra\_CCA: For a UE supporting FR2-2 power class 1, MSSB\_index\_intra CCA = 72 samples. For a UE supporting FR2-2 power class 2, MSSB\_index\_intra CCA = 48 samples. For a UE supporting FR2 power class 3, MSSB\_index\_intra CCA = 48 samples.

N: is the UE Rx beam sweeping scaling factor. N= 12.

When intra-frequency SMTC is fully non overlapping with measurement gaps or intra-frequency SMTC is fully overlapping with MGs, Kp=1

When intra-frequency SMTC is partially overlapping with measurent gaps, Kp = 1/(1- (SMTC period /MGRP)), where SMTC period < MGRP.

For FR2-2,

Klayer1\_measurement=TBD

If MCG DRX is in use, intra-frequency cell identification requirements specified in Table 10.4.1.0.1.1-1, Table 10.4.1.0.1.1-2, Table 10.4.1.0.1.1-3, Table 10.4.1.0.1.1-4, Table 10.4.1.0.1.1-5 and Table 10.4.1.0.1.1-6 shall depend on the MCG DRX cycle. If SCG DRX is in use, intra-frequency cell identification requirements specified in Table 10.4.1.0.1.1-1, Table 10.4.1.0.1.1-2, Table 10.4.1.0.1.1-3, Table 10.4.1.0.1.1-4, Table 10.4.1.0.1.1-5 and Table 10.4.1.0.1.1-6 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

The requirements apply provided any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known defined in 38.133 [6] clause 9.2A.4.3.

Table 10.4.1.0.1.1-1: Time period for PSS/SSS detection (FR1)

|  |  |
| --- | --- |
| Condition | TPSS/SSS\_sync\_intra\_CCA |
| No DRX | max( 600ms, ceil((5+LPSS/SSS) x Kp) x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max( 600ms, ceil(1.5x (5+LPSS/SSS) x Kp) x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | ceil((5+LPSS/SSS) x Kp) x DRX cycle x CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: When DRX is not configured, LPSS/SSS is the number of SMTC occasions not available at the UE during TPSS/SSS\_sync\_intra\_CCA for PSS/SSS detection, where LPSS/SSS< LPSS/SSS,max. When DRX is configured, LPSS/SSS is the number of DRX cycles in which at least one SMTC occasion is not available at the UE during TPSS/SSS\_sync\_intra\_CCA for PSS/SSS detection, where LPSS/SSS< LPSS/SSS,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. FFS: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSFintra.  NOTE 3: LPSS/SSS,max =7 for Max(DRX cycle,SMTC period)≤40ms where DRX cycle is 0 for non-DRX, LPSS/SSS,max =5 for 40ms<Max(DRX cycle,SMTC period)≤320ms, LPSS/SSS,max = 3 for DRX cycle>320ms.  NOTE 4: Upon exceeding LPSS/SSS,max, the UE is not required to meet the requirements for PSS/SSS detection. | |

Table 10.4.1.0.1.1-2: Time period for time index detection (FR1)

|  |  |
| --- | --- |
| Condition | TSSB\_time\_index\_intra\_CCA |
| No DRX | max(120ms, ceil((3+Lind) x Kp )x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max(120ms, ceil (1.5 x (3+Lind) x Kp) x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | Ceil((3+Lind) x Kp) x DRX cycle x CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: When DRX is not configured, Lind is the number of SMTC occasions not available at the UE during TSSB\_time\_index\_intra\_CCA for index detection, where Lind ≤ Lind,max. When DRX is configured, Lind is the number of DRX cycles in which at least one SMTC occasion is not available at the UE during TSSB\_time\_index\_intra\_CCA for index detection, where Lind ≤ Lind,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. FFS: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSFintra.  NOTE 3: Lind,max = 5 for Max(DRX cycle,SMTC period)≤40ms where DRX cycle is 0 for non-DRX, Lind,max = 3 for 40ms<Max(DRX cycle,SMTC period)≤320ms, Lind,max =2 for DRX cycle>320ms.  NOTE 4: Upon exceeding Lind,max over the period of time TSSB\_time\_index\_intra\_CCA, the UE has to restart the time index detection procedure. | |

Table 10.4.1.0.1.1-3: Time period for PSS/SSS detection, deactivated SCell (FR1)

|  |  |
| --- | --- |
| Condition | TPSS/SSS\_sync\_intra\_CCA |
| No DRX | (5 + LPSS/SSS,deact) x measCycleSCell x CSSFintra |
| DRX cycle≤ 320ms | (5 + LPSS/SSS, deact) x max(measCycleSCell, 1.5xDRX cycle) x CSSFintra |
| DRX cycle>320ms | (5 + LPSS/SSS, deact) x max(measCycleSCell, DRX cycle) x CSSFintra |
| NOTE 1: When DRX is not configured, LPSS/SSS, deact is the number of SMTC occasions not available at the UE during TPSS/SSS\_sync\_intra\_CCA for PSS/SSS detection, where LPSS/SSS, deact< LPSS/SSS, deact,max. When DRX is configured, LPSS/SSS, deact is the number of DRX cycles in which at least one SMTC occasion is not available at the UE during TPSS/SSS\_sync\_intra\_CCA for PSS/SSS detection, where LPSS/SSS, deact< LPSS/SSS, deact,max.When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement cycles, the UE is not required to determine the availability of SMTC occasions more frequent than once per measurement cycle. FFS: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSFintra.  NOTE 2: LPSS/SSS, deact,max, = 7 for Max(DRX cycle, measCycleSCell)≤40ms where DRX cycle is 0 for non-DRX, LPSS/SSS, deact,max = 5 for 40ms<Max(DRX cycle, measCycleSCell)≤320ms, LPSS/SSS, deact,max = 3 for DRX cycle>320ms.  NOTE 3: Upon exceeding LPSS/SSS, deact,max,, the UE is not required to meet the requirements for PSS/SSS detection. | |

Table 10.4.1.0.1.1-4: Time period for time index detection, deactivated SCell (FR1)

|  |  |
| --- | --- |
| Condition | TSSB\_time\_index\_intra\_CCA |
| No DRX | (3+Lind,deact) x measCycleSCell x CSSFintra |
| DRX cycle≤ 320ms | (3+Lind,deact) x max(measCycleSCell, 1.5xDRX cycle) x CSSFintra |
| DRX cycle>320ms | (3+Lind,deact) x max(measCycleSCell, DRX cycle) x CSSFintra |
| NOTE 1: When DRX is not configured, Lind,deact is the number of SMTC occasions not available at the UE during TSSB\_time\_index\_intra\_CCA for index detection, where Lind,deact < Lind,deact,max. When DRX is configured, Lind,deact is the number of DRX cycles in which at least one SMTC occasion is not available at the UE during TSSB\_time\_index\_intra\_CCA for index detection, where Lind,deact < Lind,deact,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement cycles, the UE is not required to determine the availability of SMTC occasions more frequent than once per measurement cycle. FFS: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSFintra.  NOTE 2: Lind,deact,max, = 5 for Max(DRX cycle, measCycleSCell)≤40ms where DRX cycle is 0 for non-DRX, Lind,deact,max = 3 for 40ms<Max(DRX cycle, measCycleSCell)≤320ms, Lind,deact,max = 2 for DRX cycle>320ms.  NOTE 3: Upon exceeding Lind,deact,max over the period of time TSSB\_time\_index\_intra\_CCA,the UE has to restart the time index detection procedure. | |

Table 10.4.1.0.1.1-5: Time period for PSS/SSS detection, (Frequency range FR2-2)

|  |  |
| --- | --- |
| Condition | TPSS/SSS\_sync\_intra\_CCA |
| No DRX | max(600ms, ceil((Mpss/sss\_sync\_w/o\_gaps\_CCA x KFR + N x LPSS/SSS) x Kp x Klayer1\_measurement)x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max(600ms, ceil(1.5 x (Mpss/sss\_sync\_w/o\_gaps\_CCA x KFR + N x LPSS/SSS) x Kp x Klayer1\_measurement)x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | ceil((Mpss/sss\_sync\_w/o\_gaps\_CCA x KFR + N  x LPSS/SSS) x Kp x Klayer1\_measurement) x DRX cycle x CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: When DRX is not configured, LPSS/SSS is the number of SMTC occasion groups not available at the UE during TPSS/SSS\_sync\_intra\_CCA for PSS/SSS detection, where LPSS/SSS< LPSS/SSS,max. A SMTC occasion group consists of N consecutive SMTC occasions. An SMTC occasion group is not available, when at least one SMTC occasion in the group is not transmitted by the gNB. When DRX is configured, LPSS/SSS is the number of [DRX cycle groups] in which at least one SMTC occasion is not available at the UE during TPSS/SSS\_sync\_intra\_CCA for PSS/SSS detection, where LPSS/SSS< LPSS/SSS,max. [A [DRX occasion group consists of N consecutive DRX cycles. A DRX occasion group occasion group is not available, when at least one SMTC occasion in the group is not transmitted by the gNB.] When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle.  NOTE 3: LPSS/SSS,max =[7] for Max(DRX cycle,SMTC period)≤40ms where DRX cycle is 0 for non-DRX, LPSS/SSS,max =[5] for 40ms<Max(DRX cycle,SMTC period)≤320ms, LPSS/SSS,max = [3] for DRX cycle>320ms.  NOTE 4: Upon exceeding LPSS/SSS,max, the UE is not required to meet the requirements for PSS/SSS detection.  NOTE 5: KFR is a scaling factor depending on the frequency range and SSB SCS. KFR = 1 if the SCS of the SSB of the cell being detected is 120 kHz, KFR = 2 if the SCS of the SSB of the cell being detected is 480 kHz, and KFR= 3 if the SCS of the SSB of the cell being detected is 960 kHz. | |

Table 10.4.1.0.1.1-6: Time period for PSS/SSS detection, deactivated SCell (FR2-2)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra\_CCA |
| No DRX | Ceil((Mpss/sss\_sync\_w/o\_gaps x KFR + N x LPSS/SSS,deact) x Kp) x measCycleSCell x CSSFintra |
| DRX cycle≤ 320ms | Ceil((Mpss/sss\_sync\_w/o\_gaps x KFR + N x LPSS/SSS,deact) x Kp) x max(measCycleSCell, 1.5xDRX cycle) x CSSFintra |
| DRX cycle> 320ms | Ceil((Mpss/sss\_sync\_w/o\_gaps x KFR + N x LPSS/SSS,deact) x Kp) x max(measCycleSCell, DRX cycle) x CSSFintra |
| NOTE 1: When DRX is not configured, LPSS/SSS, deact is the number of SMTC occasions groups not available at the UE during TPSS/SSS\_sync\_intra\_CCA for PSS/SSS detection, where LPSS/SSS, deact< LPSS/SSS, deact,max. A SMTC occasion group consists of N consecutive SMTC occasions. An SMTC occasion group is not available, when at least one SMTC occasion in the group is not transmitted by the gNB. When DRX is configured, LPSS/SSS, deact is the number of [DRX cycle groups] in which at least one SMTC occasion is not available at the UE during TPSS/SSS\_sync\_intra\_CCA for PSS/SSS detection, where LPSS/SSS, deact< LPSS/SSS, deact,max.When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. [A DRX occasion group consists of N consecutive DRX cycles. A DRX occasion group occasion group is not available, when at least one SMTC occasion in the group is not transmitted by the gNB.] When configured with measurement cycles, the UE is not required to determine the availability of SMTC occasions more frequent than once per measurement cycle.  NOTE 2: LPSS/SSS, deact,max, = [7] for Max(DRX cycle, measCycleSCell)≤40ms where DRX cycle is 0 for non-DRX, LPSS/SSS, deact,max = [5] for 40ms<Max(DRX cycle, measCycleSCell)≤320ms, LPSS/SSS, deact,max = [3] for DRX cycle>320ms.  NOTE 3: Upon exceeding LPSS/SSS, deact,max,, the UE is not required to meet the requirements for PSS/SSS detection.  NOTE 4: Void  NOTE 5: KFR is a scaling factor depending on the frequency range and SSB SCS. KFR = 1 if the SCS of the SSB of the cell being detected is 120 kHz, KFR = 2 if the SCS of the SSB of the cell being detected is 480 kHz, and KFR= 3 if the SCS of the SSB of the cell being detected is 960 kHz. | |

Table 10.4.1.0.1.1-7: Time period for time index detection (FR2-2)

|  |  |
| --- | --- |
| DRX cycle | TSSB\_time\_index\_intra\_CCA |
| No DRX | Max(200ms, ceil((MSSB\_index\_intra\_CCA + N ´ Lind) ´ Kp) ´ SMTC period) ´ CSSFintra |
| DRX cycle≤ 320ms | Max(200ms, ceil(1.5 ´ ((MSSB\_index\_intra + N ´ Lind) ´ Kp) ´ Max(SMTC period, DRX cycle)) ´ CSSFintra |
| DRX cycle> 320ms | ceil((MSSB\_index\_intra + N ´ Lind) ´ Kp) ´ DRX cycle ´ CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: When DRX is not configured, Lind is the number of SMTC occasion groups not available at the UE during TSSB\_time\_index\_intra\_CCA for index detection, where Lind ≤ Lind,max. When DRX is configured, Lind is the number of DRX cycles groups in which at least one SMTC occasion is not available at the UE during TSSB\_time\_index\_intra\_CCA for index detection, where Lind ≤ Lind,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle.  NOTE 3: Lind,max = 5 for Max(DRX cycle,SMTC period)≤40ms where DRX cycle is 0 for non-DRX, Lind,max = 3 for 40ms<Max(DRX cycle,SMTC period)≤320ms, Lind,max =2 for DRX cycle>320ms.  NOTE 4: Upon exceeding Lind,max over the period of time TSSB\_time\_index\_intra\_CCA, the UE has to restart the time index detection procedure. | |

Table 10.4.1.0.1.1-8: Time period for time index detection, deactivated SCell (FR2-2)

|  |  |
| --- | --- |
| DRX cycle | TSSB\_time\_index\_intra\_CCA |
| No DRX | Max(200ms, ceil((MSSB\_index\_intra\_CCA + N ´ Lind,deact) ´ Kp) ´ SMTC period) ´ CSSFintra |
| DRX cycle≤ 320ms | Max(200ms, ceil(1.5 ´ ((MSSB\_index\_intra + N ´ Lind,deact) ´ Kp) ´ Max(SMTC period, DRX cycle)) ´ CSSFintra |
| DRX cycle> 320ms | ceil((MSSB\_index\_intra + N ´ Lind,deact) ´ Kp) ´ DRX cycle ´ CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: When DRX is not configured, Lind,deact is the number of SMTC occasion groups not available at the UE during TSSB\_time\_index\_intra\_CCA for index detection, where Lind,deact ≤ Lind,deact,max. When DRX is configured, Lind,deact is the number of DRX cycles groups in which at least one SMTC occasion is not available at the UE during TSSB\_time\_index\_intra\_CCA for index detection, where Lind,deact ≤ Lind,deact,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle.  NOTE 3: Lind,deact,max = 5 for Max(DRX cycle,SMTC period)≤40ms where DRX cycle is 0 for non-DRX, Lind,deact,max = 3 for 40ms<Max(DRX cycle,SMTC period)≤320ms, Lind,deact,max =2 for DRX cycle>320ms.  NOTE 4: Upon exceeding Lind,deact,max over the period of time TSSB\_time\_index\_intra\_CCA, the UE has to restart the time index detection procedure. | |

The normative reference for this requirement is TS 38.133 [6] clause 9.2A.5.1.

10.4.1.0.1.2 Measurement period

The measurement period for intra-frequency measurements without gaps is as shown in table 10.4.1.0.1.2-1, 10.4.1.0.1.2-2 (deactivated SCell).

If SCG DRX is in use, intra-frequency measurement period requirements specified in Table 10.4.1.0.1.2-1, Table 10.4.1.0.1.2-2 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

The requirements apply provided any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known defined in 38.133 [6] clause 9.2A.4.3.

When the time period of unsuccessful measurement attempts due to exceeding the maximum number of unavailable at the UE SMTC occasions of an already identified cell exceeds the maximum time requirement for the cell to remain known defined in 38.133 [6] clause 9.2A.4.3, UE shall stop the measurement attempts on this SSB and perform the detection procedure again like for any other SSB.

Table 10.4.1.0.1.2-1: Measurement period for intra-frequency measurements without gaps (FR1)

|  |  |
| --- | --- |
| Condition | T SSB\_measurement\_period\_intra\_CCA |
| No DRX | max(200ms, ceil((5+Lmeas) x Kp) x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max(200ms, ceil(1.5x (5+Lmeas) x Kp) x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | ceil((5+Lmeas) x Kp ) x DRX cycle x CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: When DRX is not configured, Lmeas is the number of SMTC occasions not available at the UE during T SSB\_measurement\_period\_intra\_CCA for measurement, where Lmeas <Lmeas,max. When DRX is configured, Lmeas is the number of DRX cycles in which at least one SMTC occasion is not available at the UE during T SSB\_measurement\_period\_intra\_CCA for measurement, where Lmeas <Lmeas,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. FFS: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSFintra.  NOTE 3: Lmeas,max = 7 for Max(DRX cycle,SMTC period)≤40ms where DRX cycle is 0 for non-DRX, Lmeas,max = 5 for 40ms<Max(DRX cycle,SMTC period)≤320ms, Lmeas,max = 3 for DRX cycle>320ms.  NOTE 4: Upon exceeding Lmeas,max over the period of time T SSB\_measurement\_period\_intra\_CCA, the UE has to restart the measurement procedure. | |

Table 10.4.1.0.1.2-2: Measurement period for intra-frequency measurements without gaps, deactivated SCell (FR1)

|  |  |
| --- | --- |
| Condition | T SSB\_measurement\_period\_intra\_CCA |
| No DRX | (5+Lmeas,deact) x measCycleSCell x CSSFintra |
| DRX cycle≤ 320ms | (5+Lmeas, deact) x max(measCycleSCell, 1.5xDRX cycle) x CSSFintra |
| DRX cycle>320ms | (5+Lmeas, deact) x max(measCycleSCell, DRX cycle) x CSSFintra |
| NOTE 1: When DRX is not configured, Lmeas,deact is the number of SMTC occasions not available at the UE during T SSB\_measurement\_period\_intra\_CCA for measurement, where Lmeas,deact <Lmeas, ,deact ,max. When DRX is configured, Lmeas,deact is the number of DRX cycles in which at least one SMTC occasion is not available at the UE during T SSB\_measurement\_period\_intra\_CCA for measurement, where Lmeas,deact <Lmeas, ,deact ,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement cycles, the UE is not required to determine the availability of SMTC occasions more frequent than once per measurement cycle. FFS: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSFintra.  NOTE 2: Lmeas, ,deact ,max, = 7 for Max(DRX cycle, measCycleSCell)≤40ms where DRX cycle is 0 for non-DRX, Lmeas, ,deact ,max = 5 for 40ms<Max(DRX cycle, measCycleSCell)≤320ms, Lmeas, ,deact ,max = 3 for DRX cycle>320ms.  NOTE 3: Upon exceeding Lmeas,deact,max over the period of time T SSB\_measurement\_period\_intra\_CCA, the UE has to restart the measurement procedure. | |

Table 10.4.1.0.1.2-3: Measurement period for intra-frequency measurements without gaps (FR2-2)

|  |  |
| --- | --- |
| DRX cycle | T SSB\_measurement\_period\_intra\_CCA |
| No DRX | max(400ms, ceil((Mmeas\_period\_w/o\_gaps\_CCA + N x Lmeas) x Kp x Klayer1\_measurement) x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max(400ms, ceil(1.5x (Mmeas\_period\_w/o\_gaps\_CCA + N x Lmeas) x Kp x Klayer1\_measurement) x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | ceil((Mmeas\_period\_w/o\_gaps\_CCA + N x Lmeas) x Kp x Klayer1\_measurement ) x DRX cycle x CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: When DRX is not configured, Lmeas is the number of SMTC occasion groups not available at the UE during T SSB\_measurement\_period\_intra\_CCA for measurement, where Lmeas <Lmeas,max. A SMTC occasion group consists of N consecutive SMTC occasions. An SMTC occasion group is not available, when at least one SMTC occasion in the group is not transmitted by the gNB. When DRX is configured, Lmeas is the number of [DRX cycle groups] in which at least one SMTC occasion is not available at the UE during T SSB\_measurement\_period\_intra\_CCA for measurement, where Lmeas <Lmeas,max. . [A DRX occasion group consists of N consecutive DRX cycles. A DRX occasion group occasion group is not available, when at least one SMTC occasion in the group is not transmitted by the gNB.] When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle.  NOTE 3: Lmeas,max = [7] for Max(DRX cycle,SMTC period)≤40ms where DRX cycle is 0 for non-DRX, Lmeas,max = [5] for 40ms<Max(DRX cycle,SMTC period)≤320ms, Lmeas,max = [3] for DRX cycle>320ms.  NOTE 4: Upon exceeding Lmeas,max over the period of time T SSB\_measurement\_period\_intra\_CCA, the UE has to restart the measurement procedure. | |

Table 10.4.1.0.1.2-4: Measurement period for intra-frequency measurements without gaps, deactivated Scell (FR2-2)

|  |  |
| --- | --- |
| DRX cycle | T SSB\_measurement\_period\_intra\_CCA |
| No DRX | Ceil((Mmeas\_period\_w/o\_gaps\_CCA + N x Lmeas,deact) x Kp) x measCycleSCell x CSSFintra |
| DRX cycle≤ 320ms | Ceil((Mmeas\_period\_w/o\_gaps\_CCA + N x Lmeas,deact) x Kp) x max(measCycleSCell, 1.5xDRX cycle) x CSSFintra |
| DRX cycle> 320ms | Ceil((Mmeas\_period\_w/o\_gaps\_CCA + N x Lmeas,deact) x Kp) x max(measCycleSCell, DRX cycle) x CSSFintra |
| NOTE 1: When DRX is not configured, Lmeas,deact is the number of SMTC occasion groups not available at the UE during T SSB\_measurement\_period\_intra\_CCA for measurement, where Lmeas,deact <Lmeas, ,deact ,max. A SMTC occasion group consists of N consecutive SMTC occasions. An SMTC occasion group is not available, when at least one SMTC occasion in the group is not transmitted by the gNB. When DRX is configured, Lmeas,deact is the number of [DRX cycle groups] in which at least one SMTC occasion is not available at the UE during T SSB\_measurement\_period\_intra\_CCA for measurement, where Lmeas,deact <Lmeas, ,deact ,max. [A DRX occasion group consists of N consecutive DRX cycles. A DRX occasion group occasion group is not available, when at least one SMTC occasion in the group is not transmitted by the gNB.] When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement cycles, the UE is not required to determine the availability of SMTC occasions more frequent than once per measurement cycle. FFS: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSFintra.  NOTE 2: Lmeas, ,deact ,max, = [7] for Max(DRX cycle, measCycleSCell)≤40ms where DRX cycle is 0 for non-DRX, Lmeas, ,deact ,max = [5] for 40ms<Max(DRX cycle, measCycleSCell)≤320ms, Lmeas, ,deact ,max = [3] for DRX cycle>320ms.  NOTE 3: Upon exceeding Lmeas,deact,max over the period of time T SSB\_measurement\_period\_intra\_CCA, the UE has to restart the measurement procedure. | |

The normative reference for this requirement is TS 38.133 [6] clause 9.2A.5.2.

10.4.1.0.2 Minimum conformance requitements for intra-frequency measurements with measurement gaps

10.4.1.0.2.1 Intra-frequency cell identification

The UE shall be able to identify a new detectable intra frequency cell within Tidentify\_intra\_without\_index\_CCA if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured), or the UE has been indicated that the neighbour cell is synchronous with the serving cell (*deriveSSB-IndexFromCell* is enabled). Otherwise UE shall be able to identify a new detectable intra frequency cell within Tidentify\_intra\_with\_index\_CCA. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within Tidentify\_intra\_without\_index CCA.

Tidentify\_intra\_without\_index CCA = TPSS/SSS\_sync\_intra\_CCA + T SSB\_measurement\_period\_intra\_CCA ms

Tidentify\_intra\_with\_index\_CCA = TPSS/SSS\_sync\_intra\_CCA + T SSB\_measurement\_period\_intra\_CCA + TSSB\_time\_index\_intra\_CCA

Where:

TPSS/SSS\_sync\_intra\_CCA: it is the time period used in PSS/SSS detection given in table 10.4.1.0.2.1-1.

TSSB\_time\_index\_intra\_CCA: it is the time period used to acquire the index of the SSB being measured given in table 10.4.1.0.2.1-2.

T SSB\_measurement\_period\_intra\_CCA: equal to a measurement period of SSB based measurement given in table 10.4.1.0.2.2-1 or 10.4.1.0.2.1-3.

CSSFintra: it is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in 38.133 [6] clause 9.1.5.2 for measurement conducted within measurement gaps.

Mpss/sss\_sync\_w/o\_gaps\_CCA: For a UE supporting FR2-2 power class 1, Mpss/sss\_sync\_w/o\_gaps CCA = 60. For a UE supporting FR2-2 power class 2, Mpss/sss\_sync\_w/o\_gaps CCA = 36. For a UE supporting FR2-2 power class 3, Mpss/sss\_sync\_w/o\_gaps CCA = 36.

Mmeas\_period\_w/o\_gaps\_CCA: For a UE supporting FR2-2 power class 1, Mmeas\_period\_w/o\_gaps CCA = 60. For a UE supporting FR2-2 power class 2, Mmeas\_period\_w/o\_gaps CCA = 36. For a UE supporting FR2-2 power class 3, Mmeas\_period\_w/o\_gaps CCA = 36.

- MSSB\_index\_intra\_CCA: For a UE supporting FR2-2 power class 1, MSSB\_index\_intra CCA = 72 samples. For a UE supporting FR2-2 power class 2, MSSB\_index\_intra CCA = 48 samples. For a UE supporting FR2 power class 3, MSSB\_index\_intra CCA = 48 samples.

N: is the UE Rx beam sweeping scaling factor. N= 12.

If MCG DRX is in use, intra-frequency cell identification requirements specified in Table 10.4.1.0.2.1-1, Table 10.4.1.0.2.1-2 and Table 10.4.1.0.2.1-3 shall depend on the MCG DRX cycle. If SCG DRX is in use, intra-frequency cell identification requirements specified in Table 10.4.1.0.2.1-1, Table 10.4.1.0.2.1-2 and Table 10.4.1.0.2.1-3 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

The requirements apply provided any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known defined in 38.133 [6] clause 9.2A.4.3.

Table 10.4.1.0.2.1-1: Time period for PSS/SSS detection (FR1)

|  |  |
| --- | --- |
| Condition | TPSS/SSS\_sync\_intra\_CCA |
| No DRX | max(600ms, (5+LPSS/SSS,gaps) x max(MGRP, SMTC period)) x CSSFintra |
| DRX cycle≤ 320ms | max(600ms, ceil(1.5x (5+LPSS/SSS,gaps)) x max(DRX cycle, MGRP, SMTC period)) x CSSFintra |
| DRX cycle>320ms | (5+LPSS/SSS,gaps) x (MGRP, DRX cycle) x CSSFintra |
| NOTE 1: When DRX is not configured, LPSS/SSS,gaps is the number of SMTC occasions not available at the UE during TPSS/SSS\_sync\_intra\_CCA for PSS/SSS detection, where LPSS/SSS,gaps <LPSS/SSS,gaps,max. When DRX is configured, LPSS/SSS,gaps is the number of DRX cycles in which at least one SMTC occasion is not available at the UE during TPSS/SSS\_sync\_intra\_CCA for PSS/SSS detection, where LPSS/SSS,gaps <LPSS/SSS,gaps,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP. FFS: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSFintra.  NOTE 2: LPSS/SSS,gaps,max, =7 for Max(DRX cycle, SMTC period, MGRP)≤40ms where DRX cycle is 0 for non-DRX, LPSS/SSS,gaps,max =5 for 40ms<Max(DRX cycle, SMTC period, MGRP)≤320ms, LPSS/SSS,gaps,max =3 for DRX cycle>320ms.  NOTE 3: Upon exceeding LPSS/SSS,gaps,max, the UE is not required to meet the requirements for PSS/SSS detection. | |

Table 10.4.1.0.2.1-2: Time period for time index detection (FR1)

|  |  |
| --- | --- |
| Condition | TSSB\_time\_index\_intra\_CCA |
| No DRX | max(120ms, (3+Lind,gaps) x max(MGRP, SMTC period)) x CSSFintra |
| DRX cycle≤ 320ms | max(120ms, ceil(1.5x (3+Lind,gaps)) x max(MGRP, SMTC period,DRX cycle) x CSSFintra) |
| DRX cycle>320ms | (3+Lind,gaps) x (MGRP, DRX cycle) x CSSFintra |
| NOTE 1: When DRX is not configured, Lind,gaps is the number of SMTC occasions not available at the UE during TSSB\_time\_index\_intra\_CCA forindex detection where Lind,gaps < Lind,gaps,max. When DRX is configured, Lind,gaps is the number of DRX cycles in which at least one SMTC occasion is not available at the UE during TSSB\_time\_index\_intra\_CCA forindex detection where Lind,gaps < Lind,gaps,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP. FFS: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSFintra.  NOTE 2: Lind,gaps,max, = 5 for Max(DRX cycle, SMTC period, MGRP)≤40ms where DRX cycle is 0 for non-DRX, Lind,gaps,max = 3 for 40ms<Max(DRX cycle, SMTC period, MGRP)≤320ms, Lind,gaps,max = 2 for DRX cycle>320ms.  NOTE 3: Upon exceeding Lind,gaps,max over the TSSB\_time\_index\_intra\_CCA period of time, the UE has to restart the time index detection procedure. | |

Table 10.4.1.0.2.1-3: Time period for PSS/SSS detection (FR2-2)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra\_CCA |
| No DRX | max(600ms, (Mpss/sss\_sync\_with\_gaps\_CCA x KFR + N x Lind,gaps ) x max(MGRP, SMTC period)) x CSSFintra |
| DRX cycle≤ 320ms | max(600ms, ceil(1.5x (Mpss/sss\_sync\_with\_gaps\_CCA x KFR + N x Lind,gaps )) x max(MGRP, SMTC period, DRX cycle))x CSSFintra |
| DRX cycle>320ms | (Mpss/sss\_sync\_with\_gaps\_CCA x KFR + N x Lind,gaps ) x max(MGRP, DRX cycle) x CSSFintra |
| NOTE 1: When DRX is not configured, Lind,gaps is the number of SMTC occasion groups not available at the UE during TSSB\_time\_index\_intra\_CCA forindex detection where Lind,gaps < Lind,gaps,max. A SMTC occasion group consists of N consecutive SMTC occasions. An SMTC occasion group is not available, when at least one SMTC occasion in the group is not transmitted by the gNB. When DRX is configured, Lind,gaps is the number of [DRX cycle groups] in which at least one SMTC occasion is not available at the UE during TSSB\_time\_index\_intra\_CCA forindex detection where Lind,gaps < Lind,gaps,max.[A DRX occasion group consists of N consecutive DRX cycles. A DRX occasion group occasion group is not available, when at least one SMTC occasion in the group is not transmitted by the gNB.] When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.  NOTE 2: Lind,gaps,max, = [5] for Max(DRX cycle, SMTC period, MGRP)≤40ms where DRX cycle is 0 for non-DRX, Lind,gaps,max = [3] for 40ms<Max(DRX cycle, SMTC period, MGRP)≤320ms, Lind,gaps,max = [2] for DRX cycle>320ms.  NOTE 3: Upon exceeding Lind,gaps,max over the TSSB\_time\_index\_intra\_CCA period of time, the UE has to restart the time index detection procedure.  NOTE 4: KFR is a scaling factor depending on the frequency range and SSB SCS. KFR = 1 if the SCS of the SSB of the cell being detected is 120 kHz, KFR = 2 if the SCS of the SSB of the cell being detected is 480 kHz, and KFR = 3 if the SCS of the SSB of the cell being detected is 960 kHz. | |

The normative reference for this requirement is TS 38.133 [6] clause 9.2A.6.1.

10.4.1.0.2.2 Intra-frequency measurement period

The measurement period for intra-frequency measurements with gaps is as shown in table 10.4.1.0.2.2-1.

If MCG DRX is in use, intra-frequency cell identification requirements specified in Table 10.4.1.0.2.2-1 and 10.4.1.0.2.2-2 shall depend on the MCG DRX cycle. If SCG DRX is in use, intra-frequency measurement period requirements specified in Table 10.4.1.0.2.2-1 and 10.4.1.0.2.2-2 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

The requirements apply provided any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known defined in 38.133 [6] clause 9.2A.4.3.

When the time period of unsuccessful measurement attempts due to exceeding the maximum number of unavailable at the UE SMTC occasions of an already identified cell exceeds the maximum time requirement for the cell to remain known defined in 38.133 [6] clause 9.2A.4.3, UE shall stop the measurement attempts on this SSB and perform the detection procedure again like for any other SSB.

Table 10.4.1.0.2.2-1: Measurement period for intra-frequency measurements with gaps (FR1)

|  |  |
| --- | --- |
| Condition | T SSB\_measurement\_period\_intra\_CCA |
| No DRX | max(200ms, (5+Lmeas,gaps) x max(MGRP, SMTC period)) x CSSFintra |
| DRX cycle≤ 320ms | max(200ms, ceil(1.5x (5+Lmeas,gaps)) x max(MGRP, SMTC period,DRX cycle))x CSSFintra |
| DRX cycle>320ms | (5+Lmeas,gaps) x (MGRP, DRX cycle) x CSSFintra |
| NOTE 1: When DRX is not configured, Lmeas,gaps is the number of SMTC occasions not available at the UE during TSSB\_time\_index\_intra\_CCA for measurement where Lmeas,gaps < Lmeas,gaps,max. When DRX is configured, Lmeas,gaps is the number of DRX cycles in which at least one SMTC occasion is not available at the UE during TSSB\_time\_index\_intra\_CCA for measurement where Lmeas,gaps < Lmeas,gaps,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP. FFS: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSFintra.  NOTE 2: Lmeas,gaps,max = 7 for Max(DRX cycle, SMTC period, MGRP)≤40ms where DRX cycle is 0 for non-DRX, Lmeas,gaps,max = 5 for 40ms<Max(DRX cycle, SMTC period, MGRP)≤320ms, Lmeas,gaps,max = 3 for DRX cycle>320ms.  NOTE 3: Upon exceeding Lmeas,gaps,max over the T SSB\_measurement\_period\_intra\_CCAperiod of time, the UE has to restart the measurement procedure. | |

Table 10.4.1.0.2.2-2: Measurement period for intra-frequency measurements with gaps (FR2-2)

|  |  |
| --- | --- |
| DRX cycle | T SSB\_measurement\_period\_intra\_CCA |
| No DRX | max(400ms, (Mmeas\_period with\_gaps\_CCA + N x Lmeas,gaps ) x max(MGRP, SMTC period)) x CSSFintra |
| DRX cycle≤ 320ms | max(400ms, ceil(1.5 x (Mmeas\_period with\_gaps\_CCA + N x Lmeas,gaps )) x max(MGRP, SMTC period, DRX cycle)) Note 1 x CSSFintra |
| DRX cycle>320ms | (Mmeas\_period with\_gaps\_CCA + N x Lmeas,gaps ) x max(MGRP, DRX cycle) x CSSFintra |
| NOTE 1: When DRX is not configured, Lmeas,gaps is the number of SMTC occasion groups not available at the UE during TSSB\_time\_index\_intra\_CCA for measurement where Lmeas,gaps < Lmeas,gaps,max. A SMTC occasion group consists of N consecutive SMTC occasions. An SMTC occasion group is not available, when at least one SMTC occasion in the group is not transmitted by the gNB. When DRX is configured, Lmeas,gaps is the number of DRX cycle groups in which at least one SMTC occasion is not available at the UE during TSSB\_time\_index\_intra\_CCA for measurement where Lmeas,gaps < Lmeas,gaps,max. A DRX occasion group consists of N consecutive DRX cycles. A DRX occasion group occasion group is not available, when at least one SMTC occasion in the group is not transmitted by the gNB. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.  NOTE 2: Lmeas,gaps,max = 7 for Max(DRX cycle, SMTC period, MGRP)≤40ms where DRX cycle is 0 for non-DRX, Lmeas,gaps,max = 5 for 40ms<Max(DRX cycle, SMTC period, MGRP)≤320ms, Lmeas,gaps,max = 3 for DRX cycle>320ms.  NOTE 3: Upon exceeding Lmeas,gaps,max over the T SSB\_measurement\_period\_intra\_CCAperiod of time, the UE has to restart the measurement procedure. | |

The normative reference for this requirement is TS 38.133 [6] clause 9.2A.6.2.

10.4.1.0.3 Minimum conformance requitements for intra-frequency RSSI and channel occupancy measurements

10.4.1.0.3.1 Intra-frequency RSSI measurements

An RSSI measurement is defined as an intra-frequency measurement provided that the RSSI measurement bandwidth is fully contained within the current carrier bandwidth of the UE.

The UE physical layer shall be capable of performing the RSSI measurements, defined in TS 38.215 [10] on one or more serving carriers operating with CCA, TS 37.213 [37], if the carrier(s) are indicated by higher layers [2], and report the RSSI measurements to higher layers. The UE physical layer shall provide to higher layers a single RSSI sample for each OFDM symbol within each configured RSSI measurement duration [2] occurring with a configured RSSI measurement timing configuration periodicity [2], *rmtc-Periodicity*.

The UE can perform RSSI measurements without measurement gaps if RSSI measurement bandwidth is fully within the active DL BWP of the UE.

For performing intra-frequency RSSI measurement in FR2-2, UE shall assume the configured RSSI measurement resources are QCL-ed with TypeD to the DL RS associated with the TCI state provided in the RMTC configuration. If no TCI state is provided in the RMTC configuration, UE shall assume the configured RSSI measurement resources are QCL-ed with TypeD to one of the latest received PDSCH and the latest monitored CORESET in the active BWP of the current carrier in FR2-2.

For RSSI measurement in FR2-2 with SCS of 480 kHz or 960 kHz, the RSSI measurement results shall be derived based on symbols configured by RMTC except for the first symbol and the last symbol in RMTC, and there is no requirement when *measDurationSymbols* is configured as 1.

The measurement period for intra-frequency RSSI measurements without measurement gaps is as shown in Table 10.4.1.0.3.1-1 and Table 10.4.1.0.3.1-2, for FR1, and in 38.133 [6] Table 9.2A.7.4-1 and 38.133 [6] Table 9.2A.7.5-1 for FR2-2. The measurement period for intra-frequency RSSI measurements with measurement gaps is as shown in Table 10.4.1.0.3.1-3, for FR1 and in Table 10.4.1.0.3.1-6 for FR2-2.

Table 10.4.1.0.3.1-1: Measurement period for intra-frequency RSSI measurements without measurement gaps when SMTC and RMTC are overlapping (FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T RSSI\_measurement\_period\_intra\_cca |
| No DRX | max(*reportInterval*, *rmtc-Periodicity*\*CSSFoutside\_gap,i) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, DRX cycle) \*CSSFoutside\_gap,i) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: CSSFoutside\_gap, i is a carrier specific scaling factor and is determined according to CSSF outside\_gap,i in 38.133 [6] clause 9.1.5.1 for measurement conducted outside measurement gap. | |

Table 10.4.1.0.3.1-2: Measurement period for intra-frequency RSSI measurements without measurement gaps when SMTC and RMTC are not overlapping (FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T RSSI\_measurement\_period\_intra\_cca |
| No DRX | max(*reportInt*erval, Nintra-MO\**rmtc-Periodicity*) |
| DRX | max(*reportInt*erval, Nintra-MO\*max(*rmtc-Periodicity*, DRXcycle length)) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: Nintra-MO is defined as the number of measurement objects that can be measured without gaps | |

Table 10.4.1.0.3.1-3: Measurement period for intra-frequency RSSI measurements with measurement gaps (FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T RSSI\_measurement\_period\_intra\_cca |
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x CSSFintra) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle length) x CSSFintra) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: CSSFintra is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in 38.133 [6] clause 9.1.5.2 for measurement conducted within measurement gaps. | |

Table 10.4.1.0.3.1-4: Measurement period for intra-frequency RSSI measurements without measurement gaps when SMTC and RMTC are overlapping (FR2-2)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T RSSI\_measurement\_period\_intra\_cca |
| No DRX | max(*reportInterval*, *rmtc-Periodicity*\*CSSFoutside\_gap,i) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, DRX cycle) \*CSSFoutside\_gap,i) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: CSSFoutside\_gap, i is a carrier specific scaling factor and is determined according to CSSF outside\_gap,i in 38.133 [6] clause 9.1.5.1 for measurement conducted outside measurement gap. | |

Table 10.4.1.0.3.1-5: Measurement period for intra-frequency RSSI measurements without measurement gaps when SMTC and RMTC are not overlapping (FR2-2)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T RSSI\_measurement\_period\_intra\_cca |
| No DRX | max(*reportInt*erval, Nintra-MO\**rmtc-Periodicity*) |
| DRX | max(*reportInt*erval, Nintra-MO\*max(*rmtc-Periodicity*, DRX cycle)) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: Nintra-MO is defined as the number of measurement objects that can be measured without gaps | |

Table 10.4.1.0.3.1-6: Measurement period for intra-frequency RSSI measurements with measurement gaps (FR2-2)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T RSSI\_measurement\_period\_intra\_cca |
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x CSSFintra) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle) x CSSFintra) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: CSSFintra is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in 38.133 [6] clause 9.1.5.2 for measurement conducted within measurement gaps. | |

If the UE requires measurement gaps to perform intra-frequency measurements, a single measurement gap pattern is used for all concurrent intra-frequency measurements, including intra-frequency RSSI measurements. The RSSI measurement duration and the measurement gap should be aligned, and the following additional condition should be fulfilled:

- Entire RSSI measurement duration should be contained in the measurement gap.

The RSSI measurement performed and reported according to this clause shall meet the RSSI measurement accuracy requirement in 38.133 [6] clause 10.1.34.1. The reported RSSI measurement values contained in measurement reports shall be based on the measurement report mapping requirements specified in 38.133 [6] clause 10.1.34.3.

The normative reference for this requirement is TS 38.133 [6] clause 9.2A.7.1.

10.4.1.0.3.2 Intra-frequency channel occupancy measurements

The UE shall be capable of estimating the channel occupancy on one or more serving carrier frequencies indicated by higher layers [2], based on RSSI samples provided by the physical layer.

The UE can perform channel occupancy measurements without measurement gaps if RSSI measurement bandwidth is fully within the active DL BWP of the UE.

The measurement period for intra-frequency channel occupancy measurements without measurement gap is as shown in Table 10.4.1.0.3.2-1 and Table 10.4.1.0.3.1-2 for FR1, and in Table 10.4.1.0.3.2-4 and Table 10.4.1.0.3.1-5 for FR2-2. The measurement period for intra-frequency RSSI measurements with measurement gaps is as shown in Table 10.4.1.0.3.2-3 for FR1, and in Table 10.4.1.0.3.2-6 for FR2-2 .

Table 10.4.1.0.3.2-1: Measurement period for intra-frequency Channel Occupancy measurements without measurement gaps when SMTC and RMTC are overlapping (FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T RSSI\_measurement\_period\_intra\_cca |
| No DRX | max(*reportInterval*, *rmtc-Periodicity*\*CSSFoutside\_gap,i) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, DRX cycle) \*CSSFoutside\_gap,i) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: CSSFoutside\_gap, iis a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in 38.133 [6] clause 9.1.5.1 for measurement conducted outside measurement gap. | |

Table 10.4.1.0.3.2-2: Measurement period for intra-frequency Channel Occupancy measurements without measurement gaps when SMTC and RMTC are not overlapping (FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T RSSI\_measurement\_period\_intra\_cca |
| No DRX | max(*reportInt*erval, Nintra-MO\**rmtc-Periodicity*) |
| DRX | max(*reportInt*erval, Nintra-MO\*max(*rmtc-Periodicity*, DRXcycle length)) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: Nintra-MO is defined as the number of measurement objects that can be measured without gaps | |

Table 10.4.1.0.3.2-3: Measurement period for intra-frequency Channel Occupancy measurements with measurement gaps (FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T RSSI\_measurement\_period\_intra\_cca |
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x CSSFintra) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle length) x CSSFintra) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: CSSFintra is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in 38.133 [6] clause 9.1.5.2 for measurement conducted within measurement gaps. | |

Table 10.4.1.0.3.2-4: Measurement period for intra-frequency Channel Occupancy measurements without measurement gaps when SMTC and RMTC are overlapping (FR2-2)

|  |  |
| --- | --- |
| **Condition NOTE1,2** | **T RSSI\_measurement\_period\_intra\_cca** |
| No DRX | max(*reportInterval*, *rmtc-Periodicity*\*CSSFoutside\_gap,i) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, DRX cycle) \*CSSFoutside\_gap,i) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: CSSFoutside\_gap, i is a carrier specific scaling factor and is determined according to CSSF outside\_gap,i in 38.133 [6] clause 9.1.5.1 for measurement conducted outside measurement gap. | |

Table 10.4.1.0.3.2-5: Measurement period for intra-frequency Channel Occupancy measurements without measurement gaps when SMTC and RMTC are not overlapping (FR2-2)

|  |  |
| --- | --- |
| **Condition NOTE1,2** | **T RSSI\_measurement\_period\_intra\_cca** |
| No DRX | max(*reportInt*erval, Nintra-MO\**rmtc-Periodicity*) |
| DRX | max(*reportInt*erval, Nintra-MO\*max(*rmtc-Periodicity*, DRX cycle)) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: Nintra-MO is defined as the number of measurement objects that can be measured without gaps | |

Table 10.4.1.0.3.2-6: Measurement period for intra-frequency Channel Occupancy measurements with measurement gaps (FR2-2)

|  |  |
| --- | --- |
| **Condition NOTE1,2** | **T RSSI\_measurement\_period\_intra\_cca** |
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x CSSFintra) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle) x CSSFintra) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: CSSFintra is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in 38.133 [6] clause 9.1.5.2 for measurement conducted within measurement gaps. | |

If the UE requires measurement gaps to perform intra-frequency measurements, a single measurement gap pattern is used for all concurrent intra-frequency measurements, including intra-frequency RSSI measurements. The RSSI measurement duration and the measurement gap should be aligned, and the following additional condition should be fulfilled:

- Entire RSSI measurement duration should be contained in the measurement gap.

The channel occupancy measurement performed and reported according to this clause shall meet the channel occupancy measurement accuracy requirements in Clause 10.1.35.1. The reported channel occupancy measurement values contained in measurement reports shall be based on the measurement reporting range specified in TS 38.331 [13].

The normative reference for this requirement is TS 38.133 [6] clause 9.2A.7.2.

#### 10.4.1.1 EN-DC FR1 Event-triggered reporting tests on PSCC without gaps under non-DRX and CCA

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS

10.4.1.1.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 10.4.1.0.1.1 and 10.4.1.0.1.2.

10.4.1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting intra-freq measurements on shared channel access.

10.4.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.1.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.1.1.

10.4.1.1.4 Test description

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1) and two cells on the same carrier frequency with CCA transmitting SSBs in DBT windows according to DL CCA model: PSCell (Cell 2) and a neighbour cell (Cell 3). The test parameters for the three cells are given in Table 10.4.1.1.4.1-1 and 10.4.1.1.4.1-3 below. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

10.4.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.1.1.4.1-1.

Table 10.4.1.1.4.1-1: Supported test configurations for EN-DC FR1 Event-triggered reporting tests on PSCC without gaps under non-DRX and CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 10.4.1.1-1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.1.1-2 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.1.1.4.1-2.

Table 10.4.1.1.4.1-2: Initial conditions for EN-DC FR1 Event-triggered reporting tests on PSCC without gaps under non-DRX and CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.1.1.4.1-3.

2. Message contents are defined in clause 10.4.1.1.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR cells (PSCell and neighbour cell, respectively) with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 10.4.1.1.4.1-3: General test parameters for EN-DC FR1 Event-triggered reporting tests on PSCC without gaps under non-DRX and CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | Comment |
|  |  | configuration |  |  |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 |  |
| NR RF Channel Number |  | Config 1,2 | 1, 2 |  |
| Active cell |  | Config 1,2 | LTE Cell 1 (PCell) and  NR cell 2 with CCA (PScell) | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 2 with CCA. |
| Neighbour cell |  | Config 1,2 | NR cell 3 | NR cell 3 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1,2 | As specified in clause D.7.2.1 |  |
| UL CCA model |  | Config 1,2 | As specified in clause D.7.2.2 |  |
| A3-Offset | dB | Config 1,2 | -6 |  |
| Hysteresis | dB | Config 1,2 | 0 |  |
| CP length |  | Config 1,2 | Normal |  |
| TimeToTrigger | s | Config 1,2 | 0 |  |
| Filter coefficient |  | Config 1,2 | 0 | L3 filtering is not used |
| DRX |  | Config 1,2 | OFF | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2 | 3 μs | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3 μs | Synchronous cells. |
| T1 | s | Config 1,2 | 5 |  |
| T2 | s | Config 1,2 | 5 |  |

10.4.1.1.4.2 Test procedure

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 3. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity EN-DC*, *DC bearer MCG and SCG*, *Connected without release On* and *Test Mode On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to T1 in Table 10.4.1.1.5-1.

3. SS shall transmit an *RRCConnectionReconfiguration* message with event A3 with the corresponding offset according to Table 10.4.1.1.4.1-3.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 10.4.1.1.5-1. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 10.4.1.1.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delay measured from the beginning of time period T2 is less than [842ms], then the number of successful tests is increased by one. If the UE fails to report the event within the required measurement delay, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC PSCell release according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 3) mod 1008) for next iteration of the test procedure loop.

9. The SS then shall transmit *RRCConnectionReconfiguration* message with condition *MCG\_and\_SCG* according to TS 36.508 [25] Table 4.6.1-8 to add NR Cell 2 (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. If any the reconfiguration fails, switch off and on the UE and proceed with step 1.

10. Repeat steps 2-9 until the confidence level according to []Tables G.TBD in Annex G clause G.TBD is achieved.

10.4.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.1.1.4.3-1: Common Exception messages for EN-DC FR1 Event-triggered reporting tests on PSCC without gaps under non-DRX and CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-4 with A3-offset set as per Table 10.4.1.1.4.1-3  Table H.3.1-5  Table H.3.1-7  Table H.3.4-1  Table H.3.4-1a  Table H.3.4-2  Table H.3.4-3  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

10.4.1.1.5 Test requirements

Tables 10.4.1.1.4.1-3 and 10.4.1.1.5-1 define the primary level settings including test tolerances for EN-DC FR1 Event-triggered reporting tests on PSCC without gaps under non-DRX and CCA.

Table 10.4.1.1.5-1: Cell specific test parameters for EN-DC FR1 Event-triggered reporting tests on PSCC without gaps under non-DRX and CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | Cell 3 | |
|  | |  | configuration | T1 | T2 | T1 | T2 |
| NR RF Channel Number | |  | Config 1,2 | 2 | | 2 | |
| Duplex mode | |  | Config 1,2 | TDD | | | |
| BWchannel | | MHz | Config 1,2 | 40: NRB,c = 106 | | | |
| BWP BW | | MHz | Config 1,2 | 40: NRB,c = 106 | | | |
| TDD configuration | |  | Config 1,2 | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
| Initial DL BWP | |  | Config 1,2 | DLBWP.0.1 | | NA | |
| Initial UL BWP | |  | Config 1,2 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | |  | Config 1,2 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | |  | Config 1,2 | ULBWP.1.1 | | NA | |
| TRS configuration | |  | Config 1,2 | TRS.1.2 TDD | | NA | |
| OCNG Pattern | |  | Config 1,2 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1,2 | SR.1.1 CCA | | - | |
| CORESET Reference Channel | |  | Config 1,2 | CR.1.1 CCA | | - | |
| SSB parameters | Semi-static channel access Note 5,7 |  | Config 1,2 | SSB.1 CCA | | SSB.1 CCA | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | SSB.2 CCA | | SSB.2 CCA | |
| DBT window configuration | |  | Config 1,2 | DBT.1 | | DBT.1 | |
| SMTC configuration | |  | Config 1,2 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH | | kHz | Config 1,2 | 30 | | 30 | |
| DL CCA probability PCCA\_DL | Semi-static channel access Note 5,7 |  | Config 1,2 | PCCA\_DL=0.9375 | | PCCA\_DL=0.9375 | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | |
| UL CCA probability PCCA\_UL | Semi-static channel access Note 5,7 |  | Config 1,2 | PCCA\_UL=1 | | PCCA\_UL=1 | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | PCCA\_UL=1 | | PCCA\_UL=1 | |
| LCCA\_DL | |  | Config 1,2 | 12 | | 12 | |
| WCCA\_DL | | ms | Config 1,2 | TPSS/SSS\_sync\_intra\_cca | | TPSS/SSS\_sync\_intra\_cca | |
| EPRE ratio of PSS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz | Config 1,2 | -104+TT | | -104+TT | |
| Note2 | | dBm/SCS | Config 1,2 | -101+TT | | -101+TT | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -91+TT | -91+TT | -Infinity | -88+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT |
| IoNote3 | | dBm/38.16MHz | Config 1,2 | -58.49+TT | -58.49+TT | -63.94+TT | -56.15+TT |
| Propagation Condition | |  | Config 1,2 | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | |

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_intra\_without\_index\_CCA ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

Tidentify\_intra\_cca\_without\_index = (TPSS/SSS\_sync\_intra\_cca + T SSB\_measurement\_period\_intra\_cca) ms, where

TPSS/SSS\_sync\_intra\_cca: it is the time period used in PSS/SSS detection given in table 10.4.1.0.1.1-1.

T SSB\_measurement\_period\_intra\_cca: equal to a measurement period of SSB based measurement given in table 10.4.1.0.1.2-1.

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

#### 10.4.1.2 Void

#### 10.4.1.3 Void

#### 10.4.1.4 EN-DC FR1 Event-triggered reporting tests on PSCC with per-UE gaps under DRX and CCA

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS

10.4.1.4.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 10.4.1.0.2.1 and 10.4.1.0.2.2.

10.4.1.4.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier, supporting intra-freq measurements on shared channel access and long DRX.

10.4.1.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.1.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.1.4.

10.4.1.4.4 Test description

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1) and two cells on the same carrier frequency with CCA transmitting SSBs in DBT windows according to DL CCA model: PSCell (Cell 2) and a neighbour cell (Cell 3). The test parameters for the three cells are given in Table 10.4.1.4.4.1-1 and 10.4.1.4.4.1-3 below. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. Gap pattern #0 and DRX are configured on the UE.

10.4.1.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.1.4.4.1-1.

Table 10.4.1.4.4.1-1: Supported test configurations for EN-DC FR1 Event-triggered reporting tests on PSCC with per-UE gaps under DRX and CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 10.4.1.4-1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.1.4-2 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.1.4.4.1-2.

Table 10.4.1.4.4.1-2: Initial conditions for EN-DC FR1 Event-triggered reporting tests on PSCC with per-UE gaps under DRX and CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.1.4.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.1.4.4.1-3.

2. Message contents are defined in clause 10.4.1.4.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR cells (PSCell and neighbour cell, respectively) with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 10.4.1.4.4.1-3: General test parameters for EN-DC FR1 Event-triggered reporting tests on PSCC with per-UE gaps under DRX and CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | Comment |
|  |  | configuration |  |  |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 |  |
| NR RF Channel Number |  | Config 1,2 | 1, 2 |  |
| Active cell |  | Config 1,2 | LTE Cell 1 (PCell) and  NR cell 2 with CCA (PScell) | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 2 with CCA. |
| Neighbour cell |  | Config 1,2 | NR cell 3 | NR cell 3 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1,2 | As specified in clause D.7.2.1 |  |
| UL CCA model |  | Config 1,2 | As specified in clause D.7.2.2 |  |
| Measurement gap type |  | Config 1,2 | Per-UE gaps |  |
| Measurement gap repitition periodicity | ms | Config 1,2 | 40 |  |
| Measurement gap length | ms | Config 1,2 | 6 |  |
| Measurement gap offset | ms | Config 1,2 | 39 |  |
| A3-Offset | dB | Config 1,2 | -6 |  |
| Hysteresis | dB | Config 1,2 | 0 |  |
| CP length |  | Config 1,2 | Normal |  |
| TimeToTrigger | s | Config 1,2 | 0 |  |
| Filter coefficient |  | Config 1,2 | 0 | L3 filtering is not used |
| DRX |  | Config 1,2 | DRX.1 |  |
| Time offset between PCell and PSCell |  | Config 1,2 | 3 μs | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3 μs | Synchronous cells. |
| T1 | s | Config 1,2 | 5 |  |
| T2 | s | Config 1,2 | 5 |  |

10.4.1.4.4.2 Test procedure

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 3. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity EN-DC*, *DC bearer MCG and SCG*, *Connected without release On* and *Test Mode On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to T1 in Table 10.4.1.4.5-1.

3. SS shall transmit an *RRCConnectionReconfiguration* message with gap configuration and event A3 offset according to Table 10.4.1.4.4.1-3.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 10.4.1.1.5-1. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 10.4.1.4.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delay measured from the beginning of time period T2 is less than [842ms], then the number of successful tests is increased by one. If the UE fails to report the event within the required measurement delay, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC PSCell release according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 3) mod 1008) for next iteration of the test procedure loop.

9. The SS then shall transmit *RRCConnectionReconfiguration* message with condition *MCG\_and\_SCG* according to TS 36.508 [25] Table 4.6.1-8 to add NR Cell 2 (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. If any the reconfiguration fails, switch off and on the UE and proceed with step 1.

10. Repeat steps 2-9 until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

10.4.1.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.1.4.4.3-1: Common Exception messages for EN-DC FR1 Event-triggered reporting tests on PSCC with per-UE gaps under DRX and CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition GAP NEEDED  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-4 with A3-offset set as per Table 10.4.1.4.4.1-3  Table H.3.1-5  Table H.3.1-6 with Conditions gapUE, Pattern #0 and gap offset 39  Table H.3.1-7  Table H.3.4-1  Table H.3.4-1a  Table H.3.4-2  Table H.3.4-3  Table H.3.7-1 with condition DRX.1  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

10.4.1.4.5 Test requirements

Tables 10.4.1.4.4.1-3 and 10.4.1.4.5-1 define the primary level settings including test tolerances for EN-DC FR1 Event-triggered reporting tests on PSCC with per-UE gaps under DRX and CCA.

Table 10.4.1.4.5-1: Cell specific test parameters for EN-DC FR1 Event-triggered reporting tests on PSCC with per-UE gaps under DRX and CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | Cell 3 | |
|  | |  | configuration | T1 | T2 | T1 | T2 |
| NR RF Channel Number | |  | Config 1,2 | 2 | | 2 | |
| Duplex mode | |  | Config 1,2 | TDD | | | |
| BWchannel | | MHz | Config 1,2 | 40: NRB,c = 106 | | | |
| BWP BW | | MHz | Config 1,2 | 40: NRB,c = 106 | | | |
| TDD configuration | |  | Config 1,2 | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
| Initial DL BWP | |  | Config 1,2 | DLBWP.0.1 | | NA | |
| Initial UL BWP | |  | Config 1,2 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | |  | Config 1,2 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | |  | Config 1,2 | ULBWP.1.1 | | NA | |
| TRS configuration | |  | Config 1,2 | TRS.1.2 TDD | | NA | |
| OCNG Pattern | |  | Config 1,2 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1,2 | SR.1.1 CCA | | - | |
| CORESET Reference Channel | |  | Config 1,2 | CR.1.1 CCA | | - | |
| SSB parameters | Semi-static channel access Note 5,7 |  | Config 1,2 | SSB.1 CCA | | SSB.1 CCA | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | SSB.2 CCA | | SSB.2 CCA | |
| DBT window configuration | |  | Config 1,2 | DBT.1 | | DBT.1 | |
| SMTC configuration | |  | Config 1,2 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH | | kHz | Config 1,2 | 30 | | 30 | |
| DL CCA probability PCCA\_DL | Semi-static channel access Note 5,7 |  | Config 1,2 | PCCA\_DL=0.9375 | | PCCA\_DL=0.9375 | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | |
| UL CCA probability PCCA\_UL | Semi-static channel access Note 5,7 |  | Config 1,2 | PCCA\_UL=1 | | PCCA\_UL=1 | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | PCCA\_UL=1 | | PCCA\_UL=1 | |
| LCCA\_DL | |  | Config 1,2 | 12 | | 12 | |
| WCCA\_DL | | ms | Config 1,2 | TPSS/SSS\_sync\_intra\_cca | | TPSS/SSS\_sync\_intra\_cca | |
| EPRE ratio of PSS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz | Config 1,2 | -104+TT | | -104+TT | |
| Note2 | | dBm/SCS | Config 1,2 | -101+TT | | -101+TT | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -91+TT | -91+TT | -Infinity | -88+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT |
| IoNote3 | | dBm/38.16MHz | Config 1,2 | -58.49+TT | -58.49+TT | -63.94+TT | -56.15+TT |
| Propagation Condition | |  | Config 1,2 | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | |

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_intra\_without\_index\_CCA ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

Tidentify\_intra\_cca\_without\_index = (TPSS/SSS\_sync\_intra\_cca + T SSB\_measurement\_period\_intra\_cca) ms, where

TPSS/SSS\_sync\_intra\_cca: it is the time period used in PSS/SSS detection given in table 10.4.1.0.1.1-1.

T SSB\_measurement\_period\_intra\_cca: equal to a measurement period of SSB based measurement given in table 10.4.1.0.1.2-1.

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

#### 10.4.1.5

#### 10.4.1.6

#### 10.4.1.7

#### 10.4.1.8

### 10.4.2 Inter-frequency measurements

#### 10.4.2.0 Minimum conformance requirements

10.4.2.0.1 Minimum conformance requirements for inter-frequency measurements

10.4.2.0.1.1 Inter-frequency cell identification

When measurement gaps are provided, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable inter-frequency cell within Tidentify\_inter\_cca\_without\_index if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured). Otherwise UE shall be able to identify a new detectable inter-frequency cell, in carrier frequencies with CCA, within Tidentify\_inter\_cca\_with\_index. The UE shall be able to identify a new detectable inter-frequency SS block, in carrier frequencies with CCA, of an already detected cell within Tidentify\_inter\_cca\_without\_index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms

Tidentify\_inter\_cca\_with\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca + TSSB\_time\_index\_inter\_cca) ms

Where:

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in Table 10.4.2.0.1.1-1 and Table 10.4.2.0.1.1-3.

TSSB\_time\_index\_inter\_cca: it is the time period used to acquire the index of the SSB being measured given in Table 10.4.2.0.1.1-2 and Table 10.4.2.0.1.1-4.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in Table 10.4.2.0.1.2-1 and 10.4.2.0.1.2-2.

CSSFinter : it is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in 38.133 [6] clause 9.1.5.2 for measurement conducted within measurement gaps.

Mpss/sss\_sync\_inter\_CCA: For a UE supporting FR2-2 power class 1, Mpss/sss\_sync\_inter CCA = 96. For a UE supporting FR2-2 power class 2, Mpss/sss\_sync\_inter CCA = 60. For a UE supporting FR2-2 power class 3, Mpss/sss\_sync\_inter CCA = 60.

MSSB\_index\_inter\_CCA: For a UE supporting FR2-2 power class 2 or 3, MSSB\_index\_inter CCA = 48 samples. For a UE supporting FR2 power class 1, MSSB\_index\_inter CCA = 72 samples

Mmeas\_period\_inter\_CCA: For a UE supporting FR2-2 power class 1, Mmeas\_period\_inter CCA = 96. For a UE supporting FR2-2 power class 2, Mmeas\_period\_inter CCA = 60. For a UE supporting FR2-2 power class 3, Mmeas\_period\_inter CCA = 60

Table 10.4.2.0.1.1-1: Time period for PSS/SSS detection (FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | TPSS/SSS\_sync\_inter\_cca |
| No DRX | max(600ms, (8+LPSS/SSS,gaps) x max(MGRP, SMTC period)) x CSSFinter |
| DRX cycle ≤ 320ms | max(600ms, ceil((8+LPSS/SSS,gaps)x1.5) x max(MGRP, SMTC period, DRX cycle)) x CSSFinter |
| DRX cycle > 320ms | (8+LPSS/SSS,gaps) x DRX cycle x CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in TS 38.133 [6] clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in TS 38.133 [6] clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: When DRX is not configured, LPSS/SSS,gaps is the number of SMTC occasions not available at the UE during TPSS/SSS\_sync\_inter\_cca, for PSS/SSS detection, where LPSS/SSS,gaps ≤ LPSS/SSS,gaps,max. When DRX is configured, LPSS/SSS,gaps is the number of DRX cycles in which at least one SMTC occasion is not available at the UE during TPSS/SSS\_sync\_inter\_cca, for PSS/SSS detection, where LPSS/SSS,gaps ≤ LPSS/SSS,gaps,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP. FFS: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSFinter.  NOTE 4: LPSS/SSS,gaps,max = 12 for max(DRX cycle, SMTC period, MGRP) ≤ 40 ms LPSS/SSS,gaps,max = 8 for 40 ms < max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and LPSS/SSS,gaps,max = 5 for DRX cycle > 320 ms. | |

Upon exceeding LPSS/SSS,gaps,max, the UE is not required to meet the corresponding PSS/SSS detection requirement. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

Table 10.4.2.0.1.1-2: Time period for time index detection (FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | TSSB\_time\_index\_inter\_cca |
| No DRX | max(120ms, (3+ Lind,gaps) x max(MGRP, SMTC period)) x CSSFinter |
| DRX cycle ≤ 320ms | max(120ms, ceil((3+ Lind,gaps) x 1.5) x max(MGRP, SMTC period, DRX cycle)) x CSSFinter |
| DRX cycle > 320ms | (3 + Lind,gaps) x DRX cycle x CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in TS 38.133 [6] clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in TS 38.133 [6] clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: When DRX is not configured, Lind,gaps is the number of SMTC occasions not available at the UE during TSSB\_time\_index\_inter\_cca for time index identification, where Lind,gaps ≤ Lind,gaps,max. When DRX is configured, Lind,gaps is the number of DRX cycles in which at least one SMTC occasion is not available at the UE during TSSB\_time\_index\_inter\_cca for time index identification, where Lind,gaps ≤ Lind,gaps,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP. FFS: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSFinter.  NOTE 4: Lind,gaps,max = 5 for max(DRX cycle, SMTC period, MGRP) ≤ 40 ms, Lind,gaps,max = 3 for 40 ms < max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and Lind,gaps,max = 2 for DRX cycle > 320 ms. | |

The UE shall restart the time index detection upon exceeding Lind,gaps,max. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

Table 10.4.2.0.1.1-3: Time period for PSS/SSS detection, (Frequency range FR2-2)

|  |  |
| --- | --- |
| **Condition NOTE** | **TPSS/SSS\_sync\_inter** |
| No DRX | Max(600ms, ceil(Mpss/sss\_sync\_inter\_CCA+ [NRxBeam] x LPSS/SSS,gaps))× Max(MGRP, SMTC period)) × CSSFinter |
| DRX cycle ≤ 320ms | Max(600ms, ceil(1.5 × Mpss/sss\_sync\_inter\_CCA+ [NRxBeam] x LPSS/SSS,gaps)) × Max(MGRP, SMTC period, DRX cycle)) × CSSFinter |
| DRX cycle > 320ms | Ceil(Mpss/sss\_sync\_inter\_CCA+ [NRxBeam] x LPSS/SSS,gaps)× DRX cycle × CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in TS 38.133 [6] clause 3.6.1  NOTE 2: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 3: When DRX is not configured, LPSS/SSS,gaps is the number of SMTC occasion groups not available at the UE during TPSS/SSS\_sync\_inter\_CCA for PSS/SSS detection, where LPSS/SSS,gaps < LPSS/SSS,gaps,max. A SMTC occasion group consists of NRxBeam consecutive SMTC occasions. An SMTC occasion group is not available, when at least one SMTC occasion in the group is not transmitted by the gNB. When DRX is configured, LPSS/SSS is the number of [DRX cycle groups] in which at least one SMTC occasion is not available at the UE during TPSS/SSS\_sync\_inter\_CCA for PSS/SSS detection, where LPSS/SSS,gaps < LPSS/SSS,gaps,max . [A DRX occasion group consists of NRxBeam consecutive DRX cycles. A DRX occasion group occasion group is not available, when at least one SMTC occasion in the group is not transmitted by the gNB.] When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle.  NOTE 4: LPSS/SSS,gaps = 12 for max(DRX cycle, SMTC period, MGRP) ≤ 40 ms LPSS/SSS,gaps = 8 for 40 ms < max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and LPSS/SSS,gaps = 5 for DRX cycle > 320 ms | |

Upon exceeding LPSS/SSS,gaps,max, the UE is not required to meet the corresponding PSS/SSS detection requirement. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

Table 10.4.2.0.1.1-4: Time period for time index detection (FR2-2)

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | TSSB\_time\_index\_inter\_cca |
| No DRX | max(120ms, ceil(MSSB\_index\_inter\_CCA + [NRxBeam] x Lind,gaps) x max(MGRP, SMTC period)) x CSSFinter |
| DRX cycle ≤ 320ms | max(120ms, ceil(MSSB\_index\_inter\_CCA + [NRxBeam] x Lind,gaps) x 1.5) x max(MGRP, SMTC period, DRX cycle)) x CSSFinter |
| DRX cycle > 320ms | ceil(MSSB\_index\_inter\_CCA + [NRxBeam] x Lind,gaps) x DRX cycle x CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in TS 38.133 [6] clause 3.6.1  NOTE 2: When DRX is not configured, Lind,gaps is the number of SMTC occasions not available at the UE during **TSSB\_time\_index\_inter\_cca**, for for time index identification, where Lind,gaps ≤ Lind,gaps,max. When DRX is configured, Lind,gaps is the number of DRX cycles in which at least one SMTC occasion is not available at the UE during **TSSB\_time\_index\_inter\_cca**, for for time index identification, where Lind,gaps ≤ Lind,gaps,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP. FFS: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSFinter.  NOTE 3: Lind,gaps,max = [5] for max(DRX cycle, SMTC period, MGRP) ≤ 40 ms, Lind,gaps,max = [3] for 40 ms < max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and Lind,gaps,max = [2] for DRX cycle > 320 ms. | |

The UE shall restart the time index detection upon exceeding Lind,gaps,max. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

The normative reference for this requirement is TS 38.133 [6] clause 9.3A.4.

10.4.2.0.1.2 Inter-frequency measurements

When measurement gaps are provided for inter-frequency measurements in carrier frequencies with CCA, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting SS-RSRP, SS-RSRQ and SS-SINR measurements to higher layers with measurement accuracy as specified in 38.133 [6] clauses 10.1.28, 10.1.30 and 10.1.32, respectively, as shown in Table 10.4.2.0.1.2-1:

Table 10.4.2.0.1.2-1: Measurement period for inter-frequency measurements with gaps

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | T SSB\_measurement\_period\_inter\_cca |
| No DRX | max(200ms, (8+ Lmeas) x max(MGRP, SMTC period)) x CSSFinter |
| DRX cycle ≤ 320ms | max(200ms, ceil((8+ Lmeas) x 1.5) x max(MGRP, SMTC period, DRX cycle)) x CSSFinter |
| DRX cycle > 320ms | (8+ Lmeas) x DRX cycle x CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in TS 38.133 [6] clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in TS 38.133 [6] clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: When DRX is not configured, Lmeas is the number of SMTC occasions not available at the UE during T SSB\_measurement\_period\_NR\_cca, for inter-frequency measurements with gaps, where Lmeas ≤ Lmeas,max. When DRX is configured, Lmeas is the number of DRX cycles in which at least one SMTC occasion is not available at the UE during T SSB\_measurement\_period\_NR\_cca, for inter-frequency measurements with gaps, where Lmeas ≤ Lmeas,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP. FFS: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSFinter.  NOTE 4: Lmeas,max = 12 for max(DRX cycle, SMTC period, MGRP) ≤ 40 ms, Lmeas,max = 8 for 40 ms < max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and Lmeas,max = 5 for DRX cycle > 320 ms. | |

The UE shall restart the measurement upon exceeding Lmeas,max. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

The UE shall stop the measurement attempts on the SSB of a cell and perform the detection procedure again, like for any other SSB, when the following conditions are met:

- Lmeas > Lmeas,max, and

- The time period of unsuccessful measurement attempts exceeds the maximum time required for the cell to remain known as defined in TS 38.133 [6] clause 9.3A.6.3.

Table 10.4.2.0.1.2-2: Measurement period for inter-frequency measurements with gaps (FR2-2)

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | T SSB\_measurement\_period\_inter\_cca |
| No DRX | max(200ms, ceil(Mmeas\_period\_inter\_CCA + [NRxBeam] x Lmeas,gaps) x max(MGRP, SMTC period)) x CSSFinter |
| DRX cycle ≤ 320ms | max(200ms, ceil(Mmeas\_period\_inter\_CCA + [NRxBeam] x Lmeas,gaps) x 1.5) x max(MGRP, SMTC period, DRX cycle)) x CSSFinter |
| DRX cycle > 320ms | ceil(Mmeas\_period\_inter\_CCA + [NRxBeam] x Lmeas,gaps) x DRX cycle x CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in TS 38.133 [6] clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in TS 38.133 [6] clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: When DRX is not configured, Lmeas,gaps is the number of SMTC occasions not available at the UE during T SSB\_measurement\_period\_inter\_cca, for inter-frequency measurements with gaps, where Lmeas,gaps ≤ Lmeas,gaps,max. When DRX is configured, Lmeas,gaps is the number of DRX cycles in which at least one SMTC occasion is not available at the UE during T SSB\_measurement\_period\_NR\_cca, for inter-frequency measurements with gaps, where Lmeas,gaps ≤ Lmeas,gaps,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP. FFS: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSFinter.  NOTE 4: Lmeas,gaps,max = [12] for max(DRX cycle, SMTC period, MGRP) ≤ 40 ms, Lmeas,gaps,max = [8] for 40 ms < max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and Lmeas,gaps,max = [5] for DRX cycle > 320 ms. | |

The UE shall restart the measurement upon exceeding Lmeas,gap,max. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

The normative reference for this requirement is TS 38.133 [6] clause 9.3A.5.

10.4.2.0.1.3 Inter-frequency RSSI measurements

An RSSI measurement is defined as an inter-frequency measurement provided that the RSSI measurement bandwidth is not contained within the current carrier bandwidth of the UE.

The UE physical layer shall be capable of performing the RSSI measurements, defined in TS 38.215 [10] on one or more inter-frequency carriers operating with CCA, TS 37.213 [37], if the carrier(s) are indicated by higher layers [13], and report the RSSI measurements to higher layers. The UE physical layer shall provide to higher layers a single RSSI sample for each OFDM symbol within each configured RSSI measurement duration [13] occurring with a configured RSSI measurement timing configuration periodicity [13], *rmtc-Periodicity*. The requirements apply if *rmtc-SubframeOffset* [13] is configured.

For performing inter-frequency RSSI measurement in FR2-2,

- If a UE has serving cell in FR2-2,

- If the TCI state is provided in RMTC configuration of FR2-2, the UE shall assume the configured RSSI measurement resources are QCL-ed with TypeD to the DL RS associated with the TCI state provided in the RMTC configuration. The UE does not expect to be configured with an explicit TCI-state in RMTC-Config with a reference serving cell in FR1 or FR2-1. If no TCI state is provided in the RMTC configuration, the UE shall assume the configured RSSI measurement resources are QCL-ed with TypeD to one of the latest received PDSCH and the latest monitored CORESET in the active BWP of a serving carrier in FR2-2.

- If a UE has no serving cell in FR2-2,

- The UE does not expect that a TCI state is provided in RMTC configuration. It is up to UE implementation how to determine the spatial domain filter for the inter-frequency RSSI measurement in FR2-2, and no requirements are defined.

For RSSI measurement in FR2-2 with SCS of 480 kHz or 960 kHz, the RSSI measurement results shall be derived based on symbols configured by RMTC except for the first symbol and the last symbol in RMTC, and there is no requirements when *measDurationSymbols* is configured as 1.

Table 10.4.2.0.1.3-1: Measurement period for inter-frequency RSSI measurements with gaps

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | T RSSI\_measurement\_period\_inter\_cca |
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x CSSFinter) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle) x CSSFinter) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: CSSFinter is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in 38.133 [6] clause 9.1.5.2 for measurement conducted within measurement gaps. | |

If the UE requires measurement gaps to perform inter-frequency measurements, a single measurement gap pattern is used for all concurrent inter-frequency measurements, including inter-frequency RSSI measurements. The RSSI measurement duration and the measurement gap shall be aligned, and the following additional condition shall be fulfilled:

- Entire RSSI measurement duration is contained in the measurement gap.

The RSSI measurement performed and reported according to this clause shall meet the RSSI measurement accuracy requirement in 38.133 [6] Clause 10.1.34.2. The reported RSSI measurement values contained in measurement reports shall be based on the measurement report mapping requirements specified in 38.133 [6] Clause 10.1.34.3.

The normative reference for this requirement is TS 38.133 [6] clause 9.3A.8.

10.4.2.0.2 Minimum conformance requirements for channel occupancy measurements

10.4.2.0.2.1 Channel occupancy measurement reporting

The UE shall be capable of estimating the channel occupancy on one or more carrier frequencies indicated by higher layers [2], based on RSSI samples provided by the physical layer. The requirements apply if *rmtc-SubframeOffset* [2] is configured.

Table 10.4.2.0.2.1-1: Measurement period for inter-frequency Channel Occupancy measurements with gaps

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | T CO\_measurement\_period\_inter\_cca |
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x CSSFinter) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle) x CSSFinter) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: CSSFinter is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in 38.133 [6] clause 9.1.5.2 for measurement conducted within measurement gaps. | |

If the UE requires measurement gaps to perform inter-frequency measurements, a single measurement gap pattern is used for all concurrent inter-frequency measurements, including inter-frequency channel occupancy measurements. The RSSI measurement duration used for channel occupancy measurement and the measurement gap shall be aligned, and the following additional condition shall be fulfilled:

- Entire RSSI measurement duration is contained in the measurement gap.

The channel occupancy measurement performed and reported according to this clause shall meet the channel occupancy measurement accuracy requirements in 38.133 [6] Clause 10.1.35.2. The reported channel occupancy measurement values contained in measurement reports shall be based on the measurement reporting range specified in TS 38.331 [13].

The normative reference for this requirement is TS 38.133 [6] clause 9.3A.9.

#### 10.4.2.1 EN-DC FR1-FR1 RSSI measurement reporting under CCA

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure need to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements, general test parameters and cell-specific test parameters are still FFS or TBD in 38.133 [6]

10.4.2.1.1 Test purpose

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the inter-frequency RSSI measurement reporting requirements in Section 10.4.2.0.1.1.

10.4.2.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting RSSI measurements and channel occupancy on shared channel access.

10.4.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.2.1.

10.4.2.1.4 Test description

Two cells are deployed in the test, which are E-UTRAN PCell (Cell 1) on a licensed band and PSCell (Cell 2) with CCA transmitting SSBs in DBT windows according to DL CCA model. The test parameters for the three cells are given in Table 10.4.2.1.4.1-1 and 10.4.2.1.4.1-3 below. The RSSI measurement is performed on an inter-frequency under CCA.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

10.4.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.2.1.4.1-1.

Table 10.4.2.1.4.1-1: Supported test configurations for Inter-frequency RSSI measurement reporting under CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 10.4.2.1-1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.4.2.1-2 | LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| NOTE: The UE is only required to pass in one of the supported test configurations above. | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.2.1.4.1-2.

Table 10.4.2.1.4.1-2: Initial conditions for Inter-frequency RSSI measurement reporting under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.2.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.2.1.4.1-3.

2. Message contents are defined in clause 10.4.2.1.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is NR cell (PSCell) with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 10.4.2.1.4.1-3: General test parameters for Inter-frequency RSSI measurement reporting under CCA

TBD

10.4.2.1.4.2 Test procedure

TBD

10.4.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

FFS

10.4.2.1.5 Test requirements

Tables 10.4.2.1.4.1-3 and 10.4.2.1.5-1 define the primary level settings including test tolerances for Inter-frequency RSSI measurement reporting under CCA.

Table 10.4.2.1.5-1: Cell specific test parameters for Inter-frequency RSSI measurement reporting under CCA

TBD

#### 10.4.2.2 EN-DC FR1-FR1 Channel occupancy measurement reporting under CCA

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure need to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements, general test parameters and cell-specific test parameters are still FFS or TBD in 38.133 [6]

10.4.2.2.1 Test purpose

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the inter-frequency RSSI measurement reporting requirements in Section 10.4.2.0.2.1.

10.4.2.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting RSSI measurements and channel occupancy on shared channel access.

10.4.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.2.2.

10.4.2.2.4 Test description

Two cells are deployed in the test, which are E-UTRAN PCell (Cell 1) on a licensed band and PSCell (Cell 2) with CCA transmitting SSBs in DBT windows according to DL CCA model. The test parameters for the three cells are given in Table 10.4.2.2.4.1-1 and 10.4.2.2.4.1-3 below. The channel occupancy measurement is performed on an inter-frequency under CCA.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

10.4.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.2.2.4.1-1.

Table 10.4.2.2.4.1-1: Supported test configurations for Inter-frequency Channel occupancy measurement reporting under CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 10.4.2.2-1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.4.2.2-2 | LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| NOTE: The UE is only required to pass in one of the supported test configurations above. | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.2.2.4.1-2.

Table 10.4.2.2.4.1-2: Initial conditions for Inter-frequency Channel occupancy measurement reporting under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.2.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.2.2.4.1-3.

2. Message contents are defined in clause 10.4.2.2.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is NR cell (PSCell) with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 10.4.2.2.4.1-3: General test parameters for Inter-frequency RSSI measurement reporting under CCA

TBD

10.4.2.2.4.2 Test procedure

TBD

10.4.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

FFS

10.4.2.2.5 Test requirements

Tables 10.4.2.2.4.1-3 and 10.4.2.2.5-1 define the primary level settings including test tolerances for Inter-frequency RSSI measurement reporting under CCA.

Table 10.4.2.2.5-1: Cell specific test parameters for Inter-frequency RSSI measurement reporting under CCA

TBD

#### 10.4.2.3 EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is not used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS

10.4.2.3.1 Test purpose

The purpose of the test is to verify that the UE makes correct reporting of an event in non-DRX without SSB time index detection and with CCA. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clauses 10.4.2.0.1.1 and 10.4.2.0.1.2.

10.4.2.3.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC and RRM measurements with a shared spectrum NR carrier. Test 2 is applicable only to UEs supporting per-FR gap (*IndependentGapConfig*, as defined in TS 38.306 [11]) and Gap Pattern Id 4, otherwise Test 1 is applicable.

10.4.2.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.2.3.

10.4.2.3.4 Test description

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test configurations and parameters are given in Tables 10.4.2.3.4.1-1, 10.4.2.3.4.1-2, and 10.4.2.3.4.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table 10.4.2.3.4.1-3 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table 10.4.2.3.4.1-3 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise, it is only required to pass test 1.

10.4.2.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.2.3.4.1-1.

Table 10.4.2.3.4.1-1: Supported test configurations for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is not used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.2.3-1 | E-UTRAN cell: LTE FDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.3-2 | E-UTRAN cell: LTE TDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.2.3.4.1-2.

Table 10.4.2.3.4.1-2: Initial conditions for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is not used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.2.3.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT Part. and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.2.3.4.1-3.

2. Message contents are defined in clause 10.4.2.3.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR cells (PSCell and neighbour cell, respectively) in different frequencies with the power levels set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is switched off during the initial connection setup.

Table 10.4.2.3.4.1-3: General test parameters for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is not used

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | Comment |
|  |  | configuration | Test 1 | Test 2 |  |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 | | One E-UTRAN carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cell |  | Config 1,2 | LTE Cell 1 (PCell) and NR cell 2 with CCA (PScell) | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 with CCA is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell 3 | | NR cell 3 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1,2 | As specified in clause D.7.2.1 | |  |
| UL CCA model |  | Config 1,2 | As specified in clause D.7.2.2 | |  |
| Gap Pattern Id |  | Config 1,2 | 0 | 4 | As specified in TS 38.133 [6] clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2 | -6 | |  |
| Hysteresis | dB | Config 1,2 | 0 | |  |
| CP length |  | Config 1,2 | Normal | |  |
| TimeToTrigger | s | Config 1,2 | 0 | |  |
| Filter coefficient |  | Config 1,2 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2 | OFF | | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2 | 3 μs | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3 μs | | Synchronous cells. |
| T1 | s | Config 1,2 | 5 | |  |
| T2 | s | Config 1,2 | 1.7 | 1.7 |  |

10.4.2.3.4.2 Test procedure

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test. The SS shall provide sufficient UL grants to the UE such that no SR is required for measurement reporting.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to T1 in Table 10.4.2.3.5-1.

3. The SS shall transmit an *RRCConnectionReconfiguration* message with event A3 configured on Cell 1.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 10.4.2.3.5-1. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 10.4.2.3.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delays measured from the beginning of time period T2 is less than [1602] ms for Test1 or [1002] ms for Test2, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS shall transmit *RRCConnectionReconfiguration* message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. If either of the reconfiguration in step 7 or step 9 fails, SS switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.

10. Repeat step 2-9 until the confidence level according to Tables G.TBD in Annex G clause G.TBD is achieved.

10.4.2.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.2.3.4.3-1: Common Exception messages for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is not used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition INTER-FREQ  Table H.3.1-4 with A3-offset = -6dB  Table H.3.1-5  Table H.3.1-7 with Condition INTER-FREQ  Table H.3.4-1a  Table H.3.4-2  Table H.3.4-3  Table H.3.4-4 with Condition gapUE (Test 1), or gapFR1 (Test 2)  Table H.3.4-5 with Condition Pattern #0 and gap offset = 9 (Test 1), or Pattern #4 and gap offset = 9 (Test 2)  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access |
| Specific message contents exceptions for Test Configuration 10.4.2.3-1 and 10.4.2.3-2 | Table H.3.1-3 with Conditions INTER-FREQ MO and Synchronous cells  Table 7.3.1-3 in TS 38.508-1 [14] with condition SMTC.4 |

10.4.2.3.5 Test requirements

Table 10.4.2.3.5-1 defines the primary level settings including test tolerances for all tests for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is not used.

Table 10.4.2.3.5-1: Cell specific test parameters for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is not used

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | Cell 3 | |
|  | |  | configuration | T1 | T2 | T1 | T2 |
| NR RF Channel Number | |  | Config 1,2 | 1 | | 2 | |
| Duplex mode | |  | Config 1,2 | TDD | | | |
| BWchannel | | MHz | Config 1,2 | 40: NRB,c = 106 | | | |
| BWP BW | | MHz | Config 1,2 | 40: NRB,c = 106 | | | |
| TDD configuration | |  | Config 1,2 | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
| Initial DL BWP | |  | Config 1,2 | DLBWP.0.1 | | NA | |
| Initial UL BWP | |  | Config 1,2 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | |  | Config 1,2 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | |  | Config 1,2 | ULBWP.1.1 | | NA | |
| TRS configuration | |  | Config 1,2 | TRS.1.2 TDD | | NA | |
| OCNG Patterns | |  | Config 1,2 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1,2 | SR.1.1 CCA | | - | |
| CORESET Reference Channel | |  | Config 1,2 | CR.1.1 CCA | | - | |
| SSB parameters | Semi-static channel access Note 5,7 |  | Config 1,2 | SSB.1 CCA | | SSB.1 CCA | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | SSB.2 CCA | | SSB.2 CCA | |
| DBT window configuration | |  | Config 1,2 | As defined in A.12.1-1 | | As defined in A.12.1-1 | |
| SMTC configuration | |  | Config 1,2 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH | | kHz | Config 1,2 | 30 | | 30 | |
| DL CCA probability PCCA\_DL | Semi-static channel access Note 5,7 |  | Config 1,2 | PCCA\_DL=0.9375 | | PCCA\_DL=0.9375 | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | |
| UL CCA probability PCCA\_UL | Semi-static channel access Note 5,7 |  | Config 1,2 | PCCA\_UL=1 | | PCCA\_UL=1 | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | PCCA\_UL=1 | | PCCA\_UL=1 | |
| LCCA\_DL | |  | Config 1,2 | 12 | | 12 | |
| WCCA\_DL | | ms | Config 1,2 | TPSS/SSS\_sync\_inter\_cca | | TPSS/SSS\_sync\_inter\_cca | |
| EPRE ratio of PSS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz | Config 1,2 | -104+TT | | -104+TT | |
| Note2 | | dBm/SCS | Config 1,2 | -101+TT | | -101+TT | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -91+TT | -91+TT | -Infinity | -88+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT |
| IoNote3 | | dBm/38.16MHz | Config 1,2 | -58.49+TT | -58.49+TT | -63.94+TT | -56.15+TT |
| Propagation Condition | |  | Config 1,2 | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table Table 10.4.2.0.1.1-1.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table Table 10.4.2.0.1.2-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

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

#### 10.4.2.4 EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS

10.4.2.4.1 Test purpose

The purpose of the test is to verify that the UE makes correct reporting of an event in DRX without SSB time index detection and with CCA. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clauses 10.4.2.0.1.1 and 10.4.2.0.1.2.

10.4.2.4.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC and RRM measurements with a shared spectrum NR carrier, and long DRX cycle. Tests 3 and 4 are applicable only to UEs supporting per-FR gap (*IndependentGapConfig*, as defined in TS 38.306 [11]) and Gap Pattern Id 4, otherwise Tests 1 and 2 are applicable.

10.4.2.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.2.4.

10.4.2.4.4 Test description

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters and configurations are given in Tables 10.4.2.4.4.1-1, 10.4.2.4.4.1-2, 10.4.2.4.4.1-3, 10.4.2.4.5-2 and 10.4.2.4.5-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table 10.4.2.4.4.1-3 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table 10.4.2.4.4.1-3 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise, it is only required to pass test 1&2.

10.4.2.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.2.4.4.1-1.

Table 10.4.2.4.4.1-1: Supported test configurations for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.2.4-1 | E-UTRAN cell: LTE FDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.4-2 | E-UTRAN cell: LTE TDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.2.4.4.1-2.

Table 10.4.2.4.4.1-2: Initial conditions for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.2.4.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT Part. and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.2.4.4.1-3.

2. Message contents are defined in clause 10.4.2.4.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR cells (PSCell and neighbour cell, respectively) in different frequencies with the power levels set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is switched off during the initial connection setup.

Table 10.4.2.4.4.1-3: General test parameters for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is used

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | | | Comment |
|  |  | configuration | Test 1 | Test 2 | Test 3 | Test 4 |  |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 | | | | One E-UTRAN carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cell |  | Config 1,2 | LTE Cell 1 (PCell) and NR cell 2 with CCA (PScell) | | | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 with CCA is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1,2 | As specified in clause D.7.2.1 | | | |  |
| UL CCA model |  | Config 1,2 | As specified in clause D.7.2.2 | | | |  |
| Gap Pattern Id |  | Config 1,2 | 0 | | 4 | | As specified in TS 38.133 [6] clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2 | -6 | | | |  |
| Hysteresis | dB | Config 1,2 | 0 | | | |  |
| CP length |  | Config 1,2 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2 | 0 | | | |  |
| Filter coefficient |  | Config 1,2 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2 | DRX.1 | DRX.2 | DRX.1 | DRX.2 |  |
| Time offset between PCell and PSCell |  | Config 1,2 | 3 μs | | | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3 μs | | | | Synchronous cells. |
| T1 | s | Config 1,2 | 5 | | | |  |
| T2 | s | Config 1,2 | 2.5 | 17 | 2.5 | 17 |  |

10.4.2.4.4.2 Test procedure

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

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

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to T1 in Table 10.4.2.4.5-1.

3. The SS shall transmit an *RRCConnectionReconfiguration* message with event A3 configured on Cell 1.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 10.4.2.4.5-1. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 10.4.2.4.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delays measured from the beginning of time period T2 is less than [2402] ms for Test 1 and Test3 or [16642] ms for Test2 and Test 4, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS shall transmit *RRCConnectionReconfiguration* message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. If either of the reconfiguration in step 7 or step 9 fails, SS switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.

10. Repeat step 2-9 until the confidence level according to Tables G.TBD in Annex G clause G.TBD is achieved.

11. Repeat steps 1-10 for each Test in Tables 10.4.2.4.4.1-3 and 10.4.2.4.5-1 as appropriate.

10.4.2.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.2.4.4.3-1: Common Exception messages for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition INTER-FREQ  Table H.3.1-4 with A3-offset = -6dB  Table H.3.1-5  Table H.3.1-7 with Condition INTER-FREQ  Table H.3.4-1a  Table H.3.4-2  Table H.3.4-3  Table H.3.4-4 with Condition gapUE (Test 1, Test 2), or gapFR1 (Test 3, Test 4)  Table H.3.4-5 with Condition Pattern #0 and gap offset = 9 (Test 1, Test 2), or Pattern #4 and gap offset = 9 (Test 3, Test 4)  Table H.3.7-1 with Condition Gap, INTER-FREQ, DRX.1 (Test 1, Test 3) and DRX.2 (Test 2, Test 4)  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access |
| Specific message contents exceptions for Test Configuration 10.4.2.4-1 and 10.4.2.4-2 | Table H.3.1-3 with Conditions INTER-FREQ MO and Synchronous cells  Table 7.3.1-3 in TS 38.508-1 [14] with condition SMTC.4 |

10.4.2.4.5 Test requirements

Table 10.4.2.4.5-1 defines the primary level settings including test tolerances for all tests for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is used.

Table 10.4.2.4.5-1: Cell specific test parameters for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is used

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | | | Cell 3 | | | |
|  | |  | configuration | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| NR RF Channel Number | |  | Config 1,2 | 1 | | | | 2 | | | |
| Duplex mode | |  | Config 1,2 | TDD | | | | | | | |
| BWchannel | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | | | | |
| BWP BW | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | | | | |
| TDD configuration | |  | Config 1,2 | TDDConf.1.1 CCA | | | | TDDConf.1.1 CCA | | | |
| Initial DL BWP | |  | Config 1,2 | DLBWP.0.1 | | | | NA | | | |
| Initial UL BWP | |  | Config 1,2 | ULBWP.0.1 | | | | NA | | | |
| Dedicated DL BWP | |  | Config 1,2 | DLBWP.1.1 | | | | NA | | | |
| Dedicated UL BWP | |  | Config 1,2 | ULBWP.1.1 | | | | NA | | | |
| TRS configuration | |  | Config 1,2 | TRS.1.2 TDD | | | | NA | | | |
| OCNG Patterns | |  | Config 1,2 | OP.1 | | | | OP.1 | | | |
| PDSCH Reference | |  | Config 1,2 | SR.1.1 CCA | | | | - | | | |
| CORESET Reference Channel | |  | Config 1,2 | CR.1.1 CCA | | | | - | | | |
| SSB parameters | Semi-static channel access Note 5,7 |  | Config 1,2 | SSB.1 CCA | | | | SSB.1 CCA | | | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | SSB.2 CCA | | | | SSB.2 CCA | | | |
| DBT window configuration | |  | Config 1,2 | As defined in A.12.1-1 | | | | As defined in A.12.1-1 | | | |
| SMTC configuration | |  | Config 1,2 | SMTC.1 | | | | SMTC.4 | | | |
| PDSCH/PDCCH | | kHz | Config 1,2 | 30 | | | | 30 | | | |
| DL CCA probability PCCA\_DL | Semi-static channel access Note 5,7 |  | Config 1,2 | PCCA\_DL=0.9375 | | | | PCCA\_DL=0.9375 | | | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | |
| UL CCA probability PCCA\_UL | Semi-static channel access Note 5,7 |  | Config 1,2 | PCCA\_UL=1 | | | | PCCA\_UL=1 | | | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | PCCA\_UL=1 | | | | PCCA\_UL=1 | | | |
| LCCA\_DL | |  | Config 1,2 | 5 | | | | 5 | | | |
| WCCA\_DL | | ms | Config 1,2 | TPSS/SSS\_sync\_inter\_cca | | | | TPSS/SSS\_sync\_inter\_cca | | | |
| EPRE ratio of PSS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | | | |  | | | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2 | 0 | | | | 0 | | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | | | |  | | | |
| Note2 | | dBm/15kHz | Config 1,2 | -104+TT | | | | -104+TT | | | |
| Note2 | | dBm/SCS | Config 1,2 | -101+TT | | | | -101+TT | | | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -91+TT | | -91+TT | | -Infinity | | -88+TT | |
|  | | dB | Config 1,2 | 4+TT | | 4+TT | | -Infinity | | 7+TT | |
|  | | dB | Config 1,2 | 4+TT | | 4+TT | | -Infinity | | 7+TT | |
| IoNote3 | | dBm/38.16MHz | Config 1,2 | -58.49+TT | | -58.49+TT | | -63.94+TT | | -56.15+TT | |
| Propagation Condition | |  | Config 1,2 | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | | | | | |

Table 10.4.2.4.5-2: DRX-Configuration for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
|  | Value | Value |  |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [13] |
| drx-InactivityTimer | ms1 | ms1 |  |
| drx-RetransmissionTimerDL | sl1 | sl1 |  |
| drx-RetransmissionTimerUL | sl1 | sl1 |  |
| drx-LongCycleStartOffset | ms40 | ms640 |  |
| shortDRX | disable | disable |  |

Table 10.4.2.4.5-3: *TimeAlignmentTimer* Configuration for EN-DC FR1 vent triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is used

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [13] |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 10.4.2.0.1.1-1.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 10.4.2.0.1.2-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

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

#### 10.4.2.5 EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is not used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS

10.4.2.5.1 Test purpose

The purpose of the test is to verify that the UE makes correct reporting of an event in non-DRX with SSB time index detection and with CCA. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clauses 10.4.2.0.1.1 and 10.4.2.0.1.2.

10.4.2.5.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC and RRM measurements with a shared spectrum NR carrier. Test 2 is applicable only to UEs supporting per-FR gap (*IndependentGapConfig*, as defined in TS 38.306 [11]) and Gap Pattern Id 4, otherwise Tests 1 is applicable.

10.4.2.5.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.2.5.

10.4.2.5.4 Test description

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters and configurations are given in Tables 10.4.2.5.4.1-1, 10.4.2.5.4.1-2, and 10.4.2.5.4.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table 10.4.2.5.4.1-3 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table 10.4.2.5.4.1-3 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

10.4.2.5.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.2.5.4.1-1.

Table 10.4.2.5.5.1-1: Supported test configurations for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is not used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.2.5-1 | E-UTRAN cell: LTE FDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.5-2 | E-UTRAN cell: LTE TDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.2.5.4.1-2.

Table 10.4.2.5.4.1-2: Initial conditions for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is not used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.2.5.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT Part. and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.2.5.4.1-3.

2. Message contents are defined in clause 10.4.2.5.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR cells (PSCell and neighbour cell, respectively) in different frequencies with the power levels set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is switched off during the initial connection setup.

Table 10.4.2.5.4.1-3: General test parameters for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is not used

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | Comment |
|  |  | configuration | Test 1 | Test 2 |  |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 | | One E-UTRAN carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cell |  | Config 1,2 | LTE Cell 1 (PCell) and NR cell 2 with CCA (PScell) | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 with CCA is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell 3 | | NR cell 3 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1,2 | As specified in clause D.7.2.1 | |  |
| UL CCA model |  | Config 1,2 | As specified in clause D.7.2.2 | |  |
| Gap Pattern Id |  | Config 1,2 | 0 | 4 | As specified in TS 38.133 [6] clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2 | -6 | |  |
| Hysteresis | dB | Config 1,2 | 0 | |  |
| CP length |  | Config 1,2 | Normal | |  |
| TimeToTrigger | s | Config 1,2 | 0 | |  |
| Filter coefficient |  | Config 1,2 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2 | OFF | | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2 | 3 μs | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3 μs | | Synchronous cells. |
| T1 | s | Config 1,2 | 5 | |  |
| T2 | s | Config 1,2 | 2 | 2 |  |

10.4.2.5.4.2 Test procedure

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test. The SS shall provide sufficient UL grants to the UE such that no SR is required for measurement reporting.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to T1 in Table 10.4.2.5.5-1.

3. The SS shall transmit an *RRCConnectionReconfiguration* message with event A3 configured on Cell 1.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 10.4.2.5.5-1. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 10.4.2.5.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delays measured from the beginning of time period T2 is less than [1922] ms for Test1 or [1162] ms for Test2, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS shall transmit *RRCConnectionReconfiguration* message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. If either of the reconfiguration in step 7 or step 9 fails, SS switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.

10. Repeat step 2-9 until the confidence level according to Tables G.TBD in Annex G clause G.TBD is achieved.

10.4.2.5.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.2.5.4.3-1: Common Exception messages for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is not used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition INTER-FREQ  Table H.3.1-4 with A3-offset = -6dB and with Condition SSB Index  Table H.3.1-5  Table H.3.1-7 with Condition INTER-FREQ and SSB Index  Table H.3.4-1a  Table H.3.4-2  Table H.3.4-3  Table H.3.4-4 with Condition gapUE (Test 1), or gapFR1 (Test 2)  Table H.3.4-5 with Condition Pattern #0 and gap offset = 9 (Test 1), or Pattern #4 and gap offset = 9 (Test 2)  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access |
| Specific message contents exceptions for Test Configuration 10.4.2.5-1 and 10.4.2.5-2 | Table H.3.1-3 with Conditions INTER-FREQ MO and Synchronous cells  Table 7.3.1-3 in TS 38.508-1 [14] with condition SMTC.4 |

10.4.2.5.5 Test requirements

Table 10.4.2.5.5-1 defines the primary level settings including test tolerances for all tests for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is not used.

Table 10.4.2.5.5-1: Cell specific test parameters for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is not used

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | Cell 3 | |
|  | |  | configuration | T1 | T2 | T1 | T2 |
| NR RF Channel Number | |  | Config 1,2 | 1 | | 2 | |
| Duplex mode | |  | Config 1,2 | TDD | | | |
| BWchannel | | MHz | Config 1,2 | 40: NRB,c = 106 | | | |
| BWP BW | | MHz | Config 1,2 | 40: NRB,c = 106 | | | |
| TDD configuration | |  | Config 1,2 | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
| Initial DL BWP | |  | Config 1,2 | DLBWP.0.1 | | NA | |
| Initial UL BWP | |  | Config 1,2 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | |  | Config 1,2 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | |  | Config 1,2 | ULBWP.1.1 | | NA | |
| TRS configuration | |  | Config 1,2 | TRS.1.2 TDD | | NA | |
| OCNG Patterns | |  | Config 1,2 | OP.1 | | OP.1 | |
| PDSCH Reference | |  | Config 1,2 | SR.1.1 CCA | | - | |
| CORESET Reference Channel | |  | Config 1,2 | CR.1.1 CCA | | - | |
| SSB parameters | Semi-static channel access Note 5,7 |  | Config 1,2 | SSB.1 CCA | | SSB.1 CCA | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | SSB.2 CCA | | SSB.2 CCA | |
| DBT window configuration | |  | Config 1,2 | As defined in A.12.1-1 | | As defined in A.12.1-1 | |
| SMTC configuration | |  | Config 1,2 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH | | kHz | Config 1,2 | 30 | | 30 | |
| DL CCA probability PCCA\_DL | Semi-static channel access Note 5,7 |  | Config 1,2 | PCCA\_DL=0.9375 | | PCCA\_DL=0.9375 | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | |
| UL CCA probability PCCA\_UL | Semi-static channel access Note 5,7 |  | Config 1,2 | PCCA\_UL=1 | | PCCA\_UL=1 | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | PCCA\_UL=1 | | PCCA\_UL=1 | |
| LCCA\_DL | |  | Config 1,2 | 5 | | 5 | |
| WCCA\_DL | | ms | Config 1,2 | TPSS/SSS\_sync\_inter\_cca | | TPSS/SSS\_sync\_inter\_cca | |
| EPRE ratio of PSS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz | Config 1,2 | -104+TT | | -104+TT | |
| Note2 | | dBm/SCS | Config 1,2 | -101+TT | | -101+TT | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -91+TT | -91+TT | -Infinity | -88+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT |
| IoNote3 | | dBm/38.16MHz | Config 1,2 | -58.49+TT | -58.49+TT | -63.94+TT | -56.15+TT |
| Propagation Condition | |  | Config 1,2 | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

Tidentify\_inter\_cca\_with\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca + TSSB\_time\_index\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 10.4.2.0.1.1-1.

TSSB\_time\_index\_inter\_cca: it is the time period used to acquire the index of the SSB being measured given in table 10.4.2.0.1.1-2.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 10.4.2.0.1.2-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

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

#### 10.4.2.6 EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS

10.4.2.6.1 Test purpose

The purpose of the test is to verify that the UE makes correct reporting of an event in DRX without SSB time index detection and with CCA. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clauses 10.4.2.0.1.1 and 10.4.2.0.1.2.

10.4.2.6.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC and RRM measurements with a shared spectrum NR carrier, and long DRX cycle. Tests 3 and 4 are applicable only to UEs supporting per-FR gap (*IndependentGapConfig*, as defined in TS 38.306 [11]) and Gap Pattern Id 4, otherwise Tests 1 and 2 are applicable.

10.4.2.6.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.2.6.

10.4.2.6.4 Test description

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters and configurations are given in Tables 10.4.2.6.4.1-1, 10.4.2.6.4.1-2, 10.4.2.6.4.1-3, 10.4.2.6.5-2 and 10.4.2.6.5-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table 10.4.2.6.4.1-3 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table 10.4.2.6.4.1-3 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise, it is only required to pass test 1&2.

10.4.2.6.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.2.6.4.1-1.

Table 10.4.2.6.4.1-1: Supported test configurations for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.2.6-1 | E-UTRAN cell: LTE FDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.6-2 | E-UTRAN cell: LTE TDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.2.6.4.1-2.

Table 10.4.2.6.4.1-2: Initial conditions for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.2.6.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT Part. and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.2.6.4.1-3.

2. Message contents are defined in clause 10.4.2.6.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR cells (PSCell and neighbour cell, respectively) in different frequencies with the power levels set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is switched off during the initial connection setup.

Table 10.4.2.6.4.1-3: General test parameters for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is used

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | | | Comment |
|  |  | configuration | Test 1 | Test 2 | Test 3 | Test 4 |  |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 | | | | One E-UTRAN carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cell |  | Config 1,2 | LTE Cell 1 (PCell) and NR cell 2 with CCA (PScell) | | | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 with CCA is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1,2 | As specified in clause D.7.2.1 | | | |  |
| UL CCA model |  | Config 1,2 | As specified in clause D.7.2.2 | | | |  |
| Gap Pattern Id |  | Config 1,2 | 0 | | 4 | | As specified in TS 38.133 [6] clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2 | -6 | | | |  |
| Hysteresis | dB | Config 1,2 | 0 | | | |  |
| CP length |  | Config 1,2 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2 | 0 | | | |  |
| Filter coefficient |  | Config 1,2 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2 | DRX.1 | DRX.2 | DRX.1 | DRX.2 |  |
| Time offset between PCell and PSCell |  | Config 1,2 | 3 μs | | | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3 μs | | | | Synchronous cells. |
| T1 | s | Config 1,2 | 5 | | | |  |
| T2 | s | Config 1,2 | 3 | 20 | 3 | 20 |  |

10.4.2.6.4.2 Test procedure

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

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

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to T1 in Table 10.4.2.6.5-1.

3. The SS shall transmit an *RRCConnectionReconfiguration* message with event A3 configured on Cell 1.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 10.4.2.6.5-1. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 10.4.2.6.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delays measured from the beginning of time period T2 is less than [2882] ms for Test 1 and Test3 or [19842] ms for Test2 and Test 4, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS shall transmit *RRCConnectionReconfiguration* message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. If either of the reconfiguration in step 7 or step 9 fails, SS switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.

10. Repeat step 2-9 until the confidence level according to Tables G.TBD in Annex G clause G.TBD is achieved.

11. Repeat steps 1-10 for each Test in Tables 10.4.2.6.4.1-3 and 10.4.2.6.5-1 as appropriate.

10.4.2.6.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.2.6.4.3-1: Common Exception messages for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition INTER-FREQ  Table H.3.1-4 with A3-offset = -6dB and with Condition SSB Index  Table H.3.1-5  Table H.3.1-7 with Condition INTER-FREQ and SSB Index  Table H.3.4-1a  Table H.3.4-2  Table H.3.4-3  Table H.3.4-4 with Condition gapUE (Test 1, Test 2), or gapFR1 (Test 3, Test 4)  Table H.3.4-5 with Condition Pattern #0 and gap offset = 9 (Test 1, Test 2), or Pattern #4 and gap offset = 9 (Test 3, Test 4)  Table H.3.7-1 with Condition Gap, INTER-FREQ, DRX.1 (Test 1, Test 3) and DRX.2 (Test 2, Test 4)  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access |
| Specific message contents exceptions for Test Configuration 10.4.2.6-1 and 10.4.2.6-2 | Table H.3.1-3 with Conditions INTER-FREQ MO and Synchronous cells  Table 7.3.1-3 in TS 38.508-1 [14] with condition SMTC.4 |

10.4.2.6.5 Test requirements

Table 10.4.2.6.5-1 defines the primary level settings including test tolerances for all tests for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is used.

Table 10.4.2.6.5-1: Cell specific test parameters for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is used

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | | | Cell 3 | | | |
|  | |  | configuration | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| NR RF Channel Number | |  | Config 1,2 | 1 | | | | 2 | | | |
| Duplex mode | |  | Config 1,2 | TDD | | | | | | | |
| BWchannel | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | | | | |
| BWP BW | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | | | | |
| TDD configuration | |  | Config 1,2 | TDDConf.1.1 CCA | | | | TDDConf.1.1 CCA | | | |
| Initial DL BWP | |  | Config 1,2 | DLBWP.0.1 | | | | NA | | | |
| Initial UL BWP | |  | Config 1,2 | ULBWP.0.1 | | | | NA | | | |
| Dedicated DL BWP | |  | Config 1,2 | DLBWP.1.1 | | | | NA | | | |
| Dedicated UL BWP | |  | Config 1,2 | ULBWP.1.1 | | | | NA | | | |
| TRS configuration | |  | Config 1,2 | TRS.1.2 TDD | | | | NA | | | |
| OCNG Patterns | |  | Config 1,2 | OP.1 | | | | OP.1 | | | |
| PDSCH Reference | |  | Config 1,2 | SR.1.1 CCA | | | | - | | | |
| CORESET Reference Channel | |  | Config 1,2 | CR.1.1 CCA | | | | - | | | |
| SSB parameters | Semi-static channel access Note 5,7 |  | Config 1,2 | SSB.1 CCA | | | | SSB.1 CCA | | | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | SSB.2 CCA | | | | SSB.2 CCA | | | |
| DBT window configuration | |  | Config 1,2 | As defined in A.12.1-1 | | | | As defined in A.12.1-1 | | | |
| SMTC configuration | |  | Config 1,2 | SMTC.1 | | | | SMTC.4 | | | |
| PDSCH/PDCCH | | kHz | Config 1,2 | 30 | | | | 30 | | | |
| DL CCA probability PCCA\_DL | Semi-static channel access Note 5,7 |  | Config 1,2 | PCCA\_DL=0.9375 | | | | PCCA\_DL=0.9375 | | | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | |
| UL CCA probability PCCA\_UL | Semi-static channel access Note 5,7 |  | Config 1,2 | PCCA\_UL=1 | | | | PCCA\_UL=1 | | | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2 | PCCA\_UL=1 | | | | PCCA\_UL=1 | | | |
| LCCA\_DL | |  | Config 1,2 | 2 | | | | 2 | | | |
| WCCA\_DL | | ms | Config 1,2 | TPSS/SSS\_sync\_inter\_cca | | | | TPSS/SSS\_sync\_inter\_cca | | | |
| EPRE ratio of PSS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | | | |  | | | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2 | 0 | | | | 0 | | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | | | |  | | | |
| Note2 | | dBm/15kHz | Config 1,2 | -104+TT | | | | -104+TT | | | |
| Note2 | | dBm/SCS | Config 1,2 | -101+TT | | | | -101+TT | | | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -91+TT | | -91+TT | | -Infinity | | -88+TT | |
|  | | dB | Config 1,2 | 4+TT | | 4+TT | | -Infinity | | 7+TT | |
|  | | dB | Config 1,2 | 4+TT | | 4+TT | | -Infinity | | 7+TT | |
| IoNote3 | | dBm/38.16MHz | Config 1,2 | -58.49+TT | | -58.49+TT | | -63.94+TT | | -56.15+TT | |
| Propagation Condition | |  | Config 1,2 | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | | | | | |

Table 10.4.2.6.5-2: DRX-Configuration for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
|  | Value | Value |  |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [13] |
| drx-InactivityTimer | ms1 | ms1 |  |
| drx-RetransmissionTimerDL | sl1 | sl1 |  |
| drx-RetransmissionTimerUL | sl1 | sl1 |  |
| drx-LongCycleStartOffset | ms40 | ms640 |  |
| shortDRX | disable | disable |  |

Table 10.4.2.6.5-3: *TimeAlignmentTimer* Configuration for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is used

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [13] |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

Tidentify\_inter\_cca\_with\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca + TSSB\_time\_index\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 10.4.2.0.1.1-1.

TSSB\_time\_index\_inter\_cca: it is the time period used to acquire the index of the SSB being measured given in table 10.4.2.0.1.1-2.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 10.4.2.0.1.2-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

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

#### 10.4.2.7 EN-DC FR1-FR1 Event-triggered reporting for FR1 cell without SSB time index detection when DRX is not used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS

10.4.2.7.1 Test purpose

The purpose of the test is to verify that the UE makes correct reporting of an event in non-DRX without SSB time index detection. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clauses 10.4.2.0.1.1 and 10.4.2.0.1.2.

10.4.2.7.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC and RRM measurements with a shared spectrum NR carrier. Test 2 is applicable only to UEs supporting per-FR gap (*IndependentGapConfig*, as defined in TS 38.306 [11]) and Gap Pattern Id 4, otherwise Tests 1 is applicable.

10.4.2.7.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.2.7.

10.4.2.7.4 Test description

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables 10.4.2.7.4.1-1, 10.4.2.7.4.1-2, and 10.4.2.7.4.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table 10.4.2.7.4.1-3 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table 10.4.2.7.4.1-3 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

10.4.2.7.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.2.7.4.1-1.

Table 10.4.2.73.4.1-1: Supported test configurations for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell without SSB time index detection when DRX is not used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.2.7-1 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.7-2 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.7-3 | E-UTRAN cell: LTE FDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.7-4 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.7-5 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode,  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.7-6 | E-UTRAN cell: LTE TDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.2.7.4.1-2.

Table 10.4.2.7.4.1-2: Initial conditions for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell without SSB time index detection when DRX is not used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.2.7.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT Part. and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.2.7.4.1-3.

2. Message contents are defined in clause 10.4.2.7.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR cells (PSCell and neighbour cell, respectively) in different frequencies with the power levels set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is switched off during the initial connection setup.

Table 10.4.2.7.4.1-3: General test parameters for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell without SSB time index detection when DRX is not used

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | Comment |
|  |  | configuration | Test 1 | Test 2 |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | One E-UTRAN carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | Two FR1 NR carrier frequencies are used. NR RF channel 1 is with CCA. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | NR cell 3 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause D.7.2.1 | |  |
| UL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause D.7.2.2 | |  |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | 4 | As specified in TS 38.133 [6] clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2,3,4,5,6 | -6 | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6 | OFF | | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2,3,4,5,6 | 3 ms | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 1,2,3,4,5,6 | 3 μs | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | |  |
| T2 | s | Config 1,2,3,4,5,6 | 1.7 | 1.7 |  |

10.4.2.7.4.2 Test procedure

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test. The SS shall provide sufficient UL grants to the UE such that no SR is required for measurement reporting.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to T1 in Table 10.4.2.7.5-1.

3. The SS shall transmit an *RRCConnectionReconfiguration* message with event A3 configured on Cell 1.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 10.4.2.7.5-1. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 10.4.2.7.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delays measured from the beginning of time period T2 is less than [1602] ms for Test1 or [1002] ms for Test2, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS shall transmit *RRCConnectionReconfiguration* message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. If either of the reconfiguration in step 7 or step 9 fails, SS switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.

10. Repeat step 2-9 until the confidence level according to Tables G.TBD in Annex G clause G.TBD is achieved.

10.4.2.7.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.2.7.4.3-1: Common Exception messages for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell without SSB time index detection when DRX is not used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition INTER-FREQ  Table H.3.1-4 with A3-offset = -6dB  Table H.3.1-5  Table H.3.1-7 with Condition INTER-FREQ  Table H.3.4-1a  Table H.3.4-2  Table H.3.4-3  Table H.3.4-4 with Condition gapUE (Test 1), or gapFR1 (Test 2)  Table H.3.4-5 with Condition Pattern #0 and gap offset = 9 (Test 1), or Pattern #4 and gap offset = 9 (Test 2)  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |
| Test Configuration 10.4.2.7-1, 10.4.2.7-2, 10.4.2.7-4 and 10.4.2.7-5 | Table H.3.4-6 with Condition SSB.1 FR1 |
| Test Configuration 10.4.2.7-3, 10.4.2.7-6, | Table H.3.4-6 with Condition SSB.2 FR1 |
| Specific message contents exceptions for Test Configuration 10.4.2.7-2, 10.4.2.7-3, 10.4.2.7-5 and 10.4.2.7-6  Test Configuration 10.4.2.7-1 and 10.4.2.7-4 | Table H.3.1-3 with Conditions INTER-FREQ MO and Synchronous cells  Table 7.3.1-3 in TS 38.508-1 [14] with condition SMTC.4    Table 7.3.1-3 in TS 38.508-1 [14] with condition SMTC.5 |

10.4.2.7.5 Test requirements

Table 10.4.2.7.5-1 defines the primary level settings including test tolerances for all tests for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell without SSB time index detection when DRX is not used

Table 10.4.2.7.5-1: Cell specific test parameters for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell without SSB time index detection when DRX is not used

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | Cell 3 | |
|  | |  | configuration | T1 | T2 | T1 | T2 |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode | |  | Config 1,4 | TDD | | FDD | |
|  | |  | Config 2,3,5,6 | TDD | | TDD | |
| BWchannel | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3,6 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP BW | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3,6 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| TDD configuration | |  | Config 1,4 | TDDConf.1.1 CCA | | NA | |
|  | |  | Config 2,5 | TDDConf.1.1 CCA | | TDDConf.1.1 | |
|  | |  | Config 3,6 | TDDConf.1.1 CCA | | TDDConf.2.1 | |
| Initial DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | NA | |
| Initial UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | NA | |
| TRS configuration | |  | Config 1,2,3,4,5,6 | TRS.1.2 TDD | | NA | |
| OCNG Patterns | |  | Config 1,2,3,4,5,6 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1,4 | SR.1.1 CCA | | SR.1.1 FDD | |
| Config 2,5 | SR.1.1 CCA | | SR.1.1 TDD | |
| Config 3,6 | SR.1.1 CCA | | SR.2.1 TDD | |
| CORESET Reference Channel | |  | Config 1,4 | CR.1.1 CCA | | CR.1.1 FDD | |
| Config 2,5 | CR.1.1 CCA | | CR.1.1 TDD | |
| Config 3,6 | CR.1.1 CCA | | CR.2.1 TDD | |
| SSB | Semi-static channel access Note 5,7 |  | Config 1,4 | SSB.1 CCA | | SSB.1 FR1 | |
| parameters |  | Config 2,5 | SSB.1 CCA | | SSB.1 FR1 | |
|  |  | Config 3,6 | SSB.1 CCA | | SSB.2 FR1 | |
|  | Dynamic channel access Note 6,7 |  | Config 1,4 | SSB.2 CCA | | SSB.1 FR1 | |
|  |  | Config 2,5 | SSB.2 CCA | | SSB.1 FR1 | |
|  |  | Config 3,6 | SSB.2 CCA | | SSB.2 FR1 | |
| DBT window configuration | |  | Config 1,2,3,4,5,6 | As defined in A.12.1-1 | | Not applicable | |
| SMTC configuration | |  | Config 1,4 | SMTC.2 | | SMTC.5 | |
|  | |  | Config 2,3,5,6 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH | | kHz | Config 1,2,4,5 | 30 | | 15 | |
| subcarrier spacing | |  | Config 3,6 | 30 | | 30 | |
| DL CCA probability PCCA\_DL | Semi-static channel access Note 5,7 |  | Config 1,2,3,4,5,6 | PCCA\_DL=0.9375 | | Not applicable | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2,3,4,5,6 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | Not applicable | |
| UL CCA probability PCCA\_UL | Semi-static channel access Note 5,7 |  | Config 1,2,3,4,5,6 | PCCA\_UL=1 | | Not applicable | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2,3,4,5,6 | PCCA\_UL=1 | | Not applicable | |
| LCCA\_DL | |  | Config 1,2,3,4,5,6 | 12 | | 12 | |
| WCCA\_DL | | ms | Config 1,2,3,4,5,6 | TPSS/SSS\_sync\_inter\_cca | | TPSS/SSS\_sync\_inter\_cca | |
| EPRE ratio of PSS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2,3,4,5,6 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz | Config 1,2,3,4,5,6 | -104+TT | | -98+TT | |
| Note2 | | dBm/SCS | Config 1,2,4,5 | -101+TT | | -98+TT | |
|  | | Config 3,6 | -101+TT | | -95+TT | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2,4,5 | -94+TT | -94+TT | -Infinity | -91+TT |
|  | | Config 3,6 | -91+TT | -91+TT | -Infinity | -88+TT |
|  | | dB | Config 1,2,3,4,5,6 | 4+TT | 4+TT | -Infinity | 7+TT |
|  | | dB | Config 1,2,3,4,5,6 | 4+TT | 4+TT | -Infinity | 7+TT |
| IoNote3 | | dBm/9.36MHz | NR Config 1,2,4,5 | -58.49+TT | -58.49+TT | -70.05+TT | -62.26+TT |
| dBm/38.16MHz | NR Config 3,6 | -58.49+TT | -58.49+TT | -63.94+TT | -56.15+TT |
| Propagation Condition | |  | Config 1,2,3,4,5,6 | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 10.4.2.0.1.1-1.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 10.4.2.0.1.2-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

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

#### 10.4.2.8 EN-DC FR1-FR1 Event triggered reporting for FR1 cell without SSB time index detection when DRX is used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS

10.4.2.8.1 Test purpose

The purpose of the test is to verify that the UE makes correct reporting of an event in DRX without SSB time index detection and with CCA. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clauses 10.4.2.0.1.1 and 10.4.2.0.1.2.

10.4.2.8.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC and RRM measurements with a shared spectrum NR carrier, and long DRX cycle. Tests 3 and 4 are applicable only to UEs supporting per-FR gap (*IndependentGapConfig*, as defined in TS 38.306 [11]) and Gap Pattern Id 4, otherwise Tests 1 and 2 are applicable.

10.4.2.8.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.2.8.

10.4.2.8.4 Test description

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables 10.4.2.8.4.1-1, 10.4.2.8.4.1-2, 10.4.2.8.4.1-3, 10.4.2.8.5-2 and 10.4.2.8.5-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table 10.4.2.8.4.1-3 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table 10.4.2.8.4.1-3 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

10.4.2.8.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.2.8.4.1-1.

Table 10.4.2.8.4.1-1: Supported test configurations for EN-DC FR1-FR1 Event triggered reporting for FR1 cell without SSB time index detection when DRX is used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.2.8-1 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.8-2 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.8-3 | E-UTRAN cell: LTE FDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.8-4 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.8-5 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode,  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.8-6 | E-UTRAN cell: LTE TDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.2.8.4.1-2.

Table 10.4.2.8.4.1-2: Initial conditions for EN-DC FR1-FR1 Event triggered reporting for FR1 cell without SSB time index detection when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.2.8.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT Part. and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.2.8.4.1-3.

2. Message contents are defined in clause 10.4.2.8.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR cells (PSCell and neighbour cell, respectively) in different frequencies with the power levels set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is switched off during the initial connection setup.

Table 10.4.2.8.4.1-3: General test parameters for EN-DC FR1-FR1 Event triggered reporting for FR1 cell without SSB time index detection when DRX is used

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | | | Comment |
|  |  | configuration | Test 1 | Test 2 | Test 3 | Test 4 |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | | | One E-UTRAN carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. NR RF channel 1 is with CCA. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause D.7.2.1 | | | |  |
| UL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause D.7.2.2 | | | |  |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | | 4 | | As specified in TS 38.133 [6] clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2,3,4,5,6 | -6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | | | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6 | DRX.1 | DRX.2 | DRX.1 | DRX.2 |  |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2,3,4,5,6 | 3 ms | | | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 1,2,3,4,5,6 | 3 μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | | | |  |
| T2 | s | Config 1,2,3,4,5,6 | 2.5 | 17 | 2.5 | 17 |  |

10.4.2.8.4.2 Test procedure

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

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

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to T1 in Table 10.4.2.8.5-1.

3. The SS shall transmit an *RRCConnectionReconfiguration* message with event A3 configured on Cell 1.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 10.4.2.8.5-1. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 10.4.2.8.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delays measured from the beginning of time period T2 is less than [2402] ms for Test 1 and Test3 or [16642] ms for Test2 and Test 4, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS shall transmit *RRCConnectionReconfiguration* message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. If either of the reconfiguration in step 7 or step 9 fails, SS switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.

10. Repeat step 2-9 until the confidence level according to Tables G.TBD in Annex G clause G.TBD is achieved.

11. Repeat steps 1-10 for each Test in Tables 10.4.2.8.4.1-3 and 10.4.2.8.5-1 as appropriate.

10.4.2.8.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.2.8.4.3-1: Common Exception messages for EN-DC FR1-FR1 Event triggered reporting for FR1 cell without SSB time index detection when DRX is used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition INTER-FREQ  Table H.3.1-4 with A3-offset = -6dB  Table H.3.1-5  Table H.3.1-7 with Condition INTER-FREQ  Table H.3.4-1a  Table H.3.4-2  Table H.3.4-3  Table H.3.4-4 with Condition gapUE (Test 1, Test 2), or gapFR1 (Test 3, Test 4)  Table H.3.4-5 with Condition Pattern #0 and gap offset = 9 (Test 1, Test 2), or Pattern #4 and gap offset = 9 (Test 3, Test 4)  Table H.3.7-1 with Condition Gap, INTER-FREQ, DRX.1 (Test 1, Test 3) and DRX.2 (Test 2, Test 4)  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |
| Test Configuration 10.4.2.8-1, 10.4.2.8-2, 10.4.2.8-4 and 10.4.2.8-5 | Table H.3.4-6 with Condition SSB.1 FR1 |
| Test Configuration 10.4.2.8-3, 10.4.2.8-6, | Table H.3.4-6 with Condition SSB.2 FR1 |
| Specific message contents exceptions for Test Configuration 10.4.2.8-2, 10.4.2.8-3, 10.4.2.8-5 and 10.4.2.8-6  Test Configuration 10.4.2.8-1 and 10.4.2.8-4 | Table H.3.1-3 with Conditions INTER-FREQ MO and Synchronous cells  Table 7.3.1-3 in TS 38.508-1 [14] with condition SMTC.4    Table 7.3.1-3 in TS 38.508-1 [14] with condition SMTC.5 |

10.4.2.8.5 Test requirements

Table 10.4.2.8.5-1 defines the primary level settings including test tolerances for all tests for EN-DC FR1-FR1 Event triggered reporting for FR1 cell without SSB time index detection when DRX is used.

Table 10.4.2.8.5-1: Cell specific test parameters for EN-DC FR1-FR1 Event triggered reporting for FR1 cell without SSB time index detection when DRX is used

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | | | Cell 3 | | | |
|  | |  | configuration | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6 | 1 | | | | 2 | | | |
| Duplex mode | |  | Config 1,4 | TDD | | | | FDD | | | |
|  | |  | Config 2,3,5,6 | TDD | | | | TDD | | | |
| BWchannel | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3,6 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| BWP BW | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3,6 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| TDD configuration | |  | Config 1,4 | TDDConf.1.1 CCA | | | | NA | | | |
|  | |  | Config 2,5 | TDDConf.1.1 CCA | | | | TDDConf.1.1 | | | |
|  | |  | Config 3,6 | TDDConf.1.1 CCA | | | | TDDConf.2.1 | | | |
| Initial DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | | | NA | | | |
| Initial UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | | | NA | | | |
| Dedicated DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | | | NA | | | |
| Dedicated UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | | | NA | | | |
| TRS configuration | |  | Config 1,2,3,4,5,6 | TRS.1.2 TDD | | | | NA | | | |
| OCNG Patterns | |  | Config 1,2,3,4,5,6 | OP.1 | | | | OP.1 | | | |
| PDSCH Reference measurement channel | |  | Config 1,4 | SR.1.1 CCA | | | | SR.1.1 FDD | | | |
| Config 2,5 | SR.1.1 CCA | | | | SR.1.1 TDD | | | |
| Config 3,6 | SR.1.1 CCA | | | | SR.2.1 TDD | | | |
| CORESET Reference Channel | |  | Config 1,4 | CR.1.1 CCA | | | | CR.1.1 FDD | | | |
| Config 2,5 | CR.1.1 CCA | | | | CR.1.1 TDD | | | |
| Config 3,6 | CR.1.1 CCA | | | | CR.2.1 TDD | | | |
| SSB | Semi-static channel access Note 5,7 |  | Config 1,4 | SSB.1 CCA | | | | SSB.1 FR1 | | | |
| parameters |  | Config 2,5 | SSB.1 CCA | | | | SSB.1 FR1 | | | |
|  |  | Config 3,6 | SSB.1 CCA | | | | SSB.2 FR1 | | | |
|  | Dynamic channel access Note 6,7 |  | Config 1,4 | SSB.2 CCA | | | | SSB.1 FR1 | | | |
|  |  | Config 2,5 | SSB.2 CCA | | | | SSB.1 FR1 | | | |
|  |  | Config 3,6 | SSB.2 CCA | | | | SSB.2 FR1 | | | |
| DBT window configuration | |  | Config 1,2,3,4,5,6 | As defined in A.12.1-1 | | | | Not applicable | | | |
| SMTC configuration | |  | Config 1,4 | SMTC.2 | | | | SMTC.5 | | | |
|  | |  | Config 2,3,5,6 | SMTC.1 | | | | SMTC.4 | | | |
| PDSCH/PDCCH | | kHz | Config 1,2,4,5 | 30 | | | | 15 | | | |
| subcarrier spacing | |  | Config 3,6 | 30 | | | | 30 | | | |
| DL CCA probability PCCA\_DL | Semi-static channel access Note 5,7 |  | Config 1,2,3,4,5,6 | PCCA\_DL=0.9375 | | | | Not applicable | | | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2,3,4,5,6 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | Not applicable | | | |
| UL CCA probability PCCA\_UL | Semi-static channel access Note 5,7 |  | Config 1,2,3,4,5,6 | PCCA\_UL=1 | | | | Not applicable | | | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2,3,4,5,6 | PCCA\_UL=1 | | | | Not applicable | | | |
| LCCA\_DL | |  | Config 1,2,3,4,5,6 | 5 | | | | 5 | | | |
| WCCA\_DL | | ms | Config 1,2,3,4,5,6 | TPSS/SSS\_sync\_inter\_cca | | | | TPSS/SSS\_sync\_inter\_cca | | | |
| EPRE ratio of PSS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | | | |  | | | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2,3,4,5,6 | 0 | | | | 0 | | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | | | |  | | | |
| Note2 | | dBm/15kHz | Config 1,2,3,4,5,6 | -104+TT | | | | -98+TT | | | |
| Note2 | | dBm/SCS | Config 1,2,4,5 | -101+TT | | | | -98+TT | | | |
|  | | Config 3,6 | -101+TT | | | | -95+TT | | | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2,4,5 | -94+TT | | -94+TT | | -Infinity | | -91+TT | |
|  | | Config 3,6 | -91+TT | | -91+TT | | -Infinity | | -88+TT | |
|  | | dB | Config 1,2,3,4,5,6 | 4+TT | | 4+TT | | -Infinity | | 7+TT | |
|  | | dB | Config 1,2,3,4,5,6 | 4+TT | | 4+TT | | -Infinity | | 7+TT | |
| IoNote3 | | dBm/9.36MHz | NR Config 1,2,4,5 | -58.49+TT | | -58.49+TT | | -70.05+TT | | -62.26+TT | |
| dBm/38.16MHz | NR Config 3,6 | -58.49+TT | | -58.49+TT | | -63.94+TT | | -56.15+TT | |
| Propagation Condition | |  | Config 1,2,3,4,5,6 | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | | | | | |

Table 10.4.2.8.5-2: DRX-Configuration for EN-DC FR1-FR1 Event triggered reporting for FR1 cell without SSB time index detection when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
|  | Value | Value |  |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [13] |
| drx-InactivityTimer | ms1 | ms1 |  |
| drx-RetransmissionTimerDL | sl1 | sl1 |  |
| drx-RetransmissionTimerUL | sl1 | sl1 |  |
| drx-LongCycleStartOffset | ms40 | ms640 |  |
| shortDRX | disable | disable |  |

Table 10.4.2.8.5-3: *TimeAlignmentTimer* Configuration for EN-DC FR1-FR1 Event triggered reporting for FR1 cell without SSB time index detection when DRX is used

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [13] |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 10.4.2.0.1.1-1.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 10.4.2.0.1.2-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

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

#### 10.4.2.9 EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with SSB time index detection when DRX is not used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS

10.4.2.9.1 Test purpose

The purpose of the test is to verify that the UE makes correct reporting of an event in non-DRX with SSB time index detection. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clauses 10.4.2.0.1.1 and 10.4.2.0.1.2.

10.4.2.9.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC and RRM measurements with a shared spectrum NR carrier. Test 2 is applicable only to UEs supporting per-FR gap (*IndependentGapConfig*, as defined in TS 38.306 [11]) and Gap Pattern Id 4, otherwise Tests 1 is applicable.

10.4.2.9.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.2.9.

10.4.2.9.4 Test description

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables 10.4.2.9.4.1-1, 10.4.2.9.4.1-2, and 10.4.2.9.4.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table 10.4.2.9.4.1-3 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table 10.4.2.9.4.1-3 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

10.4.2.9.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.2.9.4.1-1.

Table 10.4.2.9.4.1-1: Supported test configurations for EN-DC FR1-FR1 Event-triggered reporting tests for FR1 cell with SSB time index detection when DRX is not used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.2.9-1 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.9-2 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.9-3 | E-UTRAN cell: LTE FDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.9-4 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.9-5 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode,  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mod |
| 10.4.2.9-6 | E-UTRAN cell: LTE TDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.2.9.4.1-2.

Table 10.4.2.9.4.1-2: Initial conditions for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with SSB time index detection when DRX is not used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.2.9.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT Part. and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.2.9.4.1-3.

2. Message contents are defined in clause 10.4.2.9.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR cells (PSCell and neighbour cell, respectively) in different frequencies with the power levels set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is switched off during the initial connection setup.

Table 10.4.2.9.4.1-3: General test parameters for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with SSB time index detection when DRX is not used

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | Comment |
|  |  | configuration | Test 1 | Test 2 |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | One E-UTRAN carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | Two FR1 NR carrier frequencies are used. NR RF channel 1 is with CCA. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | NR cell 3 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause D.7.2.1 | |  |
| UL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause D.7.2.2 | |  |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | 4 | As specified in TS 38.133 [6] clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2,3,4,5,6 | -6 | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6 | OFF | | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2,3,4,5,6 | 3 ms | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 1,2,3,4,5,6 | 3 μs | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | |  |
| T2 | s | Config 1,2,3,4,5,6 | 2 | 2 |  |

10.4.2.9.4.2 Test procedure

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test. The SS shall provide sufficient UL grants to the UE such that no SR is required for measurement reporting.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to T1 in Table 10.4.2.9.5-1.

3. The SS shall transmit an *RRCConnectionReconfiguration* message with event A3 configured on Cell 1.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 10.4.2.9.5-1. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 10.4.2.9.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delays measured from the beginning of time period T2 is less than [1922] ms for Test1 or [1162] ms for Test2, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS shall transmit *RRCConnectionReconfiguration* message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. If either of the reconfiguration in step 7 or step 9 fails, SS switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.

10. Repeat step 2-9 until the confidence level according to Tables G.TBD in Annex G clause G.TBD is achieved.

10.4.2.9.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.2.9.4.3-1: Common Exception messages for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with SSB time index detection when DRX is not used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition INTER-FREQ  Table H.3.1-4 with A3-offset = -6dB and with Condition SSB Index  Table H.3.1-5  Table H.3.1-7 with Condition INTER-FREQ and SSB Index  Table H.3.4-1a  Table H.3.4-2  Table H.3.4-3  Table H.3.4-4 with Condition gapUE (Test 1), or gapFR1 (Test 2)  Table H.3.4-5 with Condition Pattern #0 and gap offset = 9 (Test 1), or Pattern #4 and gap offset = 9 (Test 2)  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |
| Test Configuration 10.4.2.9-1, 10.4.2.9-2, 10.4.2.9-4 and 10.4.2.9-5 | Table H.3.4-6 with Condition SSB.1 FR1 |
| Test Configuration 10.4.2.9-3, 10.4.2.9-6, | Table H.3.4-6 with Condition SSB.2 FR1 |
| Specific message contents exceptions for Test Configuration 10.4.2.9-2, 10.4.2.9-3, 10.4.2.9-5 and 10.4.2.9-6  Test Configuration 10.4.2.9-1 and 10.4.2.9-4 | Table H.3.1-3 with Conditions INTER-FREQ MO and Synchronous cells  Table 7.3.1-3 in TS 38.508-1 [14] with condition SMTC.4  Table 7.3.1-3 in TS 38.508-1 [14] with condition SMTC.5 |

10.4.2.9.5 Test requirements

Table 10.4.2.9.5-1 defines the primary level settings including test tolerances for all tests for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with SSB time index detection when DRX is not used.

Table 10.4.2.9.5-1: Cell specific test parameters for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with SSB time index detection when DRX is not used

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | Cell 3 | |
|  | |  | configuration | T1 | T2 | T1 | T2 |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode | |  | Config 1,4 | TDD | | FDD | |
|  | |  | Config 2,3,5,6 | TDD | | TDD | |
| BWchannel | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3,6 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP BW | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3,6 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| TDD configuration | |  | Config 1,4 | TDDConf.1.1 CCA | | NA | |
|  | |  | Config 2,5 | TDDConf.1.1 CCA | | TDDConf.1.1 | |
|  | |  | Config 3,6 | TDDConf.1.1 CCA | | TDDConf.2.1 | |
| Initial DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | NA | |
| Initial UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | NA | |
| TRS configuration | |  | Config 1,2,3,4,5,6 | TRS.1.2 TDD | | NA | |
| OCNG Patterns | |  | Config 1,2,3,4,5,6 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1,4 | SR.1.1 CCA | | SR.1.1 FDD | |
| Config 2,5 | SR.1.1 CCA | | SR.1.1 TDD | |
| Config 3,6 | SR.1.1 CCA | | SR.2.1 TDD | |
| CORESET Reference Channel | |  | Config 1,4 | CR.1.1 CCA | | CR.1.1 FDD | |
| Config 2,5 | CR.1.1 CCA | | CR.1.1 TDD | |
| Config 3,6 | CR.1.1 CCA | | CR.2.1 TDD | |
| SSB | Semi-static channel access Note 5,7 |  | Config 1,4 | SSB.1 CCA | | SSB.1 FR1 | |
| parameters |  | Config 2,5 | SSB.1 CCA | | SSB.1 FR1 | |
|  |  | Config 3,6 | SSB.1 CCA | | SSB.2 FR1 | |
|  | Dynamic channel access Note 6,7 |  | Config 1,4 | SSB.2 CCA | | SSB.1 FR1 | |
|  |  | Config 2,5 | SSB.2 CCA | | SSB.1 FR1 | |
|  |  | Config 3,6 | SSB.2 CCA | | SSB.2 FR1 | |
| DBT window configuration | |  | Config 1,2,3,4,5,6 | As defined in A.12.1-1 | | Not applicable | |
| SMTC configuration | |  | Config 1,4 | SMTC.2 | | SMTC.5 | |
|  | |  | Config 2,3,5,6 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH | | kHz | Config 1,2,4,5 | 30 | | 15 | |
| subcarrier spacing | |  | Config 3,6 | 30 | | 30 | |
| DL CCA probability PCCA\_DL | Semi-static channel access Note 5,7 |  | Config 1,2,3,4,5,6 | PCCA\_DL=0.9375 | | Not applicable | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2,3,4,5,6 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | Not applicable | |
| UL CCA probability PCCA\_UL | Semi-static channel access Note 5,7 |  | Config 1,2,3,4,5,6 | PCCA\_UL=1 | | Not applicable | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2,3,4,5,6 | PCCA\_UL=1 | | Not applicable | |
| LCCA\_DL | |  | Config 1,2,3,4,5,6 | 5 | | 5 | |
| WCCA\_DL | | ms | Config 1,2,3,4,5,6 | TPSS/SSS\_sync\_inter\_cca | | TPSS/SSS\_sync\_inter\_cca | |
| EPRE ratio of PSS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2,3,4,5,6 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz | Config 1,2,3,4,5,6 | -104+TT | | -98+TT | |
| Note2 | | dBm/SCS | Config 1,2,4,5 | -101+TT | | -98+TT | |
|  | | Config 3,6 | -101+TT | | -95+TT | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2,4,5 | -94+TT | -94+TT | -Infinity | -91+TT |
|  | | Config 3,6 | -91+TT | -91+TT | -Infinity | -88+TT |
|  | | dB | Config 1,2,3,4,5,6 | 4+TT | 4+TT | -Infinity | 7+TT |
|  | | dB | Config 1,2,3,4,5,6 | 4+TT | 4+TT | -Infinity | 7+TT |
| IoNote3 | | dBm/9.36MHz | NR Config 1,2,4,5 | -58.49+TT | -58.49+TT | -70.05+TT | -62.26+TT |
| dBm/38.16MHz | NR Config 3,6 | -58.49+TT | -58.49+TT | -63.94+TT | -56.15+TT |
| Propagation Condition | |  | Config 1,2,3,4,5,6 | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

Tidentify\_inter\_cca\_with\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca + TSSB\_time\_index\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 10.4.2.0.1.1-1.

TSSB\_time\_index\_inter\_cca: it is the time period used to acquire the index of the SSB being measured given in table 10.4.2.0.1.1-2.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 10.4.2.0.1.2-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

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

#### 10.4.2.10 EN-DC FR1-FR1 Event triggered reporting for FR1 cell with SSB time index detection when DRX is used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS

10.4.2.10.1 Test purpose

The purpose of the test is to verify that the UE makes correct reporting of an event in DRX without SSB time index detection and with CCA. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clauses 10.4.2.0.1.1 and 10.4.2.0.1.2.

10.4.2.10.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC and RRM measurements with a shared spectrum NR carrier, and long DRX cycle. Tests 3 and 4 are applicable only to UEs supporting per-FR gap (*IndependentGapConfig*, as defined in TS 38.306 [11]) and Gap Pattern Id 4, otherwise Tests 1 and 2 are applicable.

10.4.2.10.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.2.10.

10.4.2.10.4 Test description

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters and configurations are given in Tables 10.4.2.10.4.1-1, 10.4.2.10.4.1-2, 10.4.2.10.4.1-3, 10.4.2.10.5-2 and 10.4.2.10.5-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table 10.4.2.10.4.1-3 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table 10.4.2.10.4.1-3 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

10.4.2.10.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.2.10.4.1-1.

Table 10.4.2.10.4.1-1: Supported test configurations for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with SSB time index detection when DRX is used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.2.10-1 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.10-2 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.10-3 | E-UTRAN cell: LTE FDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.10-4 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.2.10-5 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode,  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mod |
| 10.4.2.10-6 | E-UTRAN cell: LTE TDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.2.10.4.1-2.

Table 10.4.2.10.4.1-2: Initial conditions for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with SSB time index detection when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.2.10.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT Part. and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.2.10.4.1-3.

2. Message contents are defined in clause 10.4.2.10.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR cells (PSCell and neighbour cell, respectively) in different frequencies with the power levels set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is switched off during the initial connection setup.

Table 10.4.2.10.4.1-3: General test parameters for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with SSB time index detection when DRX is used

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | | | Comment |
|  |  | configuration | Test 1 | Test 2 | Test 3 | Test 4 |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | | | One E-UTRAN carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. NR RF channel 1 is with CCA. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause D.7.2.1 | | | |  |
| UL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause D.7.2.2 | | | |  |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | | 4 | | As specified in TS 38.133 [6] clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2,3,4,5,6 | -6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | | | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6 | DRX.1 | DRX.2 | DRX.1 | DRX.2 | As specified in clause A.5 |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2,3,4,5,6 | 3 ms | | | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 1,2,3,4,5,6 | 3 μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | | | |  |
| T2 | s | Config 1,2,3,4,5,6 | 3 | 20 | 3 | 20 |  |

10.4.2.10.4.2 Test procedure

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

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

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to T1 in Table 10.4.2.10.5-1.

3. The SS shall transmit an *RRCConnectionReconfiguration* message with event A3 configured on Cell 1.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 10.4.2.10.5-1. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 10.4.2.10.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delays measured from the beginning of time period T2 is less than [2882] ms for Test 1 and Test3 or [19842] ms for Test2 and Test 4, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. The SS shall transmit *RRCConnectionReconfiguration* message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. If either of the reconfiguration in step 7 or step 9 fails, SS switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.

10. Repeat step 2-9 until the confidence level according to Tables G.TBD in Annex G clause G.TBD is achieved.

11. Repeat steps 1-10 for each Test in Tables 10.4.2.10.4.1-3 and 10.4.2.10.5-1 as appropriate.

10.4.2.10.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.2.10.4.3-1: Common Exception messages for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with SSB time index detection when DRX is used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition INTER-FREQ  Table H.3.1-4 with A3-offset = -6dB and with Condition SSB Index  Table H.3.1-5  Table H.3.1-7 with Condition INTER-FREQ and SSB Index  Table H.3.4-1a  Table H.3.4-2  Table H.3.4-3  Table H.3.4-4 with Condition gapUE (Test 1, Test 2), or gapFR1 (Test 3, Test 4)  Table H.3.4-5 with Condition Pattern #0 and gap offset = 9 (Test 1, Test 2), or Pattern #4 and gap offset = 9 (Test 3, Test 4)  Table H.3.7-1 with Condition Gap, INTER-FREQ, DRX.1 (Test 1, Test 3) and DRX.2 (Test 2, Test 4)  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |
| Test Configuration 10.4.2.10-1, 10.4.2.10-2, 10.4.2.10-4 and 10.4.2.10-5 | Table H.3.4-6 with Condition SSB.1 FR1 |
| Test Configuration 10.4.2.10-3, 10.4.2.10-6, | Table H.3.4-6 with Condition SSB.2 FR1 |
| Specific message contents exceptions for Test Configuration 10.4.2.10-2, 10.4.2.10-3, 10.4.2.10-5 and 10.4.2.10-6  Test Configuration 10.4.2.10-1 and 10.4.2.10-4 | Table H.3.1-3 with Conditions INTER-FREQ MO and Synchronous cells  Table 7.3.1-3 in TS 38.508-1 [14] with condition SMTC.4    Table 7.3.1-3 in TS 38.508-1 [14] with condition SMTC.5 |

10.4.2.10.5 Test requirements

Table 10.4.2.10.5-1 defines the primary level settings including test tolerances for all tests for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with SSB time index detection when DRX is used.

Table 10.4.2.10.5-1: Cell specific test parameters for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with SSB time index detection when DRX is used

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | | | Cell 3 | | | |
|  | |  | configuration | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6 | 1 | | | | 2 | | | |
| Duplex mode | |  | Config 1,4 | TDD | | | | FDD | | | |
|  | |  | Config 2,3,5,6 | TDD | | | | TDD | | | |
| BWchannel | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3,6 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| BWP BW | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3,6 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| TDD configuration | |  | Config 1,4 | TDDConf.1.1 CCA | | | | NA | | | |
|  | |  | Config 2,5 | TDDConf.1.1 CCA | | | | TDDConf.1.1 | | | |
|  | |  | Config 3,6 | TDDConf.1.1 CCA | | | | TDDConf.2.1 | | | |
| Initial DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | | | NA | | | |
| Initial UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | | | NA | | | |
| Dedicated DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | | | NA | | | |
| Dedicated UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | | | NA | | | |
| TRS configuration | |  | Config 1,2,3,4,5,6 | TRS.1.2 TDD | | | | NA | | | |
| OCNG Patterns | |  | Config 1,2,3,4,5,6 | OP.1 | | | | OP.1 | | | |
| PDSCH Reference measurement channel | |  | Config 1,4 | SR.1.1 CCA | | | | SR.1.1 FDD | | | |
| Config 2,5 | SR.1.1 CCA | | | | SR.1.1 TDD | | | |
| Config 3,6 | SR.1.1 CCA | | | | SR.2.1 TDD | | | |
| CORESET Reference Channel | |  | Config 1,4 | CR.1.1 CCA | | | | CR.1.1 FDD | | | |
| Config 2,5 | CR.1.1 CCA | | | | CR.1.1 TDD | | | |
| Config 3,6 | CR.1.1 CCA | | | | CR.2.1 TDD | | | |
| SSB | Semi-static channel access Note 5,7 |  | Config 1,4 | SSB.1 CCA | | | | SSB.1 FR1 | | | |
| parameters |  | Config 2,5 | SSB.1 CCA | | | | SSB.1 FR1 | | | |
|  |  | Config 3,6 | SSB.1 CCA | | | | SSB.2 FR1 | | | |
|  | Dynamic channel access Note 6,7 |  | Config 1,4 | SSB.2 CCA | | | | SSB.1 FR1 | | | |
|  |  | Config 2,5 | SSB.2 CCA | | | | SSB.1 FR1 | | | |
|  |  | Config 3,6 | SSB.2 CCA | | | | SSB.2 FR1 | | | |
| DBT window configuration | |  | Config 1,2,3,4,5,6 | As defined in A.12.1-1 | | | | Not applicable | | | |
| SMTC configuration | |  | Config 1,4 | SMTC.2 | | | | SMTC.5 | | | |
|  | |  | Config 2,3,5,6 | SMTC.1 | | | | SMTC.4 | | | |
| PDSCH/PDCCH | | kHz | Config 1,2,4,5 | 30 | | | | 15 | | | |
| subcarrier spacing | |  | Config 3,6 | 30 | | | | 30 | | | |
| DL CCA probability PCCA\_DL | Semi-static channel access Note 5,7 |  | Config 1,2,3,4,5,6 | PCCA\_DL=0.9375 | | | | Not applicable | | | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2,3,4,5,6 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | Not applicable | | | |
| UL CCA probability PCCA\_UL | Semi-static channel access Note 5,7 |  | Config 1,2,3,4,5,6 | PCCA\_UL=1 | | | | Not applicable | | | |
|  | Dynamic channel access Note 6,7 |  | Config 1,2,3,4,5,6 | PCCA\_UL=1 | | | | Not applicable | | | |
| LCCA\_DL | |  | Config 1,2,3,4,5,6 | 2 | | | | 2 | | | |
| WCCA\_DL | | ms | Config 1,2,3,4,5,6 | TPSS/SSS\_sync\_inter\_cca | | | | TPSS/SSS\_sync\_inter\_cca | | | |
| EPRE ratio of PSS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | | | |  | | | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2,3,4,5,6 | 0 | | | | 0 | | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | | | |  | | | |
| Note2 | | dBm/15kHz | Config 1,2,3,4,5,6 | -104+TT | | | | -98+TT | | | |
| Note2 | | dBm/SCS | Config 1,2,4,5 | -101+TT | | | | -98+TT | | | |
|  | | Config 3,6 | -101+TT | | | | -95+TT | | | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2,4,5 | -94+TT | | -94+TT | | -Infinity | | -91+TT | |
|  | | Config 3,6 | -91+TT | | -91+TT | | -Infinity | | -88+TT | |
|  | | dB | Config 1,2,3,4,5,6 | 4+TT | | 4+TT | | -Infinity | | 7+TT | |
|  | | dB | Config 1,2,3,4,5,6 | 4+TT | | 4+TT | | -Infinity | | 7+TT | |
| IoNote3 | | dBm/9.36MHz | NR Config 1,2,4,5 | -58.49+TT | | -58.49+TT | | -70.05+TT | | -62.26+TT | |
| dBm/38.16MHz | NR Config 3,6 | -58.49+TT | | -58.49+TT | | -63.94+TT | | -56.15+TT | |
| Propagation Condition | |  | Config 1,2,3,4,5,6 | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | | | | | |

Table 10.4.2.10.5-2: DRX-Configuration for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with SSB time index detection when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
|  | Value | Value |  |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [13] |
| drx-InactivityTimer | ms1 | ms1 |  |
| drx-RetransmissionTimerDL | sl1 | sl1 |  |
| drx-RetransmissionTimerUL | sl1 | sl1 |  |
| drx-LongCycleStartOffset | ms40 | ms640 |  |
| shortDRX | disable | disable |  |

Table 10.4.2.10.5-3: *TimeAlignmentTimer* Configuration for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with SSB time index detection when DRX is used

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [13] |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

Tidentify\_inter\_cca\_with\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca + TSSB\_time\_index\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 10.4.2.0.1.1-1.

TSSB\_time\_index\_inter\_cca: it is the time period used to acquire the index of the SSB being measured given in table 10.4.2.0.1.1-2.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 10.4.2.0.1.2-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

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

### 10.4.3 L1-RSRP measurement for beam reporting under CCA

#### 10.4.3.0 Minimum conformance requirements

10.4.3.0.1 Minimum conformance requitements for SSB-based L1-RSRP measurement for beam reporting under CCA

10.4.3.0.1.1 SSB-based L1-RSRP Reporting under CCA

The UE shall be capable of performing L1-RSRP measurements based on the configured SSB resource under CCA for L1-RSRP computation, and the UE physical layer shall be capable of reporting L1-RSRP measured over the measurement period of TL1-RSRP\_Measurement\_Period\_SSB\_CCA.

The value of TL1-RSRP\_Measurement\_Period\_SSB\_CCA is defined in Table 10.4.3.0.1.1-1 for FR1,

where

- M=1 if higher layer parameter *timeRestrictionForChannelMeasurement* is configured, and M=3 otherwise

For FR1,

- P=, when in the monitored cell there are GAPs configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB; and

- P=1 when in the monitored cell there are no GAPs overlapping with any occasion of the SSB.

Where:

TSSB = ssb-periodicityServingCell

TSMTCperiod = the configured SMTC period or SMTC2 period if configured

If the high layer in TS 38.331 [13] signaling of *smtc2* is configured, TSMTCperiod corresponds to the value of higher layer parameter *smtc2*; Otherwise TSMTCperiod corresponds to the value of higher layer parameter *smtc1*.

Longer evaluation period would be expected if the combination of SSB, SMTC occasion and measurement gap configurations does not meet previous conditions.

UE shall report RSRP\_0 (Not valid) if L1>L1max, where L1 and L1max are defined in Table 10.4.3.0.1.1-1.

Table 10.4.3.0.1.1-1: Measurement period TL1-RSRP\_Measurement\_Period\_SSB\_CCA for FR1

|  |  |
| --- | --- |
| Configuration | TL1-RSRP\_Measurement\_Period\_SSB\_CCA (ms) |
| non-DRX | max(TReport, ceil((M+L1)\*P)\*TSSB) |
| DRX cycle ≤ 320ms | max(TReport, ceil(1.5\*(M+L1)\*P)\*max(TDRX,TSSB)) |
| DRX cycle > 320ms | ceil((M+L1)\*P)\*TDRX |
| Note 1: TSSB = ssb-periodicityServingCell is the periodicity of the SSB-Index configured for L1-RSRP measurement. TDRX is the DRX cycle length.  TReport is configured periodicity for reporting.  Note 2: L1=0 if higher layer parameter timeRestrictionForChannelMeasurement is configured. Otherwise, when DRX is not configured L1 is the number of SSBs not available at the UE during TL1-RSRP\_Measurement\_Period\_SSB\_CCA, and when DRX is configured L1 is the number of DRX cycles in which at least one SSB is not available at the UE during TL1-RSRP\_Measurement\_Period\_SSB\_CCA, where L1 ≤ L1max. The UE is not required to determine the availability of SSB occasions more frequent than Once per Max(TReport, P \* TSSB) if no DRX is used,  Once per Max(TReport, Ceil(1.5 \* P) \* Max(TDRX, TSSB)) if DRX cycle ≤ 320ms,  Once per P \* TDRX if DRX cycle > 320ms.  Note 3: L1max =7 for Max(TDRX,TSSB) ≤ 40ms assuming TDRX=0 for non-DRX, L1max =5 for 40ms < Max(TDRX, TSSB) ≤ 320ms,  L1max =3 for TDRX > 320ms. | |

The UE shall send L1-RSRP reports only for report configurations configured for the active BWP.

The UE shall report the L1-RSRP value as a 7-bit value in the range [-140, -44] dBm with 1dB step size according to TS 38.133 [6] clause 10.1.33 for FR1 if *nrofReportedRS* is configured to one. If *nrofReportedRS* is configured to be larger than one, or if *groupBasedBeamReporting* is enabled, the UE shall use differential L1-RSRP based reporting as defined in TS 38.133 [6] clause 10.1.33 for FR1. The differential L1-RSRP is quantized to a 4-bit value with 2dB step size. The mapping between the reported L1-RSRP value and the measured quantity is described in TS 38.133 [6] Table 10.1.6.1-2.

During EN-DC operation, for FR1, when the UE is configured to perform E-UTRA SRS carrier-based switching an additional delay can be expected if the UE is capable of per-FR gap, or an additional delay can be expected.

Reported L1-RSRP measurements contained in periodic L1-RSRP measurement reports shall meet the requirements in TS 38.133 [6] clauses 10.1.33 for FR1.

The UE shall only send periodic L1-RSRP measurement reports for an active BWP.

The UE shall transmit the periodic L1-RSRP reporting on PUCCH over the air interface according to the periodicity defined in clause 5.2.1.4 in TS 38.214 [9].

The UE is required to be capable of measuring SSB for L1-RSRP without measurement gaps. The UE is required to perform the SSB measurements with measurement restrictions as described in the following clauses.

When the SSB for L1-RSRP measurement is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement,

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;

- If SSB and CSI-RS have different SCS,

- If UE supports simultaneousRxDataSSB-DiffNumerology, UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;

- If UE does not support simultaneousRxDataSSB-DiffNumerology, UE is required to measure SSB for L1-RSRP measurement.

The normative reference for this requirement is TS 38.133 [6] clause 9.5A.3.1, 9.5A.4.1 and 9.5A.5.1.

#### 10.4.3.1 EN-DC FR1 SSB based L1-RSRP measurement on PSCC under CCA when DRX is not used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS
* Applicability needs to be updated

10.4.3.1.1 Test purpose

To verify that the UE makes correct reporting of L1-RSRP measurement under CCA when DRX is not used. This test will partly verify the L1-RSRP measurement requirements in clause 10.4.3.0.1.1.

10.4.3.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC FR1 with a shared spectrum NR carrier, RRM measurements and UL with a shared spectrum NR carrier.

10.4.3.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.3.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.3.1.

10.4.3.1.4 Test description

There are two cells in the test, E-UTRAN Pcell (Cell 1) and FR1 PSCell (Cell 2) which operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in Table A.6B.1-1. The test configurations and parameters for the Cell 2 are given in Table 10.4.3.1.4.1-1 and Table 10.4.3.1.4.1-2 below respectively.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

10.4.3.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.3.1.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 10.4.3.1.4.1-2. Test environment parameters are given in Table 10.4.3.1.4.1-3.

Table 10.4.3.1.4.1-1: Supported test configurations for EN-DC FR1 SSB based L1-RSRP measurement on PSCC under CCA when DRX is not used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.3.1-1 | LTE FDD  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.3.1-2 | LTE TDD  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table 10.4.3.1.4.1-2: General test parameters for EN-DC FR1 SSB based L1-RSRP measurement on PSCC under CCA when DRX is not used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1,2 |  | freq1 |
| DL CCA model | 1,2 |  | As specified in D.7.2.1 |
| UL CCA model | 1,2 |  | As specified in D.7.2.2 |
| Duplex mode | 1,2 |  | TDD |
| TDD Configuration | 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | 1,2 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1,2 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1,2 |  | CCR.1.1 CCA |
| SSB configuration | 1,2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1,2 |  | OP.1 |
| Initial BWP Configuration | 1,2 |  | DLBWP.0.1 ULBWP.0.1 |
| Dedicated BWP configuration | 1,2 |  | DLBWP.1.1 ULBWP.1.1 |
| DBT Window Configuration | 1,2 |  | DBT.1 |
| TRS Configuration | 1,2 |  | TRS.1.2 TDD |
| DRX configuration | 1,2 |  | Off |
| reportConfigType | 1,2 |  | periodic |
| reportQuantity | 1,2 |  | ssb-Index-RSRP |
| Number of reported RS | 1,2 |  | 2 |
| L1-RSRP reporting period | 1,2 | slot | 80 |
| T1 | 1,2 | s | 5 |
| T2 | 1,2 | s | 1 |
| EPRE ratio of PSS to SSS |  |  |  |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | 1,2 | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation condition | 1,2 |  | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table 10.4.3.1.4.1-3: Test Environment parameters for EN-DC FR1 SSB based L1-RSRP measurement on PSCC under CCA when DRX is not used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.3.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. Message contents are defined in clause 10.4.3.1.4.3.

2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Table A.6B.1-1. Cell 2 is NR FR1 cell (PSCell). Cell 2 is the target for SSB based L1-RSRP measurements.

10.4.3.1.4.2 Test procedure

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test. The SS shall provide sufficient UL grants to the UE such that no SR is required for measurement reporting.

Prior to the start of the time duration T1, the UE shall be fully synchronized to PSCell. The UE shall be configured for periodic CSI reporting in PUCCH format 2 with a reporting periodicity as mentioned in the above Table 10.4.3.1.4.1-2.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *EN-DC*, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On,* according to TS 38.508-1 [14] clause 4.5 and general test parameters set according to Table 10.4.3.1.4.1-2.

2. Set the parameters according to T1 in Table 10.4.3.1.5-1. The SS shall enable DL and UL CCA model according to Table 10.4.3.1.5-1. T1 starts.

3. The UE shall be transmitting CSI on PUCCH with a periodicity of 80 slots.

4. When T1 expires, the SS shall set the parameters according to T2 in 10.4.3.1.5-1. T2 starts.

5. The UE shall start sending L1-RSRP reports. The SS shall check following requirements:

R1: the UE shall start to transmit valid reports no later than [680] ms for configuration 1 and 2 from the beginning of time period T2. A valid report shall meet the absolute L1-RSRP requirement for SSB#1 (Table 10.4.3.1.5-2 for test configurations 1, 2) and the relative L1-RSRP requirement for SSB#0 in Table 10.4.3.1.5-3. If the first valid report is received earlier than the specified time, the number of passed iterations for R1 is increased by one. Otherwise, the number of failed iterations for R1 is increased by one.

R2: the UE shall transmit reports every 80 slots until the end of time period T2. If the reports are received accordingly, the number of passed iterations for R2 is increased by one. Otherwise, the number of failed iterations for R2 is increased by one.

R3: The L1-RSRP value of SSB#1 reported by the UE is compared to the expected L1-RSRP value for SSB#1. In all consecutive reports after the first valid value is received, if the resulting value is outside the limits in Table 10.4.3.1.5-2 for test configurations 1, 2 or the UE fails to report the measurement value for SSB#1, the number of failed iterations for R3 is increased by one. Otherwise, the number of passed iterations for R3 is increased by one.

R4: The DIFF RSRP value of SSB#0 reported by the UE is compared to the expected DIFF RSRP value. In all consecutive reports after the first valid value is received, if the resulting value is outside the limits in Table 10.4.3.1.5-3 or the UE fails to report the measurement value for SSB#0, the number of failed iterations for R4 is increased by one. Otherwise, the number of passed iterations for R4 is increased by one.

6. The SS waits until T2 expires.

7. The SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. The SS then shall transmit *RRCConnectionReconfiguration* message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message.

9. If any of the reconfiguration at steps 7 or 8 fails, switch off and on the UE and ensure the UE is in RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

10. Repeat steps 2-9 until the confidence level according to Tables G.TBD in Annex G clause G.TBD is achieved.

10.4.3.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.3.1.4.3-1: Common Exception messages for EN-DC FR1 SSB based L1-RSRP measurement on PSCC under CCA when DRX is not used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.6-2 with conditions PERIODIC and SS-RSRP  Table H.3.6-3 with condition SSB  Table H.3.6-10  Table H.3.4-1  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access |

Table 10.4.3.1.4.3-2: RadioLinkMonitoringConfig

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-133 | | | |
| Information Element | Value/remark | Comment | Condition |
| RadioLinkMonitoringConfig ::= SEQUENCE { |  |  |  |
| failureDetectionResourcesToAddModList SEQUENCE (SIZE(1..maxNrofFailureDetectionResources)) OF SEQUENCE { | 1 entry |  |  |
| purpose | both | UE is configured to perform RLM and BFD based on the SSBs. |  |
| detectionResource CHOICE { |  |  |  |
| ssb-Index | 0 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

10.4.3.1.5 Test requirement

Table 10.4.3.1.5-1 defines the primary level settings for all tests for EN-DC FR1 SSB based L1-RSRP measurement on PSCC under CCA when DRX is not used.

Table 10.4.3.1.5-1: SSB specific test parameters for EN-DC FR1 SSB based L1-RSRP measurement on PSCC under CCA when DRX is not used

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL Note 4,6 | 1,2 |  | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
| DL CCA Probability PCCA\_DL Note 4.7 | 1,2 |  | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA\_UL | 1,2 |  | 1.0 | 1.0 | 1.0 | 1.0 |
| Note2 | 1,2 | dBm/15kHz | -94.65+TT | | | |
| Note2 | 1,2 | dBm/SSB SCS | -91.65+TT | | | |
|  | 1,2 | dB | 0+TT | 0+TT | -Infinity | 3+TT |
| SSB RSRP Note3 | 1,2 | dBm/SSB SCS | -91.65+TT | -91.65+TT | -Infinity | -88.65+TT |
| Io Note3 | 1,2 | dBm/38.16 MHz | -57.59+TT | -57.59+TT | -60.61+TT | -55.84+TT |
|  | 1,2 | dB | 0+TT | 0+TT | -Infinity | 3+TT |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS Res when the discovery burst is transmitted during DBT windows.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2. | | | | | | |

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in Table 10.4.3.1.5-2 and relative accuracy requirement in Table 10.4.3.1.5-3. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

Table 10.4.3.1.5-2: L1-RSRP absolute accuracy requirements for  
the reported values for all test configurations

|  |  |  |
| --- | --- | --- |
| Normal Conditions | T1 | T2 |
| Lowest reported value (SSB#1) | - | FFS |
| Highest reported value (SSB#1) | - | FFS |

Table 10.4.3.1.5-3: L1-RSRP relative accuracy requirements for  
the reported values for all test configurations

|  |  |  |
| --- | --- | --- |
| Normal Conditions | T1 | T2 |
| Lowest DIFF RSRP reported (SSB#0) | - | FFS |
| Highest DIFF RSRP reported (SSB#0) | - | FFS |

For the test to pass, the ratio of successful reported values for each requirement (R1 to R4) shall be more than 90% with a confidence level of 95%. Each requirement is evaluated independently of the others.

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

#### 10.4.3.2 EN-DC FR1 SSB based L1-RSRP measurement on PSCC under CCA when DRX is used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS
* Applicability needs to be updated

10.4.3.2.1 Test purpose

To verify that the UE makes correct reporting of L1-RSRP measurement under CCA when DRX is used. This test will partly verify the L1-RSRP measurement requirements in clause 10.4.3.0.1.1.

10.4.3.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC FR1 with a shared spectrum NR carrier, RRM measurements, UL with a shared spectrum NR carrier and long DRX cycle.

10.4.3.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.3.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.3.2.

10.4.3.2.4 Test description

There are two cells in the test, E-UTRAN Pcell (Cell 1) and FR1 PSCell (Cell 2) which operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in Table A.6B.1-1. The test configurations and parameters for the Cell 2 are given in Table 10.4.3.2.4.1-1 and Table 10.4.3.2.4.1-2 below respectively.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

10.4.3.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.3.2.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 10.4.3.2.4.1-2. Test environment parameters are given in Table 10.4.3.2.4.1-3.

Table 10.4.3.2.4.1-1: Supported test configurations for EN-DC FR1 SSB based L1-RSRP measurement on PSCC under CCA when DRX is used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.3.2-1 | LTE FDD  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.3.2-2 | LTE TDD  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table 10.4.3.2.4.1-2: General test parameters for EN-DC FR1 SSB based L1-RSRP measurement on PSCC under CCA when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1,2 |  | freq1 |
| DL CCA model | 1,2 |  | As specified in D.7.2.1 |
| UL CCA model | 1,2 |  | As specified in D.7.2.2 |
| Duplex mode | 1,2 |  | TDD |
| TDD Configuration | 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | 1,2 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1,2 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1,2 |  | CCR.1.1 CCA |
| SSB configuration | 1,2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1,2 |  | OP.1 |
| Initial BWP Configuration | 1,2 |  | DLBWP.0.1 ULBWP.0.1 |
| Dedicated BWP configuration | 1,2 |  | DLBWP.1.1 ULBWP.1.1 |
| DBT Window Configuration | 1,2 |  | DBT.1 |
| TRS Configuration | 1,2 |  | TRS.1.2 TDD |
| DRX configuration | 1,2 |  | DRX.3 |
| reportConfigType | 1,2 |  | periodic |
| reportQuantity | 1,2 |  | ssb-Index-RSRP |
| Number of reported RS | 1,2 |  | 2 |
| L1-RSRP reporting period | 1,2 | slot | 80 |
| T1 | 1,2 | s | 5 |
| T2 | 1,2 | s | 1 |
| EPRE ratio of PSS to SSS |  |  |  |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | 1,2 | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation condition | 1,2 |  | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table 10.4.3.2.4.1-3: Test Environment parameters for EN-DC FR1 SSB based L1-RSRP measurement on PSCC under CCA when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.3.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. Message contents are defined in clause 10.4.3.2.4.3.

2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Table A.6B.1-1. Cell 2 is NR FR1 cell (PSCell). Cell 2 is the target for SSB based L1-RSRP measurements. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs. DRX is configured as specified in Table 10.4.3.2.4.1-2.

10.4.3.2.4.2 Test procedure

Same test procedure as in subclause 10.4.3.1.4.2 with tables 10.4.3.1.4.1-2 and 10.4.3.1.5-1 replaced by tables 10.4.3.2.4.1-2 and 10.4.3.2.5-1.

10.4.3.2.4.3 Message contents

Same message content as in subclause 10.4.3.1.4.3 with the following exception:

Table 10.4.3.2.4.3-1: Common Exception messages for EN-DC FR1 SSB based L1-RSRP measurement on PSCC under CCA when DRX is used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.7-1 with condition DRX.3 |

10.4.3.2.5 Test requirement

Table 10.4.3.2.5-1 defines the primary level settings for all tests for EN-DC FR1 SSB based L1-RSRP measurement on PSCC under CCA when DRX is used.

Table 10.4.3.2.5-1: SSB specific test parameters for EN-DC FR1 SSB based L1-RSRP measurement on PSCC under CCA when DRX is used

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL Note 4,6 | 1,2 |  | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
| DL CCA Probability PCCA\_DL Note 4.7 | 1,2 |  | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA\_UL | 1,2 |  | 1.0 | 1.0 | 1.0 | 1.0 |
| Note2 | 1,2 | dBm/15kHz | -94.65+TT | | | |
| Note2 | 1,2 | dBm/SSB SCS | -91.65+TT | | | |
|  | 1,2 | dB | 0+TT | 0+TT | -Infinity | 3+TT |
| SSB RSRP Note3 | 1,2 | dBm/SSB SCS | -91.65+TT | -91.65+TT | -Infinity | -88.65+TT |
| Io Note3 | 1,2 | dBm/38.16 MHz | -57.59+TT | -57.59+TT | -60.61+TT | -55.84+TT |
|  | 1,2 | dB | 0+TT | 0+TT | -Infinity | 3+TT |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2. | | | | | | |

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in Table 10.4.3.2.5-2 and relative accuracy requirement in Table 10.4.3.2.5-3. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

Table 10.4.3.2.5-2: L1-RSRP absolute accuracy requirements for  
the reported values for all test configurations

|  |  |  |
| --- | --- | --- |
| Normal Conditions | T1 | T2 |
| Lowest reported value (SSB#1) | - | FFS |
| Highest reported value (SSB#1) | - | FFS |

Table 10.4.3.2.5-3: L1-RSRP relative accuracy requirements for  
the reported values for all test configurations

|  |  |  |
| --- | --- | --- |
| Normal Conditions | T1 | T2 |
| Lowest DIFF RSRP reported (SSB#0) | - | FFS |
| Highest DIFF RSRP reported (SSB#0) | - | FFS |

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

#### 10.4.3.3 EN-DC FR1 SSB based L1-RSRP measurement on SCC under CCA when DRX is not used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS
* Applicability needs to be updated

10.4.3.3.1 Test purpose

To verify that the UE makes correct reporting of L1-RSRP measurement under CCA when DRX is not used. This test will partly verify the L1-RSRP measurement requirements in clause 10.4.3.0.1.1.

10.4.3.3.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC FR1 with a shared spectrum NR carrier, RRM measurements and UL with a shared spectrum NR carrier.

10.4.3.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.3.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.3.3.

10.4.3.3.4 Test description

There are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2), and FR1 SCell (Cell 3). Cell 2 and Cell 3 operate on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in Table A.6B.1-1. The test configurations and parameters for the Cell 2 and Cell 3 are given in Table 10.4.3.3.4.1-1 and Table 10.4.3.3.4.1-2 below respectively.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

10.4.3.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.3.3.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 10.4.3.3.4.1-2. Test environment parameters are given in Table 10.4.3.3.4.1-3.

Table 10.4.3.3.4.1-1: Supported test configurations for EN-DC FR1 SSB based L1-RSRP measurement on SCC under CCA when DRX is not used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.3.3-1 | LTE FDD  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.3.3-2 | LTE TDD  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table 10.4.3.3.4.1-2: General test parameters for EN-DC FR1 SSB based L1-RSRP measurement on SCC under CCA when DRX is not used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| Active PScell | 1,2 |  | Cell 2 |
| Active Scell | 1,2 |  | Cell 3 |
| RF Channel Number | 1,2 |  | 1: Cell 2  2: Cell 3 |
| DL CCA model | 1,2 |  | As specified in D.7.2.1 |
| UL CCA model | 1,2 |  | As specified in D.7.2.2 |
| Duplex mode | 1,2 |  | TDD |
| TDD Configuration | 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | 1,2 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1,2 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1,2 |  | CCR.1.1 CCA |
| SSB configuration | 1,2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1,2 |  | OP.1 |
| Initial BWP Configuration | 1,2 |  | DLBWP.0.1 ULBWP.0.1 |
| Dedicated BWP configuration | 1,2 |  | DLBWP.1.1 ULBWP.1.1 |
| DBT Window Configuration | 1,2 |  | DBT.1 |
| TRS Configuration | 1,2 |  | TRS.1.2 TDD |
| DRX configuration | 1,2 |  | Off |
| reportConfigType | 1,2 |  | periodic |
| reportQuantity | 1,2 |  | ssb-Index-RSRP |
| Number of reported RS | 1,2 |  | 2 |
| L1-RSRP reporting period | 1,2 | slot | 80 |
| T1 | 1,2 | s | 5 |
| T2 | 1,2 | s | 1 |
| EPRE ratio of PSS to SSS |  |  |  |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | 1,2 | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation condition | 1,2 |  | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table 10.4.3.3.4.1-3: Test Environment parameters for EN-DC FR1 SSB based L1-RSRP measurement on SCC under CCA when DRX is not used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.3.3.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. Message contents are defined in clause 10.4.3.3.4.3.

2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Table A.6B.1-1. Cell 2 is NR FR1 PSCell and Cell3 is the NR FR1 SCell. Cell 3 is the target for SSB based L1-RSRP measurements. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

10.4.3.3.4.2 Test procedure

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test. The SS shall provide sufficient UL grants to the UE such that no SR is required for measurement reporting.

Prior to the start of the time duration T1, the UE shall be fully synchronized to PSCell. The UE shall be configured for periodic CSI reporting in PUCCH format 2 with a reporting periodicity as mentioned in the above table 10.4.3.3.4.1-2.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On and Test Mode On, according to TS 38.508-1 [14] clause 4.5 and general test parameters set according to Table 10.4.3.3.4.1-2.

2. Set the parameters according to T1 in Table 10.4.3.3.5-1. The SS shall enable DL and UL CCA model according to Table 10.4.3.3.5-1. T1 starts.

3. The UE shall be transmitting CSI on PUCCH with a periodicity of 80 slots.

4. When T1 expires, the SS shall set the parameters according to T2 in 10.4.3.3.5-1. T2 starts.

5. The UE shall start sending L1-RSRP reports. The SS shall check following requirements:

R1: the UE shall start to transmit valid reports no later than [680] ms for configurations 1 and 2 from the beginning of time period T2. A valid report shall meet the absolute L1-RSRP requirement for SSB#1 (Table 10.4.3.3.5-2 for test configurations 1, 2) and the relative L1-RSRP requirement for SSB#0 in Table 10.4.3.3.5-3. If the first valid report is received earlier than the specified time, the number of passed iterations for R1 is increased by one. Otherwise, the number of failed iterations for R1 is increased by one.

R2: the UE shall transmit reports every 80 slots until the end of time period T2. If the reports are received accordingly, the number of passed iterations for R2 is increased by one. Otherwise, the number of failed iterations for R2 is increased by one.

R3: The L1-RSRP value of SSB#1 reported by the UE is compared to the expected L1-RSRP value for SSB#1. In all consecutive reports after the first valid value is received, if the resulting value is outside the limits in Table 10.4.3.3.5-2 for test configurations 1, 2 or the UE fails to report the measurement value for SSB#1, the number of failed iterations for R3 is increased by one. Otherwise, the number of passed iterations for R3 is increased by one.

R4: The DIFF RSRP value of SSB#0 reported by the UE is compared to the expected DIFF RSRP value. In all consecutive reports after the first valid value is received, if the resulting value is outside the limits in Table 10.4.3.3.5-3 or the UE fails to report the measurement value for SSB#0, the number of failed iterations for R4 is increased by one. Otherwise, the number of passed iterations for R4 is increased by one.

6. The SS waits until T2 expires.

7. The SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. The SS then shall transmit *RRCConnectionReconfiguration* message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message.

9. If any the reconfiguration fails, switch off and on the UE and ensure the UE is in RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

10. Repeat steps 2-9 until the confidence level according to Tables G.TBD in Annex G clause G.TBD is achieved.

10.4.3.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.3.3.4.3-1: Common Exception messages for EN-DC FR1 SSB based L1-RSRP measurement on SCC under CCA when DRX is not used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.6-2 with conditions PERIODIC and SS-RSRP  Table H.3.6-3 with condition SSB  Table H.3.6-10  Table H.3.4-1  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access |

Table 10.4.3.3.4.3-2: RadioLinkMonitoringConfig

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-133 | | | |
| Information Element | Value/remark | Comment | Condition |
| RadioLinkMonitoringConfig ::= SEQUENCE { |  |  |  |
| failureDetectionResourcesToAddModList SEQUENCE (SIZE(1..maxNrofFailureDetectionResources)) OF SEQUENCE { | 1 entry |  |  |
| purpose | both | UE is configured to perform RLM and BFD based on the SSBs. |  |
| detectionResource CHOICE { |  |  |  |
| ssb-Index | 0 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

10.4.3.3.5 Test requirement

Table 10.4.3.3.5-1 defines the primary level settings for all tests for EN-DC FR1 SSB based L1-RSRP measurement on SCC under CCA when DRX is not used.

Table 10.4.3.3.5-1: SSB specific test parameters for EN-DC FR1 SSB based L1-RSRP measurement on SCC under CCA when DRX is not used

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL Note 4,6 | 1, 2 |  | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
| DL CCA Probability PCCA\_DL Note 4.7 | 1, 2 |  | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA\_UL | 1, 2 |  | 1.0 | 1.0 | 1.0 | 1.0 |
| Note2 | 1**,** 2 | dBm/15kHz | -94.65+TT | | | |
| Note2 | 1**,** 2 | dBm/SSB SCS | -91.65+TT | | | |
|  | 1, 2 | dB | 0+TT | 0+TT | -Infinity | 3+TT |
| SSB RSRP Note3 | 1, 2 | dBm/SSB SCS | -91.65+TT | -91.65+TT | -Infinity | -88.65+TT |
| Io Note3 | 1, 2 | dBm/38.16 MHz | -57.59+TT | -57.59+TT | -60.61+TT | -55.84+TT |
|  | 1, 2 | dB | 0+TT | 0+TT | -Infinity | 3+TT |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2. | | | | | | |

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in Table 10.4.3.3.5-2 and relative accuracy requirement in Table 10.4.3.3.5-3. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 3.

Table 10.4.3.3.5-2: L1-RSRP absolute accuracy requirements for  
the reported values for all test configurations

|  |  |  |
| --- | --- | --- |
| Normal Conditions | T1 | T2 |
| Lowest reported value (SSB#1) | - | FFS |
| Highest reported value (SSB#1) | - | FFS |

Table 10.4.3.3.5-3: L1-RSRP relative accuracy requirements for  
the reported values for all test configurations

|  |  |  |
| --- | --- | --- |
| Normal Conditions | T1 | T2 |
| Lowest DIFF RSRP reported (SSB#0) | - | FFS |
| Highest DIFF RSRP reported (SSB#0) | - | FFS |

For the test to pass, the ratio of successful reported values for each requirement (R1 to R4) shall be more than 90% with a confidence level of 95%. Each requirement is evaluated independently of the others.

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

#### 10.4.3.4 EN-DC FR1 SSB based L1-RSRP measurement on SCC under CCA when DRX is used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS
* Applicability needs to be updated

10.4.3.4.1 Test purpose

To verify that the UE makes correct reporting of L1-RSRP measurement under CCA when DRX is used. This test will partly verify the L1-RSRP measurement requirements in clause 10.4.3.0.1.1.

10.4.3.4.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC FR1 with a shared spectrum NR carrier, RRM measurements, UL with a shared spectrum NR carrier and long DRX cycle.

10.4.3.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.3.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.3.4.

10.4.3.4.4 Test description

There are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2), and FR1 SCell (Cell 3). Cell 2 and Cell 3 operate on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in Table A.6B.1-1. The test configurations and parameters for the Cell 2 are given in Table 10.4.3.4.4.1-1 and Table 10.4.3.4.4.1-2 below respectively.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

10.4.3.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.3.4.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 10.4.3.4.4.1-2. Test environment parameters are given in Table 10.4.3.4.4.1-3.

Table 10.4.3.2.4.1-1: Supported test configurations for EN-DC FR1 SSB based L1-RSRP measurement on SCC under CCA when DRX is used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.3.4-1 | LTE FDD  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.3.4-2 | LTE TDD  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table 10.4.3.4.4.1-2: General test parameters for EN-DC FR1 SSB based L1-RSRP measurement on SCC under CCA when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| Active PScell | 1,2 |  | Cell 2 |
| Active Scell | 1,2 |  | Cell 3 |
| RF Channel Number | 1,2 |  | 1: Cell 2  2: Cell 3 |
| DL CCA model | 1,2 |  | As specified in D.7.2.1 |
| UL CCA model | 1,2 |  | As specified in D.7.2.2 |
| Duplex mode | 1,2 |  | TDD |
| TDD Configuration | 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | 1,2 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1,2 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1,2 |  | CCR.1.1 CCA |
| SSB configuration | 1,2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1,2 |  | OP.1 |
| Initial BWP Configuration | 1,2 |  | DLBWP.0.1 ULBWP.0.1 |
| Dedicated BWP configuration | 1,2 |  | DLBWP.1.1 ULBWP.1.1 |
| DBT Window Configuration | 1,2 |  | DBT.1 |
| TRS Configuration | 1,2 |  | TRS.1.2 TDD |
| DRX configuration | 1,2 |  | DRX.3 |
| reportConfigType | 1,2 |  | periodic |
| reportQuantity | 1,2 |  | ssb-Index-RSRP |
| Number of reported RS | 1,2 |  | 2 |
| L1-RSRP reporting period | 1,2 | slot | 80 |
| T1 | 1,2 | s | 5 |
| T2 | 1,2 | s | 1 |
| EPRE ratio of PSS to SSS |  |  |  |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | 1,2 | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation condition | 1,2 |  | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table 10.4.3.4.4.1-3: Test Environment parameters for EN-DC FR1 SSB based L1-RSRP measurement on SCC under CCA when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.3.4.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. Message contents are defined in clause 10.4.3.4.4.3.

2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Table A.6B.1-1. Cell 2 is NR FR1 PSCell and Cell3 is the NR FR1 SCell. Cell 3 is the target for SSB based L1-RSRP measurements. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs. DRX is configured as specified in Table 10.4.3.4.4.1-2.

10.4.3.4.4.2 Test procedure

Same test procedure as in subclause 10.4.3.3.4.2 with tables 10.4.3.3.4.1-2 and 10.4.3.3.5-1 replaced by tables 10.4.3.4.4.1-2 and 10.4.3.4.5-1.

10.4.3.4.4.3 Message contents

Same message content as in subclause 10.4.3.4.4.3 with the following exception:

Table 10.4.3.4.4.3-1: Common Exception messages for EN-DC FR1 SSB based L1-RSRP measurement on SCC under CCA when DRX is used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.7-1 with condition DRX.3 |

10.4.3.4.5 Test requirement

Table 10.4.3.4.5-1 defines the primary level settings for all tests for EN-DC FR1 SSB based L1-RSRP measurement on SCC under CCA when DRX is used.

Table 10.4.3.4.5-1: SSB specific test parameters for EN-DC FR1 SSB based L1-RSRP measurement on SCC under CCA when DRX is used

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL Note 4,6 | 1, 2 |  | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
| DL CCA Probability PCCA\_DL Note 4.7 | 1, 2 |  | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA\_UL | 1, 2 |  | 1.0 | 1.0 | 1.0 | 1.0 |
| Note2 | 1, 2 | dBm/15kHz | -94.65+TT | | | |
| Note2 | 1, 2 | dBm/SSB SCS | -91.65+TT | | | |
|  | 1, 2 | dB | 0+TT | 0+TT | -Infinity | 3+TT |
| SSB RSRP Note3 | 1, 2 | dBm/SSB SCS | -91.65+TT | -91.65+TT | -Infinity | -88.65+TT |
| Io Note3 | 1, 2 | dBm/38.16 MHz | -57.59+TT | -57.59+TT | -60.61+TT | -55.84+TT |
|  | 1, 2 | dB | 0+TT | 0+TT | -Infinity | 3+TT |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2. | | | | | | |

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in Table 10.4.3.4.5-2 and relative accuracy requirement in Table 10.4.3.4.5-3. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 3.

Table 10.4.3.4.5-2: L1-RSRP absolute accuracy requirements for  
the reported values for all test configurations

|  |  |  |
| --- | --- | --- |
| Normal Conditions | T1 | T2 |
| Lowest reported value (SSB#1) | - | FFS |
| Highest reported value (SSB#1) | - | FFS |

Table 10.4.3.4.5-3: L1-RSRP relative accuracy requirements for  
the reported values for all test configurations

|  |  |  |
| --- | --- | --- |
| Normal Conditions | T1 | T2 |
| Lowest DIFF RSRP reported (SSB#0) | - | FFS |
| Highest DIFF RSRP reported (SSB#0) | - | FFS |

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

### 10.4.4 E-UTRAN-NR inter-RAT measurements on NR carrier frequency under CCA

#### 10.4.4.0 Minimum conformance requirements

10.4.4.0.1 Minimum conformance requitements for E-UTRAN FDD – NR measurements when CCA is used

Requirements in this clause shall apply for NR capable UE, when NR is in carrier frequencies with CCA and not configured with EN-DC.

The UE shall be able to identify new RAT E-UTRAN FDD-NR cells and perform SS-RSRP, SS-RSRQ, and SS-SINR measurements of identified inter-RAT cells if carrier frequency information is provided by the PCell, even if no explicit neighbour list with physical layer cell identities is provided.

In the requirements of clause 10.4.4.0.1, the term SMTC occasion not available at the UE refers to when the SMTC contains SSBs configured by gNB in a cell on a carrier frequency subject to CCA, but the *N* candidate SSB positions for the same SS/PBCH block index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the corresponding period, where:

- For the cell detection procedure: *N* is at least one candidate SSB position (NOTE: the one candidate SSB position for the cell detection shall not be impacted by the set of candidate SSB positions which are already being measured by the UE within the current measurement period of the on-going measurements), and

- For other procedures in clause 10.4.4.0.1: *N* are the first two successive candidate SSB positions when two or more candidate SSB positions are configured for this SSB index in one discovery burst transmission window, otherwise N is one candidate SSB position;

otherwise the SMTC occasion is considered as available at the UE.

The normative reference for this requirement is TS 36.133 [23] clause 8.1.2.4.21A.

10.4.4.0.1.1 Identification of a new NR cell

When measurement gaps are scheduled, the UE shall be able to identify a new detectable cell within Tidentify\_irat\_cca\_without\_index if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured). Otherwise, UE shall be able to identify a new detectable inter-RAT frequency cell within Tidentify\_irat\_cca\_with\_index. The UE shall be able to identify a new detectable inter-RAT frequency SSB of an already detected cell within Tidentify\_irat\_cca\_without\_index.

Tidentify\_irat\_cca\_without\_index = (TPSS/SSS\_sync\_irat\_cca + T SSB\_measurement\_period\_irat\_cca) ms

Tidentify\_irat\_cca\_with\_index = (TPSS/SSS\_sync\_irat\_cca + T SSB\_measurement\_period\_irat\_cca + TSSB\_time\_index\_irat\_cca) ms

Where:

TPSS/SSS\_sync\_irat\_cca: it is the time period used in PSS/SSS detection given in table 10.4.4.0.1.1-1.

TSSB\_time\_index\_irat\_cca: it is the time period used to acquire the index of the SSB being measured given in table 10.4.4.0.1.1-2.

T SSB\_measurement\_period\_irat\_cca: equal to a measurement period of SSB based measurement given in table 10.4.4.0.1.1-3.

Nfreq is defined in TS 36.133 [23] clause 8.1.2.1.1.

Table 10.4.4.0.1.1-1: Time period for PSS/SSS detection, in NR carrier frequencies with CCA

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | TPSS/SSS\_sync\_irat\_cca |
| No DRX | Max(600ms, (8 +LPSS/SSS,gaps)  × Max(MGRP, SMTC period)) × Nfreq |
| DRX cycle ≤ 320ms | Max(600ms, Ceil((8+LPSS/SSS,gaps) ×1.5) × Max(MGRP, SMTC period, DRX cycle)) × Nfreq |
| DRX cycle > 320ms | (8+LPSS/SSS,gaps) × DRX cycle × Nfreq |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 5.  NOTE 2: LPSS/SSS,gaps is the number of SMTC occasions not available at the UE during TPSS/SSS\_sync\_irat\_cca, where LPSS/SSS,gaps ≤ LPSS/SSS,gaps,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.  NOTE 3: LPSS/SSS,gaps = 12 for max(DRX cycle, SMTC period, MGRP) ≤ 40 ms LPSS/SSS,gaps = 8 for 40 ms < max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and LPSS/SSS,gaps = 5 for DRX cycle > 320 ms. | |

Upon exceeding LPSS/SSS,gaps,max, the UE is not required to meet the corresponding PSS/SSS detection requirement. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

Table 10.4.4.0.1.1-2: Time period for time index detection, in NR carrier frequencies with CCA

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | TSSB\_time\_index\_irat\_cca |
| No DRX | Max(120ms, (3 + Lind,gaps)  × Max(MGRP, SMTC period)) × Nfreq |
| DRX cycle ≤ 320ms | Max(120ms, ceil((3+ Lind,gaps)  x 1.5) × Max(MGRP, SMTC period, DRX cycle)) × Nfreq |
| DRX cycle > 320ms | (3+ Lind,gaps) × DRX cycle × Nfreq |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 5  NOTE 2: Lind,gaps is the number of SMTC occasions not available at the UE during TSSB\_time\_index\_irat\_cca, where Lind,gaps ≤ Lind,gaps,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.  NOTE 3: Lind,gaps,max = 5 for Max(DRX cycle, SMTC period, MGRP) ≤ 40 ms, Lind,gaps,max = 3 for Max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and Lind,gaps,max = 2 for DRX cycle > 320 ms. | |

The UE shall restart the time index detection upon exceeding Lind,gaps,max. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

In the requirements, an NR cell is considered to be detectable when:

- NR SS-RSRP related conditions in the accuracy requirements in Section TBD are fulfilled for a corresponding Band, together with the corresponding side conditions in TBD of TS 38.133 [6],

- NR SS-RSRQ related conditions in the accuracy requirements in Section TBD are fulfilled for a corresponding Band, together with the corresponding side conditions in TBD of TS 38.133 [6],

- NR SS-SINR related conditions in the accuracy requirements in Section TBD are fulfilled for a corresponding Band, together with the corresponding side conditions in TBD of TS 38.133 [6].

When measurement gaps are scheduled for NR measurements the UE physical layer shall be capable of reporting NR SS-RSRP, SS-RSRQ, and SS-SINR measurements to higher layers with measurement accuracy as specified in clause TBD, with measurement period as shown in table 10.4.4.0.1.1-3:

Table 10.4.4.0.1.1-3: Measurement period for inter-RAT measurements

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | T SSB\_measurement\_period\_irat\_cca |
| No DRX | Max(200ms, (8+ Lmeas) × Max(MGRP, SMTC period)) × Nfreq |
| DRX cycle ≤ 320ms | Max(200ms, ceil((8+ Lmeas) x 1.5) × Max(MGRP, SMTC period, DRX cycle)) × Nfreq |
| DRX cycle > 320ms | (8+ Lmeas) × DRX cycle × Nfreq |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 5  NOTE 3: Lmeas is the number of SMTC occasions not available at the UE during T SSB\_measurement\_period\_irat\_cca, where Lmeas ≤ Lmeas,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.  NOTE 4: Lmeas,max = 12 for Max(DRX cycle, SMTC period, MGRP) ≤ 40 ms, Lmeas,max = 8 for Max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and Lmeas,max = 5 for DRX cycle > 320 ms. | |

The UE shall restart the measurement upon exceeding Lmeas,max. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

When the time period of unsuccessful measurement attemps due to exceeding the maximum number of unavailable at the UE SMTC occasions of an already identified cell exceeds the maximum time requirement for the cell to remain known defined in clause TS 36.133 [23] 9.3A.6.3, the UE shall stop the measurement attempts on this SSB and perform the detection procedure again, like for any other SSB.

The UE shall be capable of performing SSB based SS-RSRP, SS-RSRQ, and SS-SINR for up to [7] NR carrier frequencies.

For each RAT E-UTRAN FDD-NR layer on, in carrier frequencies with CCA, the UE shall be capable of monitoring at least 4 cells.

For each RAT E-UTRAN FDD-NR layer in carrier frequencies with CCA, during each layer 1 measurement period, the UE shall be capable of monitoring at least 7 SSBs with different SSB indexes and/or PCI on the RAT E-UTRAN FDD-NR layer.

The NR SS-RSRP measurement accuracy for all measured cells shall be as specified in clause TBD. The NR SS-RSRQ measurement accuracy for all measured cells shall be as specified in clause TBD. The NR SS-SINR measurement accuracy for all measured cells shall be as specified in clause TBD.

The normative reference for this requirement is TS 36.133 [23] clause 8.1.2.4.21A.1.1.

10.4.4.0.1.2 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in TS 36.133 [23] clause 9.

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

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report and all delays due to UL CCA failures until the successful transmission of the report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than Tidentify\_irat\_cca\_without\_index or Tidentify\_irat\_cca\_with\_index defined in Clause 10.4.4.0.1.1 for the minimum requirements.When L3 filtering is used or IDC autonomous denial or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period Tidentify\_irat\_cca\_without\_index or Tidentify\_irat\_cca\_with\_index defined in clause 10.4.4.0.1.1 for the minimum requirements and then triggers the measurement report as per TS 36.331 [29], the event triggered measurement reporting delay shall be less than Tmeasurement\_NR\_cca\_FDD defined in clause 10.4.4.0.1.1 provided the timing to that cell has not changed more than ±3200 Tc while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

The normative reference for this requirement is TS 36.133 [23] clause 8.1.2.4.21A.1.3.

10.4.4.0.2 Minimum conformance requitements for E-UTRAN TDD – NR measurements when CCA is used

Requirements in this clause shall apply for NR capable UE when not configured with EN-DC, considering NR carrier frequencies with CCA.

The requirements in clause 10.4.4.0.1 also apply for this section.

The normative reference for this requirement is TS 36.133 [23] clause 8.1.2.4.22A.

#### 10.4.4.1 EN-DC FR1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS
* Applicability needs to be updated

10.4.4.1.1 Test purpose

The purpose of the test is to verify that the UE makes correct reporting of an event in non-DRX without SSB time index detection. This test will partly verify the NR inter-RAT cell search requirements in clause 10.4.4.0.1 for E-UTRAN FDD-NR measurements under CCA and clause 10.4.4.0.2 for E-UTRAN TDD-NR measurements under CCA.

10.4.4.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC FR1 with a shared spectrum NR carrier and supporting inter-RAT and RRM measurements on shared channel access. Test 2 is applicable only to UEs supporting per-FR gap (*IndependentGapConfig*, as defined in TS 38.306 [11]) and Gap Pattern Id 4, otherwise Test 1 is applicable.

10.4.4.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.4.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.4.1.

10.4.4.1.4 Test description

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test configurations and parameters are given in Tables 10.4.4.1.4.1-1, 10.4.4.1.4.1-3, 10.4.4.1.5-1 and 10.4.4.1.5-2. Cell transmits SSBs in DBT windows according to DL CCA model.

In test 1 measurement gap pattern configuration # 0 as defined in Table 10.4.4.1.4.1-3 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table 10.4.4.1.4.1-3 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise, it is only required to pass test 1.

10.4.4.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.4.1.4.1-1.

Table 10.4.4.1.4.1-1: Supported test configurations for EN-DC FR1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.4.1-1 | E-UTRAN cell: LTE FDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.4.1-2 | E-UTRAN cell: LTE TDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.4.1.4.1-2.

Table 10.4.4.1.4.1-2: Initial conditions for EN-DC FR1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.4.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT Part. and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.4.1.4.1-3.

2. Message contents are defined in clause 10.4.4.1.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR cells (PSCell and neighbour cell, respectively) in different frequencies with the power levels set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is switched off during the initial connection setup.

Table 10.4.4.1.4.1-3: General test parameters for EN-DC FR1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | | Comment |
|  | |  |  | Test 1 | Test 2 |  |
| E-UTRA RF Channel Number | |  | 1, 2 | 1 | | One E-UTRAcarrier frequency is used. |
| NR RF Chanel Number | |  | 1, 2 | 1,2 | | Two FR1 NR carrier frequency under CCA is used. |
| DL CCA model | Dynamic channel accessNote 3, 5 |  |  | As specified in clause D.7.2.1 | |  |
| Semi-static channel access Note 4, 5 |
| UL CCA model | Dynamic channel accessNote 3, 5 |  |  | As specified in clause D.7.2.2 | |  |
| Semi-static channel access Note 4, 5 |
| Active cell | |  | 1, 2 | E-UTRA cell 1 (PCell) and NR cell 2 with CCA (PSCell) | | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | |  | 1, 2 | NR cell 3 | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id | |  | 1, 2 | 0 | 4 | As specified in clause Table 8.1.2.1-1 of TS 36.133 [23]. |
| Measurement gap offset | |  | 1, 2 | 39 | 19 | As specified in TS 36.331 [29]. |
| b2-Threshold1 | | dBm | 1, 2 | Note 1 | | E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [29] |
| b2-Threshold2NR | | dBm | 1, 2 | Note 2 | | SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 3 for event B2 [29] |
| Hysteresis | | dB | 1, 2 | 0 | |  |
| CP length | |  | 1, 2 | Normal | |  |
| TimeToTrigger | | s | 1, 2 | 0 | |  |
| Filter coefficient | |  | 1, 2 | 0 | | L3 filtering is not used |
| DRX | |  | 1, 2 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells | |  | 1, 2 | 3μs | | Synchronous cells. |
| T1 | | s | 1, 2 | 5 | |  |
| T2 | | s | 1, 2 | ≥Tidentify\_irat\_cca\_without\_index | ≥Tidentify\_irat\_cca\_without\_index | Tidentify\_irat\_cca\_without\_index­ is defined in clause 10.4.4.0.1 and 10.4.4.0.2 |
| NOTE 1: The value of b2-Threshold1 is defined in Table 10.4.4.1.5-1.  NOTE 2: The value of b2-Threshold2NR is defined in Table 10.4.4.1.5-2.  NOTE 3: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 4: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 5: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | |

10.4.4.1.4.2 Test procedure

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The UE is tested when *MeasTriggerQuantity* is configured as RSRP, RSRQ and SINR for each test. 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 NR cell 3. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test. The SS shall provide sufficient UL grants to the UE such that no SR is required for measurement reporting.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters of Cell 1 and Cell 2 according to T1 in Tables 10.4.4.1.5-1 and 10.4.4.1.5-2 respectively.

3. The SS shall transmit an *RRCConnectionReconfiguration* message with event B2 configured on Cell 1.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 10.4.4.1.5-1. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Tables 10.4.4.1.5-1 and 10.4.4.1.5-2. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event B2. If the overall delays measured from the beginning of time period T2 is less than [1600] ms for Test1 or [1000] ms for Test2, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. The SS shall transmit an *RRCConnectionRelease* message to release the RRC connection on Cell 1 which includes the release of the established radio bearers as well as all radio resources.

9. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

10. The SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 [25] clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3); or

- switches on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

11. Repeat step 1-10 until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

10.4.4.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.4.1.4.3-1: Common Exception messages for EN-DC FR1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-3  Table H.3.4-4 with Condition gapUE (Test 1), or gapFR1 (Test 2)  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B2 for Test 1 or Test 2  Table H.3.4-5 with Condition Pattern #0 and gap offset = 39 (Test 1), or Pattern #4 and gap offset = 19 (Test 2)  Table H.3.4-7 with Condition Inter-RAT and EVENT B2  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |
| Specific message contents exceptions for Test Configuration 10.4.4.1-1 and 10.4.4.1-2 | Table H.3.4-6 with Conditions SMTC.1 and Synchronous cells |

10.4.4.1.5 Test requirements

Tables 10.4.4.1.5-1 and 10.4.4.1.5-2 define the primary level settings for all tests for EN-DC FR1-FR1 Event-triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is not used.

Table 10.4.4.1.5-1: E-UTRAN PCell specific test parameters for EN-DC FR1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | |
|  |  |  | T1 | T2 |
| RF channel number |  | 1, 2 | 1 | |
| Duplex mode |  | 1 | FDD | |
| 2 | TDD | |
| TDD special subframe configurationNote1 |  | 2 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 2 | 1 | |
| BWchannel | MHz | 1, 2 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 2 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 2 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 2 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2 | -77 for RSRP | |
| dB | 1, 2 | 77 for RSRQ | |
| dB | 1, 2 | 90 for SINR | |
| PBCH\_RA | dB | 1, 2 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2 | -104+TT | |
| Ês/Noc | dB | 1, 2 | 17+TT | 17+TT |
| Ês/IotNote5 | dB | 1, 2 | 17+TT | 17+TT |
| RSRPNote5 | dBm/15kHz | 1, 2 | -87+TT | -87+TT |
| SCH\_RPNote5 | dBm/15kHz | 1, 2 | -87+TT | -87+TT |
| IoNote5 | dBm/9MHz | 1, 2 | -59.13+10log (NRB,c /50)+TT | -59.13+10log (NRB,c /50)+TT |
| Propagation Condition Note6 |  | 1, 2 | ETU70 | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [23] respectively.  Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [27]. | | | | |

Table 10.4.4.1.5-2: NR neighbour cell specific test parameters for EN-DC FR1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | | | Cell 3 | |
|  |  |  | T1 | T2 | | T1 | T2 |
| NR RF Channel Number |  | 1, 2 | 2 | | | 3 | |
| TDD configuration |  | 1, 2 | TDDConf.1.1 CCA | | | TDDConf.1.1 CCA | |
| BWchannel | MHz | 1, 2 | 40: NRB,c = 106 | | | 40: NRB,c = 106 | |
| PCCA\_DL for dynamic channel access Note 6,8 |  | 1, 2 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | |
| PCCA\_DL for semi-static channel access Note 7,8 |  | 1, 2 | PCCA\_DL=0.9375 | | | PCCA\_DL=0.9375 | |
| PCCA\_UL for dynamic channel access Note 6,8 |  | 1, 2 | 1 | | | 1 | |
| PCCA\_UL for semi-static channel access Note 7,8 |  | 1, 2 | 1 | | | 1 | |
| OCNG Patterns |  | 1, 2 | OP.1 | | | OP.1 | |
| SMTC configuration |  | 1, 2 | SMTC.1 | | | SMTC.1 | |
| DBT window configuration |  | 1, 2 | DBT.1 | | | DBT.1 | |
| SSB configuration for semi-static channel access |  | 1, 2 | SSB.1 CCA | | | SSB.1 CCA | |
| SSB configuration for dynamic channel access |  | 1, 2 | SSB.2 CCA | | | SSB.2 CCA | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 30 | | | 30 | |
| b2-Threshold2NR | dBm | 1, 2 | NA | | | -98 for SS-RSRP | |
| dB | 1, 2 | NA | | | 55 for SS-RSRQ | |
|  | 1, 2 | NA | | | 50 for SS-SINR | |
| EPRE ratio of PSS to SSS |  | 1, 2 | 0 | | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | | |  | |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |  |  | | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | | |  | |
| Note2 | dBm/15kHz | 1, 2 | -98+TT | | | -98+TT | |
| Note2 | dBm/SCS | 1, 2 | -95+TT | | | -95+TT | |
| SS-RSRP Note 3,5 | dBm/SCS | 1, 2 | -91+TT | | -91+TT | -Infinity | -88+TT |
| Note 5 | dB | 1, 2 | 4+TT | | 4+TT | -Infinity | 7+TT |
| Note 5 | dB | 1, 2 | 4+TT | | 4+TT | -Infinity | 7+TT |
| IoNote3 | dBm/38.16MHz | 1, 2 | -58.49+TT | | -58.49+TT | -63.95+TT | -56.16+TT |
| Propagation Condition |  | 1, 2 | ETU70 | | | ETU70 | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, | 1x2 Low | | | 1x2 Low | |
| 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.  NOTE 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 8: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_without\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index. Tidentify\_irat\_cca\_without\_index is defined in clause 10.4.4.0.1 and 10.4.4.0.2.

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

#### 10.4.4.2 EN-DC FR1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS
* Applicability needs to be updated

10.4.4.2.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in DRX without SSB time index detection. This test will partly verify the NR inter-RAT cell search requirements in clause 10.4.4.0.1 for E-UTRAN FDD-NR measurements under CCA and clause 10.4.4.0.2 for E-UTRAN TDD-NR measurements under CCA.

10.4.4.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC FR1 with a shared spectrum NR carrier, inter-RAT and RRM measurements on shared channel access and long DRX cycle. Tests 3 and 4 are applicable only to UEs supporting per-FR gap (*IndependentGapConfig*, as defined in TS 38.306 [11]) and Gap Pattern Id 4, otherwise Tests 1 and 2 are applicable.

10.4.4.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.4.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.4.2.

10.4.4.2.4 Test description

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test configurations and parameters are given in Tables 10.4.4.2.4.1-1, 10.4.4.2.4.1-3, 10.4.4.2.5-1 and 10.4.4.2.5-2. Cell transmits SSBs in DBT windows according to DL CCA model.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table 10.4.4.2.4.1-3 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table 10.4.4.2.4.1-3 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise, it is only required to pass test 1&2.

10.4.4.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.4.2.4.1-1.

Table 10.4.4.2.4.1-1: Supported test configurations for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.4.2-1 | E-UTRAN cell: LTE FDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.4.2-2 | E-UTRAN cell: LTE TDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.4.2.4.1-2.

Table 10.4.4.2.4.1-2: Initial conditions for EN-DC FR1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.4.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT Part. and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.4.2.4.1-3.

2. Message contents are defined in clause 10.4.4.2.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR cells (PSCell and neighbour cell, respectively) in different frequencies with the power levels set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is switched off during the initial connection setup.

Table 10.4.4.2.4.1-3: General test parameters for EN-DC FR1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is used

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | | | | Comment |
|  | |  |  | Test 1 | Test 2 | Test 3 | Test 4 |  |
| E-UTRA RF Channel Number | |  | 1, 2 | 1 | | | | One E-UTRAcarrier frequency is used. |
| NR RF Chanel Number | |  | 1, 2 | 1,2 | | | | Two FR1 NR carrier frequency under CCA is used. |
| Active cell | |  | 1, 2 | E-UTRA cell 1 (PCell) and NR cell 2 with CCA (PSCell) | | | | E-UTRA cell 1 is on E-UTRA RF channel  number 1. |
| DL CCA model | Dynamic channel accessNote 3, 5 |  |  | As specified in clause D.7.2.1 | | | |  |
| Semi-static channel access Note 4, 5 |
| UL CCA model | Dynamic channel accessNote 3, 5 |  |  | As specified in clause D.7.2.2 | | | |  |
| Semi-static channel access Note 4, 5 |
| Neighbour cell | |  | 1, 2 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id | |  | 1, 2 | 0 | | 4 | | As specified in clause Table 8.1.2.1-1 of TS 36.133 [23]. |
| Measurement gap offset | |  | 1, 2 | 39 | | 19 | | As specified in TS 36.331 [29]. |
| b2-Threshold1 | | dBm | 1, 2 | Note 1 | | | | E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [29] |
| b2-Threshold2NR | | dBm | 1, 2 | Note 2 | | | | SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 3 for event B2 [29] |
| Hysteresis | | dB | 1, 2 | 0 | | | |  |
| CP length | |  | 1, 2 | Normal | | | |  |
| TimeToTrigger | | s | 1, 2 | 0 | | | |  |
| Filter coefficient | |  | 1, 2 | 0 | | | | L3 filtering is not used |
| DRX | |  | 1, 2 | DRX.9 | DRX.12 | DRX.9 | DRX.12 | As specified in Table H3.7-2 |
| Time offset between serving and neighbour cells | |  | 1, 2 | 3μs | | | | Synchronous cells. |
| T1 | | s | 1, 2 | 5 | | | |  |
| T2 | | s | 1, 2 | ≥Tidentify\_irat\_cca\_without\_index | | | | Tidentify\_irat\_cca\_without\_index­ is defined in clause 10.4.4.0.1 and 10.4.4.0.2 |
| NOTE 1: The value of b2-Threshold1 is defined in Table 10.4.4.2.5-1.  NOTE 2: The value of b2-Threshold2NR is defined in Table 10.4.4.2.5-2.  NOTE 3: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 4: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 5: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | |

10.4.4.2.4.2 Test procedure

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [29] is used. The UE is tested when *MeasTriggerQuantity* is configured as RSRP, RSRQ and SINR for each test. 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 NR cell 3. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test. The SS shall provide sufficient UL grants to the UE such that no SR is required for measurement reporting.

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

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *EN-DC*, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters of Cell 1 and Cell 2 according to T1 in Tables 10.4.4.2.5-1 and 10.4.4.2.5-2 respectively.

3. The SS shall transmit an *RRCConnectionReconfiguration* message with event B2 configured on Cell 1.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Tables 10.4.4.2.5-1 and 10.4.4.2.5-2. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Tables 10.4.4.2.5-1 and 10.4.4.2.5-2. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event B2. If the overall delays measured from the beginning of time period T2 is less than [2400] ms for Test 1 and Test3 or [16640] ms for Test2 and Test 4, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. The SS shall transmit an *RRCConnectionRelease* message to release the RRC connection on Cell 1 which includes the release of the established radio bearers as well as all radio resources.

9. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

10. The The SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 [25] clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3); or

- switches on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

11. Repeat step 1-10 until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

12. Repeat steps 1-11 for each Test in Tables 10.4.4.2.4.1-3, 10.4.4.2.5-1 and 10.4.4.2.5-2 as appropriate.

10.4.4.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.4.2.4.3-1: Common Exception messages for EN-DC FR1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-3  Table H.3.4-4 with Condition gapUE (Test 1, Test 2), or gapFR1 (Test 3, Test 4)  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B2 for Test 1 and 2 or Test 3 and 4  Table H.3.4-5 with Condition Pattern #0 and gap offset = 39 (Test 1, Test 2), or Pattern #4 and gap offset = 19 (Test 3, Test 4)  Table H.3.4-7 with Condition Inter-RAT and EVENT B2  Table H.3.7-2 with Condition DRX.9 and Gap for Test 1 and Test 3  Table H.3.7-2 with Condition DRX.12 and Gap for Test 2 and Test 4  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |
| Specific message contents exceptions for Test Configuration 10.4.4.2-1 and 10.4.4.2-2 | Table H.3.4-6 with Conditions SMTC.1 and Synchronous cells |

10.4.4.2.5 Test requirements

Tables 10.4.4.2.5-1 and 10.4.4.2.5-2 define the primary level settings for all tests for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA without SSB time index detection when DRX is used.

Table 10.4.4.2.5-1: E-UTRAN PCell specific test parameters for EN-DC FR1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is used

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | |
|  |  |  | T1 | T2 |
| RF channel number |  | 1, 2 | 1 | |
| Duplex mode |  | 1 | FDD | |
| 2 | TDD | |
| TDD special subframe configurationNote1 |  | 2 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 2 | 1 | |
| BWchannel | MHz | 1, 2 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 2 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 2 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 2 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2 | -77 for RSRP | |
| dB | 1, 2 | 77 for RSRQ | |
| dB | 1, 2 | 90 for SINR | |
| PBCH\_RA | dB | 1, 2 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2 | -104+TT | |
| Ês/Noc | dB | 1, 2 | 17+TT | 17+TT |
| Ês/IotNote5 | dB | 1, 2 | 17+TT | 17+TT |
| RSRPNote5 | dBm/15kHz | 1, 2 | -87+TT | -87+TT |
| SCH\_RPNote5 | dBm/15kHz | 1, 2 | -87+TT | -87+TT |
| IoNote5 | dBm/9MHz | 1, 2 | -59.13+10log (NRB,c /50)+TT | -59.13+10log (NRB,c /50)+TT |
| Propagation Condition Note6 |  | 1, 2 | ETU70 | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [24].  Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [23] respectively.  Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [27]. | | | | |

Table 10.4.4.2.5-2: NR neighbor cell specific test parameters for EN-DC FR1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is used

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | | | Cell 3 | |
|  |  |  | T1 | T2 | | T1 | T2 |
| NR RF Channel Number |  | 1, 2 | 2 | | | 3 | |
| TDD configuration |  | 1, 2 | TDDConf.1.1 CCA | | | TDDConf.1.1 CCA | |
| BWchannel | MHz | 1, 2 | 40: NRB,c = 106 | | | 40: NRB,c = 106 | |
| PCCA\_DL for dynamic channel access Note 6,8 |  | 1, 2 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | |
| PCCA\_DL for semi-static channel access Note 7,8 |  | 1, 2 | PCCA\_DL=0.9375 | | | PCCA\_DL=0.9375 | |
| PCCA\_UL for dynamic channel access Note 6,8 |  | 1, 2 | 1 | | | 1 | |
| PCCA\_UL for semi-static channel access Note 7,8 |  | 1, 2 | 1 | | | 1 | |
| OCNG Patterns |  | 1, 2 | OP.1 | | | OP.1 | |
| SMTC configuration |  | 1, 2 | SMTC.1 | | | SMTC.1 | |
| DBT window configuration |  | 1, 2 | DBT.1 | | | DBT.1 | |
| SSB configuration for semi-static channel access |  | 1, 2 | SSB.1 CCA | | | SSB.1 CCA | |
| SSB configuration for dynamic channel access |  | 1, 2 | SSB.2 CCA | | | SSB.2 CCA | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 30 | | | 30 | |
| b2-Threshold2NR | dBm | 1, 2 | NA | | | -98 for SS-RSRP | |
| dB | 1, 2 | NA | | | 55 for SS-RSRQ | |
|  | 1, 2 | NA | | | 50 for SS-SINR | |
| EPRE ratio of PSS to SSS |  | 1, 2 | 0 | | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | | |  | |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |  |  | | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | | |  | |
| Note2 | dBm/15kHz | 1, 2 | -98+TT | | | -98+TT | |
| Note2 | dBm/SCS | 1, 2 | -95+TT | | | -95+TT | |
| SS-RSRP Note 3,5 | dBm/SCS | 1, 2 | -91+TT | | -91+TT | -Infinity | -88+TT |
| Note 5 | dB | 1, 2 | 4+TT | | 4+TT | -Infinity | 7+TT |
| Note 5 | dB | 1, 2 | 4+TT | | 4+TT | -Infinity | 7+TT |
| IoNote3 | dBm/38.16MHz | 1, 2 | -58.49+TT | | -58.49+TT | -63.95+TT | -56.16+TT |
| Propagation Condition |  | 1, 2 | ETU70 | | | ETU70 | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, | 1x2 Low | | | 1x2 Low | |
| 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.  NOTE 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 8: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_without\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_without\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_without\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_without\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

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

#### 10.4.4.3 EN-DC FR1 E-UTRA-NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS
* Applicability needs to be updated

10.4.4.3.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in non-DRX with SSB time index detection. This test will partly verify the NR inter-RAT cell search requirements in clause 10.4.4.0.1 for E-UTRAN FDD-NR measurements under CCA and clause 10.4.4.0.2 for E-UTRAN TDD-NR measurements under CCA.

10.4.4.3.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC FR1 with a shared spectrum NR carrier, supporting inter-RAT and RRM measurements on shared channel access. Tests 2 is applicable only to UEs supporting per-FR gap (*IndependentGapConfig*, as defined in TS 38.306 [11]) and Gap Pattern Id 4, otherwise Test 1 is applicable.

10.4.4.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.4.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.4.3.

10.4.4.3.4 Test description

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test configurations and parameters are given in Tables 10.4.4.3.4.1-1, 10.4.4.3.4.1-3, 10.4.4.3.5-1 and 10.4.4.3.5-2. Cell transmits SSBs in DBT windows according to DL CCA model.

In test 1 measurement gap pattern configuration # 0 as defined in Table 10.4.4.3.4.1-3 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table 10.4.4.3.4.1-3 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise, it is only required to pass test 1.

10.4.4.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.4.3.4.1-1.

Table 10.4.4.3.4.1-1: Supported test configurations for EN-DC FR1 E-UTRA-NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.4.3-1 | E-UTRAN cell: LTE FDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.4.3-2 | E-UTRAN cell: LTE TDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.4.3.4.1-2.

Table 10.4.4.3.4.1-2: Initial conditions for EN-DC FR1 E-UTRA-NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.4.3.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT Part. and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.4.3.4.1-3.

2. Message contents are defined in clause 10.4.4.3.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR cells (PSCell and neighbour cell, respectively) in different frequencies with the power levels set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is switched off during the initial connection setup.

Table 10.4.4.3.4.1-3: General test parameters for EN-DC FR1 E-UTRA-NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | | Comment |
|  | |  |  | Test 1 | Test 2 |  |
| E-UTRA RF Channel Number | |  | 1, 2 | 1 | | One E-UTRAcarrier frequency is used. |
| NR RF Chanel Number | |  | 1, 2 | 1,2 | | Two FR1 NR carrier frequency under CCA is used. |
| DL CCA model | Dynamic channel accessNote 3, 5 |  |  | As specified in clause D.7.2.1 | |  |
| Semi-static channel access Note 4, 5 |
| UL CCA model | Dynamic channel accessNote 3, 5 |  |  | As specified in clause D.7.2.2 | |  |
| Semi-static channel access Note 4, 5 |
| Active cell | |  | 1, 2 | E-UTRA cell 1 (PCell) and NR cell 2 with CCA (PSCell) | | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | |  | 1, 2 | NR cell 3 | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id | |  | 1, 2 | 0 | 4 | As specified in clause Table 8.1.2.1-1 of TS 36.133 [23]. |
| Measurement gap offset | |  | 1, 2 | 39 | 19 | As specified in TS 36.331 [29]. |
| b2-Threshold1 | | dBm | 1, 2 | Note 1 | | E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [29] |
| b2-Threshold2NR | | dBm | 1, 2 | Note 2 | | SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 3 for event B2 [29] |
| Hysteresis | | dB | 1, 2 | 0 | |  |
| CP length | |  | 1, 2 | Normal | |  |
| TimeToTrigger | | s | 1, 2 | 0 | |  |
| Filter coefficient | |  | 1, 2 | 0 | | L3 filtering is not used |
| DRX | |  | 1, 2 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells | |  | 1, 2 | 3μs | | Synchronous cells. |
| T1 | | s | 1, 2 | 5 | |  |
| T2 | | s | 1, 2 | ≥ Tidentify\_irat\_cca\_with\_index | ≥ Tidentify\_irat\_cca\_with\_index | Tidentify\_irat\_cca\_with\_index is defined in clause 10.4.4.0.1 and 10.4.4.0.2 |
| NOTE 1: The value of b2-Threshold1 is defined in Table 10.4.4.3.5-1.  NOTE 2: The value of b2-Threshold2NR is defined in Table 10.4.4.3.5-2.  NOTE 3: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 4: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 5: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | |

10.4.4.3.4.2 Test procedure

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [29] is used. The UE is tested when *MeasTriggerQuantity* is configured as RSRP, RSRQ and SINR for each test. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. 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 NR cell 3. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test. The SS shall provide sufficient UL grants to the UE such that no SR is required for measurement reporting.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters of Cell 1 and Cell 2 according to T1 in Tables 10.4.4.3.5-1 and 10.4.4.3.5-2 respectively.

3. The SS shall transmit an *RRCConnectionReconfiguration* message with event B2 configured on Cell 1.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Tables 10.4.4.3.5-1 and 10.4.4.3.5-2. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Tables 10.4.4.3.5-1 and 10.4.4.3.5-2. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event B2. If the overall delays measured from the beginning of time period T2 is less than [1920] ms for Test1 or [1160] ms for Test2, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. The SS shall transmit an *RRCConnectionRelease* message to release the RRC connection on Cell 1 which includes the release of the established radio bearers as well as all radio resources.

9. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

10. The The SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 [25] clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3); or

- switches on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

11. Repeat step 1-10 until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

10.4.4.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.4.3.4.3-1: Common Exception messages for EN-DC FR1 E-UTRA-NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-3  Table H.3.4-4 with Condition gapUE (Test 1), or gapFR1 (Test 2)  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B2 for Test 1 or Test 2  Table H.3.4-5 with Condition Pattern #0 and gap offset = 39 (Test 1), or Pattern #4 and gap offset = 19 (Test 2)  Table H.3.4-7 with Condition Inter-RAT and EVENT B2  Table H.3.4-8 with Condition SSB-Index  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |
| Specific message contents exceptions for Test Configuration 10.4.4.3-1 and 10.4.4.3-2 | Table H.3.4-6 with Conditions SMTC.1 and Synchronous cells |

10.4.4.3.5 Test requirements

Table 10.4.4.3.5-1 and 10.4.4.3.5-2 define the primary level settings for all tests for EN-DC FR1 E-UTRA-NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used.

Table 10.4.4.3.5-1: E-UTRAN PCell specific test parameters for EN-DC FR1 E-UTRA-NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | |
|  |  |  | T1 | T2 |
| RF channel number |  | 1, 2 | 1 | |
| Duplex mode |  | 1 | FDD | |
| 2 | TDD | |
| TDD special subframe configurationNote1 |  | 2 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 2 | 1 | |
| BWchannel | MHz | 1, 2 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 2 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 2 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 2 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2 | -77 for RSRP | |
| dB | 1, 2 | 77 for RSRQ | |
| dB | 1, 2 | 90 for SINR | |
| PBCH\_RA | dB | 1, 2 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2 | -104+TT | |
| Ês/Noc | dB | 1, 2 | 17+TT | 17+TT |
| Ês/IotNote5 | dB | 1, 2 | 17+TT | 17+TT |
| RSRPNote5 | dBm/15kHz | 1, 2 | -87+TT | -87+TT |
| SCH\_RPNote5 | dBm/15kHz | 1, 2 | -87+TT | -87+TT |
| IoNote5 | dBm/9MHz | 1, 2 | -59.13+10log (NRB,c /50)+TT | -59.13+10log (NRB,c /50)+TT |
| Propagation Condition Note6 |  | 1, 2 | ETU70 | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [24].  Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [23] respectively.  Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [27]. | | | | |

Table 10.4.4.3.5-2: NR neighbor cell specific test parameters for EN-DC FR1 E-UTRA-NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | | | Cell 3 | |
|  |  |  | T1 | T2 | | T2 | T2 |
| NR RF Channel Number |  | 1, 2 | 2 | | | 3 | |
| TDD configuration |  | 1, 2 | TDDConf.1.1 CCA | | | TDDConf.1.1 CCA | |
| BWchannel | MHz | 1, 2 | 40: NRB,c = 106 | | | 40: NRB,c = 106 | |
| PCCA\_DL for dynamic channel access Note 6,8 |  | 1, 2 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | |
| PCCA\_DL for semi-static channel access Note 7,8 |  | 1, 2 | PCCA\_DL=0.9375 | | | PCCA\_DL=0.9375 | |
| PCCA\_UL for dynamic channel access Note 6,8 |  | 1, 2 | 1 | | | 1 | |
| PCCA\_UL for semi-static channel access Note 7,8 |  | 1, 2 | 1 | | | 1 | |
| OCNG Patterns |  | 1, 2 | OP.1 | | | OP.1 | |
| SMTC configuration |  | 1, 2 | SMTC.1 | | | SMTC.1 | |
| DBT window configuration |  | 1, 2 | DBT.1 | | | DBT.1 | |
| SSB configuration for semi-static channel access |  | 1, 2 | SSB.1 CCA | | | SSB.1 CCA | |
| SSB configuration for dynamic channel access |  | 1, 2 | SSB.2 CCA | | | SSB.2 CCA | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 30 | | | 30 | |
| b2-Threshold2NR | dBm | 1, 2 | NA | | | -98 for SS-RSRP | |
| dB | 1, 2 | NA | | | 55 for SS-RSRQ | |
|  | 1, 2 | NA | | | 50 for SS-SINR | |
| EPRE ratio of PSS to SSS |  | 1, 2 | 0 | | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | | |  | |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |  |  | | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | | |  | |
| Note2 | dBm/15kHz | 1, 2 | -98+TT | | | -98+TT | |
| Note2 | dBm/SCS | 1, 2 | -95+TT | | | -95+TT | |
| SS-RSRP Note 3,5 | dBm/SCS | 1, 2 | -91+TT | | -91+TT | -Infinity | -88+TT |
| Note 5 | dB | 1, 2 | 4+TT | | 4+TT | -Infinity | 7+TT |
| Note 5 | dB | 1, 2 | 4+TT | | 4+TT | -Infinity | 7+TT |
| IoNote3 | dBm/38.16MHz | 1, 2 | -58.49+TT | | -58.49+TT | -63.95+TT | -56.16+TT |
| Propagation Condition |  | 1, 2 | ETU70 | | | ETU70 | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, | 1x2 Low | | | 1x2 Low | |
| 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.  NOTE 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 8: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_with\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_with\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

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

#### 10.4.4.4 EN-DC FR1 E-UTRA-NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS
* Applicability needs to be updated

10.4.4.4.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in DRX with SSB time index detection. This test will partly verify the NR inter-RAT cell search requirements in clause 10.4.4.0.1 for E-UTRAN FDD-NR measurements under CCA and clause 10.4.4.0.2 for E-UTRAN TDD-NR measurements under CCA.

10.4.4.4.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC FR1 with a shared spectrum NR carrier, supporting inter-RAT and RRM measurements on shared channel access and long DRX cycle. Tests 3 and 4 are applicable only to UEs supporting per-FR gap (*IndependentGapConfig*, as defined in TS 38.306 [11]) and Gap Pattern Id 4, otherwise Tests 1 and 2 are applicable.

10.4.4.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.4.4.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.4.4.4.

10.4.4.4.4 Test description

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test configurations and parameters are given in Tables 10.4.4.4.4.1-1, 10.4.4.4.4.1-3, 10.4.4.4.5-1 and 10.4.4.4.5-2. Cell transmits SSBs in DBT windows according to DL CCA model.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table 10.4.4.4.4.1-3 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table 10.4.4.4.4.1-3 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise, it is only required to pass test 1&2.

10.4.4.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.4.4.4.4.1-1.

Table 10.4.4.4.4.1-1: Supported test configurations for EN-DC FR1 E-UTRA-NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

|  |  |
| --- | --- |
| Config | Description |
| 10.4.4.4-1 | E-UTRAN cell: LTE FDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.4.4.4-2 | E-UTRAN cell: LTE TDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 10.4.4.4.4.1-2.

Table 10.4.4.4.4.1-2: Initial conditions for EN-DC FR1 E-UTRA-NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.4.4.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT Part. and A.3.1.8.4 for TE Part | |  |

1. The general test parameter settings are set up according to Table 10.4.4.4.4.1-3.

2. Message contents are defined in clause 10.4.4.4.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are NR cells (PSCell and neighbour cell, respectively) in different frequencies with the power levels set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is switched off during the initial connection setup.

Table 10.4.4.4.4.1-3: General test parameters for EN-DC FR1 E-UTRA-NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | | | | Comment |
|  | |  |  | Test 1 | Test 2 | Test 3 | Test |  |
| E-UTRA RF Channel Number | |  | 1, 2 | 1 | | | | One E-UTRAcarrier frequency is used. |
| NR RF Chanel Number | |  | 1, 2 | 1,2 | | | | Two FR1 NR carrier frequency under CCA is used. |
| DL CCA model | Dynamic channel accessNote 3, 5 |  |  | As specified in clause D.7.2.1 | | | |  |
| Semi-static channel access Note 4, 5 |
| UL CCA model | Dynamic channel accessNote 3, 5 |  |  | As specified in clause D.7.2.2 | | | |  |
| Semi-static channel access Note 4, 5 |
| Active cell | |  | 1, 2 | E-UTRA cell 1 (PCell) and NR cell 2 with CCA (PSCell) | | | | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | |  | 1, 2 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id | |  | 1, 2 | 0 | | 4 | | As specified in clause Table 8.1.2.1-1 of TS 36.133 [15]. |
| Measurement gap offset | |  | 1, 2 | 39 | | 19 | | As specified in TS 36.331 [16]. |
| b2-Threshold1 | | dBm | 1, 2 | Note 1 | | | | E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16] |
| b2-Threshold2NR | | dBm | 1, 2 | Note 2 | | | | SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 3 for event B2 [16] |
| Hysteresis | | dB | 1, 2 | 0 | | | |  |
| CP length | |  | 1, 2 | Normal | | | |  |
| TimeToTrigger | | s | 1, 2 | 0 | | | |  |
| Filter coefficient | |  | 1, 2 | 0 | | | | L3 filtering is not used |
| DRX | |  | 1, 2 | DRX.9 | DRX.12 | DRX.9 | DRX.12 | As specified in Table H.3.7-2 |
| Time offset between serving and neighbour cells | |  | 1, 2 | 3μs | | | | Synchronous cells. |
| T1 | | s | 1, 2 | 5 | | | |  |
| T2 | | s | 1, 2 | ≥Tidentify\_irat\_cca\_with\_index | | | | Tidentify\_irat\_cca\_with\_index­ is defined in clause 10.4.4.0.1 and 10.4.4.0.2 |
| NOTE 1: The value of b2-Threshold1 is defined in Table 10.4.4.4.5-1.  NOTE 2: The value of b2-Threshold2NR is defined in Table 10.4.4.4.5-2.  NOTE 3: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 4: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 5: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | |

10.4.4.4.4.2 Test procedure

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [29] is used. The UE is tested when *MeasTriggerQuantity* is configured as RSRP, RSRQ and SINR for each test. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. 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 NR cell 3. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test. The SS shall provide sufficient UL grants to the UE such that no SR is required for measurement reporting.

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

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters of Cell 1 and Cell 2 according to T1 in Tables 10.4.4.4.5-1 and 10.4.4.4.5-2 respectively.

3. The SS shall transmit an *RRCConnectionReconfiguration* message with event B2 configured on Cell 1.

4. The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Tables 10.4.4.4.5-1 and 10.4.4.4.5-2. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Tables 10.4.4.4.5-1 and 10.4.4.4.5-2. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event B2. If the overall delays measured from the beginning of time period T2 is less than [2880] ms for Test 1 and Test3 or [19840] ms for Test2 and Test 4, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCConnectionReconfiguration* message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

8. The SS shall transmit an *RRCConnectionRelease* message to release the RRC connection on Cell 1 which includes the release of the established radio bearers as well as all radio resources.

9. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

10. The The SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State 3A according to TS 36.508 [25] clause 4.5.3A (if the paging fails, switches off and on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3); or

- switches on the UE and ensures the UE is in State 3A-RF according to TS 36.508 [25] clause 7.2A.3.

11. Repeat step 1-10 until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

12. Repeat steps 1-11 for each Test in Tables 10.4.4.4.4.1-3, 10.4.4.4.5-1 and 10.4.4.4.5-2 as appropriate.

10.4.4.42.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.4.4.4.4.3-1: Common Exception messages for EN-DC FR1 E-UTRA-NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.4-3  Table H.3.4-4 with Condition gapUE (Test 1, Test 2), or gapFR1 (Test 3, Test 4)  Table H.3.4-4 with Condition INTER-RAT NR, EVENT B2 for Test 1 and 2 or Test 3 and 4  Table H.3.4-5 with Condition Pattern #0 and gap offset = 39 (Test 1, Test 2), or Pattern #4 and gap offset = 19 (Test 3, Test 4)  Table H.3.4-7 with Condition Inter-RAT and EVENT B2  Table H.3.7-2 with Condition DRX.9 and Gap for Test 1 and Test 3  Table H.3.7-2 with Condition DRX.12 and Gap for Test 2 and Test 4  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |
| Specific message contents exceptions for Test Configuration 10.4.4.4-1 and 10.4.4.4-2 | Table H.3.4-6 with Conditions SMTC.1 and Synchronous cells |

10.4.4.4.5 Test requirements

Table 10.4.4.4.5-1 and 10.4.4.4.5-2 define the primary level settings for all tests for EN-DC FR1-FR1 Event triggered reporting for FR1 cell with CCA with SSB time index detection when DRX is used.

Table 10.4.4.4.5-1: E-UTRAN PCell specific test parameters for EN-DC FR1 E-UTRA-NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | |
|  |  |  | T1 | T2 |
| RF channel number |  | 1, 2 | 1 | |
| Duplex mode |  | 1 | FDD | |
| 2 | TDD | |
| TDD special subframe configurationNote1 |  | 2 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 2 | 1 | |
| BWchannel | MHz | 1, 2 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 2 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 2 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 2 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2 | -77 for RSRP | |
| dB | 1, 2 | 77 for RSRQ | |
| dB | 1, 2 | 90 for SINR | |
| PBCH\_RA | dB | 1, 2 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2 | -104+TT | |
| Ês/Noc | dB | 1, 2 | 17+TT | 17+TT |
| Ês/IotNote5 | dB | 1, 2 | 17+TT | 17+TT |
| RSRPNote5 | dBm/15kHz | 1, 2 | -87+TT | -87+TT |
| SCH\_RPNote5 | dBm/15kHz | 1, 2 | -87+TT | -87+TT |
| IoNote5 | dBm/9MHz | 1, 2 | -59.13+10log (NRB,c /50)+TT | -59.13+10log (NRB,c /50)+TT |
| Propagation Condition Note6 |  | 1, 2 | ETU70 | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | |

Table 10.4.4.4.5-2: NR neighbor cell specific test parameters for EN-DC FR1 E-UTRA-NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | | | Cell 3 | |
|  |  |  | T1 | T2 | | T2 | T2 |
| NR RF Channel Number |  | 1, 2 | 2 | | | 3 | |
| TDD configuration |  | 1, 2 | TDDConf.1.1 CCA | | | TDDConf.1.1 CCA | |
| BWchannel | MHz | 1, 2 | 40: NRB,c = 106 | | | 40: NRB,c = 106 | |
| PCCA\_DL for dynamic channel access Note 6,8 |  | 1, 2 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | |
| PCCA\_DL for semi-static channel access Note 7,8 |  | 1, 2 | PCCA\_DL=0.9375 | | | PCCA\_DL=0.9375 | |
| PCCA\_UL for dynamic channel access Note 6,8 |  | 1, 2 | 1 | | | 1 | |
| PCCA\_UL for semi-static channel access Note 7,8 |  | 1, 2 | 1 | | | 1 | |
| OCNG Patterns |  | 1, 2 | OP.1 | | | OP.1 | |
| SMTC configuration |  | 1, 2 | SMTC.1 | | | SMTC.1 | |
| DBT window configuration |  | 1, 2 | DBT.1 | | | DBT.1 | |
| SSB configuration for semi-static channel access |  | 1, 2 | SSB.1 CCA | | | SSB.1 CCA | |
| SSB configuration for dynamic channel access |  | 1, 2 | SSB.2 CCA | | | SSB.2 CCA | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 30 | | | 30 | |
| b2-Threshold2NR | dBm | 1, 2 | NA | | | -98 for SS-RSRP | |
| dB | 1, 2 | NA | | | 55 for SS-RSRQ | |
|  | 1, 2 | NA | | | 50 for SS-SINR | |
| EPRE ratio of PSS to SSS |  | 1, 2 | 0 | | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | | |  | |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |  |  | | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | | |  | |
| Note2 | dBm/15kHz | 1, 2 | -98+TT | | | -98+TT | |
| Note2 | dBm/SCS | 1, 2 | -95+TT | | | -95+TT | |
| SS-RSRP Note 3,5 | dBm/SCS | 1, 2 | -91+TT | | -91+TT | -Infinity | -88+TT |
| Note 5 | dB | 1, 2 | 4+TT | | 4+TT | -Infinity | 7+TT |
| Note 5 | dB | 1, 2 | 4+TT | | 4+TT | -Infinity | 7+TT |
| IoNote3 | dBm/38.16MHz | 1, 2 | -58.49+TT | | -58.49+TT | -63.95+TT | -56.16+TT |
| Propagation Condition |  | 1, 2 | ETU70 | | | ETU70 | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, | 1x2 Low | | | 1x2 Low | |
| 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | | | | |

In In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_with\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_with\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_with\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_with\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

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

## 10.5 Measurement Performance

### 10.5.1 SS-RSRP

#### 10.5.1.0 Minimum Conformance Requirements

##### 10.5.1.0.1 Intra-frequency absolute SS-RSRP measurement accuracy requirements under CCA

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on the same frequency as that of the serving cell under CCA.

The accuracy requirements in Table 10.5.1.0.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to 38.133 [6] Annex B.2.8 for a corresponding Band for each relevant SSB.

Table 10.5.1.0.1-1: SS-RSRP intra-frequency absolute accuracy

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±4.5 | ±9 | ≥-6 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -70 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±8 | ±11 | ≥-6 | NR\_CCA\_FR1\_I | N/A | N/A | -70 | -50 |
| NR\_CCA\_FR1\_J |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups are as defined in clause 3A.4.1. | | | | | | | |

The normative reference for this requirement is TS 38.133 [6] clause 10.1.36.1.1.

##### 10.5.1.0.2 Intra-frequency relative SS-RSRP measurement accuracy requirements under CCA

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell compared to the SS-RSRP measured from another cell on the same frequency, or between any two SS-RSRP levels measured on the same cell under CCA.

The accuracy requirements in Table 10.5.1.0.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to 38.133 [6] Annex B.2.8 for a corresponding Band for each relevant SSB.

Table 10.5.1.0.2-1: SS-RSRP intra-frequency relative accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±2 | ±3 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±3 | ±3 | ≥-6 | Note 3 | Note 3 | Note 3 | N/A | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 4: NR operating band groups are as defined in clause 3A.4.1. | | | | | | | |

The normative reference for this requirement is TS 38.133 [6] clause 10.1.36.1.2.

##### 10.5.1.0.3 Inter-frequency absolute SS-RSRP measurement accuracy requirements under CCA

The requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on a frequency under CCA that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.5.1.0.3-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to 38.133 [6] Annex B.2.9 for a corresponding Band for each relevant SSB.

Table 10.5.1.0.3-1: SS-RSRP inter-frequency absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±4.5 | ±9 | ≥-6 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -70 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±8 | ±11 | ≥-6 | NR\_CCA\_FR1\_I | N/A | N/A | -70 | -50 |
| NR\_CCA\_FR1\_J |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups are as defined in clause 3A.4.1. | | | | | | | |

The normative reference for this requirement is TS 38.133 [6] clause 10.1.37.1.1.

##### 10.5.1.0.4 Inter-frequency relative SS-RSRP measurement accuracy requirements under CCA

The relative accuracy of SS-RSRP in inter frequency case is defined as the RSRP measured from one cell on a frequency compared to the RSRP measured from another cell on a different frequency, with at least one of the two frequencies being under CCA.

The accuracy requirements in Table 10.5.1.0.4-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to 38.133 [6] Annex B.2.9 for a corresponding Band for each relevant SSB.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

- |Channel 1\_Io ‑Channel 2\_Io | ≤ 20 dB

Table 10.5.1.0.4-1: SS-RSRP inter-frequency relative accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±4.5 | ±6 | ≥-6 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: NR operating band groups are as defined in clause 3A.4.1. | | | | | | | |

The normative reference for this requirement is TS 38.133 [6] clause 10.1.37.1.2.

#### 10.5.1.1 EN-DC FR1 intra-frequency SS-RSRP measurement accuracy on a CCA serving cell

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS
* Test requirements are FFS

10.5.1.1.1 Test purpose

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.5.1.0.1 and 10.5.1.0.2 when the serving cell is subject to CCA.

10.5.1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier andsupporting intra-frequency measurements on shared channel access.

10.5.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 10.5.1.0.1 and 10.5.1.0.2 for absolute and relative accuracy, correspondingly.

The normative reference for this requirement is TS 38.133 [6] clause A.10.5.1.1.

10.5.1.1.4 Test description

Supported test configurations are shown in Table 10.5.1.1.4.1-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table 10.5.1.1.5-1. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.6B. In all test cases, Cell 2 is the PSCell, and Cell 3 is the target cell.

10.5.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.5.1.1.4.1-1.

Table 10.5.1.1.4.1-1: Supported test configurations for EN-DC FR1 intra-frequency SS-RSRP measurement accuracy on a CCA serving cell

|  |  |
| --- | --- |
| Configuration | Description |
| 10.5.1.1-1 | LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.5.1.1-2 | LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations for each supported band | |

Configure the test equipment and the DUT according to the parameters in Table 10.5.1.1.4.1-2.

Table 10.5.1.1.4.1-2: Initial conditions for EN-DC FR1 intra-frequency SS-RSRP measurement accuracy on a CCA serving cell

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.5.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 10.5.1.1.5-1.

2. Message contents are defined in clause 10.5.1.1.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is the NR cell (PSCell) with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

10.5.1.1.4.2 Test procedure

In this set of test cases there are three cells, E-UTRAN PCell (Cell 1), FR1 PSCell under CCA (Cell 2), and target neighbour FR1 Cell 3. Cell 2 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On,* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Table 10.5.1.1.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfiguration* message) on Cell 1 configuring the UE to perform intra-frequency measurements in DBT windows as specified in section 10.5.1.1.4.3.

4. The UE shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfigurationComplete* message) to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 10.5.1.1.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 5, the SS shall check the SS-RSRP reported values in the periodic *MeasurementReport*. The SS-RSRP value of Cell 3 reported by the UE is compared to the expected SS-RSRP. If the value is outside the limits in Table 10.5.1.1.5-2 or the UE fails to report the measurement value for Cell 3 [for FFS consecutive transmissions], the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 2-7 for each subtest defined in Table 10.5.1.1.5-1.

10.5.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.5.1.1.4.3-1: Common Exception messages for EN-DC FR1 intra-frequency SS-RSRP measurement accuracy on a CCA serving cell

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-5  Table H.3.1-7  Table H.3.4-1  Table H.3.4-1a  Table H.3.4-2  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access |

Table 10.5.1.1.4.3-2: *ReportConfigNR* for EN-DC FR1 intra-frequency SS-RSRP measurement accuracy on a CCA serving cell

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrq | false |  |  |
| sinr | false |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

10.5.1.1.5 Test requirements

Table 10.5.1.1.5-1 defines the primary level settings including test tolerances for EN-DC FR1 intra-frequency SS-RSRP measurement accuracy on a CCA serving cell. Table 10.5.1.1.5-2 and Table 10.5.1.1.5-3 define the absolute and relative accuracy requirements, correspondingly.

Table 10.5.1.1.5-1: Cell specific test parameters for EN-DC FR1 intra-frequency SS-RSRP measurement accuracy on a CCA serving cell

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | |
|  | | |  | Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| Physical cell ID | | |  | 489 | 0 | 489 | 0 |
| SSB ARFCN | | |  | freq1 | | | |
| Duplex mode | | Config 1, 2 |  | TDD | | | |
| TDD configuration | | Config 1, 2 |  | TDDConf.1.1 CCA | | | |
| BWchannel | | Config 1, 2 | MHz | 40: NRB,c = 106 | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | |
| Downlink dedicated BWP configuration | | |  | DLBWP.1.1 | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | |
| Uplink dedicated BWP configuration | | |  | ULBWP.1.1 | | | |
| TRS configuration | | Config 1, 2 |  | TRS.1.2 TDD | NA | TRS.1.2 TDD | NA |
| DRX Cycle | | | ms | Not Applicable | | | |
| PDSCH Reference measurement channel | | Config 1, 2 |  | SR.1.1 CCA |  | SR.1.1 CCA |  |
| RMSI CORESET Reference Channel | | Config 1, 2 |  | CR.1.1 CCA |  | CR.1.1 CCA |  |
| Control Channel RMC | | Config 1, 2 |  | CCR.1.1 CCA |  | CCR.1.1 CCA |  |
| DL CCA model | |  |  | As specified in clause D.7.2.1 | | | |
| UL CCA model | |  |  | As specified in clause D.7.2.2 | | | |
| PCCA\_DL for dynamic channel access Note 7,8 | | Config 1, 2 |  | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 |
| PCCA\_DL for semi-static channel access Note 6.8 | | Config 1, 2 |  | PCCA\_DL=0.9375 | PCCA\_DL=0.9375 | PCCA\_DL=0.9375 | PCCA\_DL=0.9375 |
| PCCA\_UL | | Config 1, 2 |  | 1 | 1 | 1 | 1 |
| SSB configuration | Semi-static channel access | Config 1, 2 |  | SSB.1 CCA  (As defined in A.3A.1) | SSB.1 CCA  (As defined in A.3A.1) | SSB.1 CCA  (As defined in A.3A.1) | SSB.1 CCA  (As defined in A.3A.1) |
| Dynamic channel access | SSB.2 CCA  (As defined in A.3A.1) | SSB.2 CCA  (As defined in A.3A.1) | SSB.2 CCA  (As defined in A.3A.1) | SSB.2 CCA  (As defined in A.3A.1) |
| Time offset with Cell 2 | | Config 1, 2 | μs | - | 3 | - | 3 |
| SMTC configuration | | Config 1, 2 |  | SMTC.1 | | | |
| DBT Window Configuration | | Config 1, 2 |  | DBT.1 (As defined in A.12.1) | | | |
| DL CCA model | | Config 1, 2 |  | As specified in clause D.7.2.1 | | | |
| UL CCA model | | Config 1, 2 |  | As specified in clause D.7.2.2 | | | |
| OCNG Patterns | | |  | OP.1 | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2 | kHz | 30kHz | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |
| Note2 | Config 1, 2 | NR\_CCA\_FR1\_I | dBm/15Khz | -94+TT | | -110+TT | |
|  |  | NR\_CCA\_FR1\_J | -109.5+TT | |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
| Note2 | Config 1, 2 | NR\_CCA\_FR1\_I | dBm/SCS | -91+TT | | -107.0+TT | |
|  |  |
|  |  |
|  |  |
|  |  | NR\_CCA\_FR1\_J | -106.5+TT | |
|  |  |
|  |  |
|  |  |
|  | | | dB | 2.46+TT | -5.97+TT | -2.01+TT | -3.54+TT |
|  | | | dB | 6+TT | 1+TT | 1+TT | 0+TT |
| SS-RSRPNote3 | Config 1, 2 | NR\_CCA\_FR1\_I | dBm/SCS | -85+TT | -90+TT | -106.00+TT | -107.00+TT |
|  |  | NR\_CCA\_FR1\_J | -105.50+TT | -106.50+TT |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
| IoNote3 | Config 1, 2 | NR\_CCA\_FR1\_I | dBm/  38.16MHz | -51.99+TT | | -70.82+TT | |
|  |  | NR\_CCA\_FR1\_J | -70.32+TT | |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 8: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | |

Table 10.5.1.1.5-2: Absolute accuracy requirements for the reported values for EN-DC FR1 intra-frequency SS-RSRP measurement accuracy on a CCA serving cell

|  |  |  |  |
| --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2 | |
| Lowest SS-RSRP reported value | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-RSRP reported value | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in clause 3A.4, Table 3A.4.1-1 | | | |

Table 10.5.1.1.5-3: Relative accuracy requirements for the reported values for EN-DC FR1 intra-frequency SS-RSRP measurement accuracy on a CCA serving cell

|  |  |  |
| --- | --- | --- |
|  | Test 1 | Test 2 |
|  | All bands | All bands |
| Normal Conditions | | |
| Lowest reported value (Cell 3) | RSRP\_x – FFS | RSRP\_x – FFS |
| Highest reported value (Cell 3) | RSRP\_x – FFS | RSRP\_x + FFS |
| Extreme Conditions | | |
| Lowest reported value (Cell 3) | RSRP\_x – FFS | RSRP\_x – FFS |
| Highest reported value (Cell 3) | RSRP\_x - FFS | RSRP\_x + FFS |
| RSRP\_x is the reported value of Cell 2 | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 10.5.1.2 EN-DC FR1-FR1 inter-frequency SS-RSRP measurement accuracy with CCA serving cell and CCA target cell

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS
* Test requirements are FFS
* SMTC config is still TBD

10.5.1.2.1 Test purpose

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.5.1.0.3 and 10.5.1.0.4 when both the serving cell and the target cell are subject to CCA.

10.5.1.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting inter-frequency measurements on shared channel access.

10.5.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 10.5.1.0.3 and 10.5.1.0.4 for absolute and relative accuracy, correspondingly.

The normative reference for this requirement is TS 38.133 [6] clause A.10.5.1.2.

10.5.1.2.4 Test description

Supported test configurations are shown in Table 10.5.1.2.4.1-1. Both absolute and relative accuracy of SS-RSRP inter-frequency measurements are tested by using the parameters in Table 10.5.1.2.5-1. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.6B. In all test cases, Cell 2 is the PSCell, and Cell 3 is the target cell. The inter-frequency measurements are supported by a measurement gap.

10.5.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.5.1.2.4.1-1.

Table 10.5.1.2.4.1-1: Supported test configurations for EN-DC FR1-FR1 inter-frequency SS-RSRP measurement accuracy with CCA serving cell and CCA target cell

|  |  |
| --- | --- |
| Configuration | Description |
| 10.5.1.2-1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.5.1.2-2 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations for each supported band | |

Configure the test equipment and the DUT according to the parameters in Table 10.5.1.2.4.1-2.

Table 10.5.1.2.4.1-2: Initial conditions for EN-DC FR1-FR1 inter-frequency SS-RSRP measurement accuracy with CCA serving cell and CCA target cell

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.5.1.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 10.5.1.2.5-1.

2. Message contents are defined in clause 10.5.1.2.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is the NR cell (PSCell) with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

10.5.1.2.4.2 Test procedure

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on a different frequency than the PSCell. Both Cell 2 and Cell 3 are subject to CCA and transmit SSBs in DBT windows according to DL CCA model. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On,* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Table 10.5.1.2.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfiguration* message) on Cell 1 configuring the UE to perform measurements in DBT windows in the target neighbouring frequency, as specified in section 10.5.1.2.4.3.

4. The UE shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfigurationComplete* message) to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 10.5.1.2.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 5, the SS shall check the SS-RSRP reported values in the periodic *MeasurementReport*. The SS-RSRP value of Cell 3 reported by the UE is compared to the expected SS-RSRP. If the value is outside the limits in Table 10.5.1.2.5-2 or the UE fails to report the measurement value for Cell 3 [for FFS consecutive transmissions], the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 2-7 for each subtest defined in Table 10.5.1.2.5-1.

10.5.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.5.1.2.4.3-1: Common Exception messages for EN-DC FR1-FR1 inter-frequency SS-RSRP measurement accuracy with CCA serving cell and CCA target cell

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with condition INTER-FREQ and GAP NEEDED  Table H.3.1-3 with Condition INTER-FREQ MO  Table H.3.1-5  Table H.3.1-7 with condition INTER-FREQ  Table H.3.4-1  Table H.3.4-1a  Table H.3.4-2  Table H.3.4-4 with Condition gapUE  Table H.3.4-5 with Condition Pattern#0  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access |

Table 10.5.1.2.4.3-2: *ReportConfigNR* for EN-DC FR1-FR1 inter-frequency SS-RSRP measurement accuracy with CCA serving cell and CCA target cell

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrq | false |  |  |
| sinr | false |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

10.5.1.2.5 Test requirements

Table 10.5.1.2.5-1 defines the primary level settings including test tolerances for EN-DC FR1-FR1 inter-frequency SS-RSRP measurement accuracy with CCA serving cell and CCA target cell. Table 10.5.1.2.5-2 and Table 10.5.1.2.5-3 define the absolute and relative accuracy requirements, correspondingly.

Table 10.5.1.2.5-1: Cell specific test parameters for EN-DC FR1-FR1 inter-frequency SS-RSRP measurement accuracy with CCA serving cell and CCA target cell

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Config | Unit | Test 1 | | Test 2 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| SSB ARFCN | | 1, 2 |  | freq1 | freq2 | freq1 | freq2 |
| BWchannel | | 1, 2 | MHz | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| Gap pattern ID | |  |  | 0 | | 0 | |
| Duplex mode | | 1, 2 |  | TDD | | TDD | |
| TDD configuration | | 1, 2 |  | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
| PDSCH Reference measurement channel | | 1, 2 |  | SR.1.1 CCA |  | SR.1.1 CCA |  |
| RMSI CORESET Reference Channel | | 1, 2 |  | CR.1.1 CCA | - | CR.1.1 CCA | - |
| Dedicated CORESET Reference Channel | | 1, 2 |  | CCR.1.1 CCA | - | CCR.1.1 CCA | - |
| SSB configuration | Semi-static channel access | 1, 2 |  | SSB.1 CCA  (As defined in A.3A.1) | | SSB.1 CCA  (As defined in A.3A.1) | |
| Dynamic channel access | SSB.2 CCA  (As defined in A.3A.1) | | SSB.2 CCA  (As defined in A.3A.1) | |
| OCNG Patterns | | 1, 2 |  | OP.1 | | OP.1 | |
| TRS configuration | | 1, 2 |  | TRS.1.2 TDD |  | TRS.1.2 TDD |  |
| Initial BWP Configuration | | 1, 2 |  | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP configuration | | 1, 2 |  | DLBWP.1.1  ULBWP.1.1 | | DLBWP.1.1  ULBWP.1.1 | |
| Time offset with Cell 2 | | 1, 2 | μs | - | 3 | - | 3 |
| SMTC configuration | | 1, 2 |  | TBD | | TBD | |
| DBT Window Configuration | | 1, 2 |  | As defined in A.12.1 | | As defined in A.12.1 | |
| DL CCA model | |  |  | As specified in clause D.7.2.1 | | | |
| UL CCA model | |  |  | As specified in clause D.7.2.2 | | | |
| EPRE ratio of PSS to SSS | |  |  |  |  |  |  |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | 1, 2 | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS | |  |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |  |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |  |  |  |  |  |
| Note2 | NR\_CCA\_FR1\_I | 1, 2 | dBm/15kHz | -94.65+TT | | ( for Cell 3 +8dB)+TT | -111+TT |
|  | NR\_CCA\_FR1\_J |  | |  | -110.5+TT |
|  |
|  |
|  |
|  |
|  |
|  |
| Note2 | NR\_CCA\_FR1\_I | 1, 2 | dBm/SSB SCS | -91.65+TT | | ( for Cell 3 +8dB)+TT | -109.00+TT |
| NR\_CCA\_FR1\_J | -108.50+TT |
|  | | 1, 2 | dB | 10+TT | 10+TT | 13+TT | -3+TT |
| SS-RSRPNote3 | NR\_CCA\_FR1\_I | 1, 2 | dBm/SCS | -81.65+TT | | (RSRP for Cell 3 +25dB)+TT | -111.00+TT |
|  | NR\_CCA\_FR1\_J | -110.50+TT |
|  |
|  |
|  |
|  |
|  |
|  |
| IoNote3 | R\_CCA\_FR1\_I | 1, 2 | dBm/  38.16MHz | -50.19+TT | | (Io for Channel 3 +19.75dB)+TT | -75.19+TT |
|  | NR\_CCA\_FR1\_J | -74.69+TT |
|  |
|  |
|  |
|  |
|  |
|  |
|  | | 1, 2 | dB | 10+TT | 10+TT | 13+TT | -3+TT |
| Propagation condition | | 1, 2 | - | AWGN | | AWGN | |
| Antenna configuration | |  |  | 1x2 | | 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: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | |

Table 10.5.1.2.5-2: Absolute accuracy requirements for the reported values for EN-DC FR1-FR1 inter-frequency SS-RSRP measurement accuracy with CCA serving cell and CCA target cell

|  |  |  |  |
| --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2 | |
| Lowest SS-RSRP reported value | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-RSRP reported value | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in clause 3A.4, Table 3A.4.1-1 | | | |

Table 10.5.1.2.5-3: Relative accuracy requirements for the reported values for EN-DC FR1-FR1 inter-frequency SS-RSRP measurement accuracy with CCA serving cell and CCA target cell

|  |  |  |
| --- | --- | --- |
|  | Test 1 | Test 2 |
|  | All bands | All bands |
| Normal Conditions | | |
| Lowest reported value (Cell 3) | RSRP\_x - FFS | RSRP\_x - FFS |
| Highest reported value (Cell 3) | RSRP\_x - FFS | RSRP\_x + FFS |
| Extreme Conditions | | |
| Lowest reported value (Cell 3) | RSRP\_x - FFS | RSRP\_x - FFS |
| Highest reported value (Cell 3) | RSRP\_x - FFS | RSRP\_x + FFS |
| RSRP\_x is the reported value of Cell 2 | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

### 10.5.2 SS-RSRQ

#### 10.5.2.0 Minimum Conformance Requirements

##### 10.5.2.0.1 Intra-frequency absolute SS-RSRQ measurement accuracy requirements under CCA

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on the same frequency as that of the serving cell under CCA.

The accuracy requirements in Table 10.5.2.0.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to 38.133 [6] Annex B.2.9 for a corresponding Band for each relevant SSB.

Table 10.5.2.0.1-1: SS-RSRQ intra-frequency absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±2.5 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±3.5 | ±4 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: NR operating band groups are as defined in clause 3A.4.1. | | | | | | | |

The normative reference for this requirement is TS 38.133 [6] clause 10.1.29.1.1.

##### 10.5.2.0.2 Void

##### 10.5.2.0.3 Inter-frequency absolute SS-RSRQ measurement accuracy requirements under CCA

The requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on a frequency under CCA that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.5.2.0.3-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to 38.133 [6] Annex B.2.10 for a corresponding Band for each relevant SSB.

Table 10.5.2.0.3-1: SS-RSRQ inter-frequency absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±2.5 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±3.5 | ±4 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: NR operating band groups are as defined in clause 3A.4.1. | | | | | | | |

The normative reference for this requirement is TS 38.133 [6] clause 10.1.30.1.1.

##### 10.5.2.0.4 Inter-frequency relative SS-RSRQ measurement accuracy requirements under CCA

The relative accuracy of SS-RSRQ in inter-frequency case is defined as the RSRQ measured from one cell on a frequency compared to the RSRQ measured from another cell on a different frequency, with at least one of the two frequencies being under CCA.

The accuracy requirements in Table 10.5.2.0.4-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to 38.133 [6] Annex B.2.9 for a corresponding Band for each relevant SSB.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

- |Channel 1\_Io ‑Channel 2\_Io | ≤ 20 dB

Table 10.5.2.0.4-1: SS-RSRQ inter-frequency relative accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 2 | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| **dB** | **dB** | **dB** |  | **dBm / SCSSSB** | | **dBm/BWChannel** | **dBm/BWChannel** |
|  |  |  |  | **SCSSSB = 15 kHz** | **SCSSSB = 30 kHz** |  |  |
| ±3 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±4 | ±4 | ≥-6 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 4: NR operating band groups are as defined in clause 3A.4.1. | | | | | | | |

The normative reference for this requirement is TS 38.133 [6] clause 10.1.30.1.2.

#### 10.5.2.1 EN-DC FR1 intra-frequency SS-RSRQ measurement accuracy with serving cell and target cell under CCA

Editor's Note:

* MU and TT analysis is incomplete
* Message contents may need to be updated
* Call setup and test procedure may need to be updated
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements are FFS
* Some parameters and/or references are still in brackets

10.5.2.1.1 Test purpose

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.5.2.0.1 when the serving and target cell are subject to CCA.

10.5.2.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC, supporting NR-U and [intra-frequency measurements on shared channel access].

10.5.2.1.3 Minimum conformance requirements

The minimum conformance requirement is specified in clause 10.5.2.0.1 for absolute RSRQ accuracy.

The normative reference for this requirement is TS 38.133 [6] clause A.10.5.2.1.

10.5.2.1.4 Test description

Supported test configurations are shown in Table 10.5.2.1.4.1-1. Absolute accuracy of SS-RSRQ intra-frequency measurements is tested by using the parameters in Table 10.5.2.1.5-1. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.6B. In all test cases, Cell 2 is the PSCell, and Cell 3 is the target cell.

10.5.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.5.2.1.4.1-1.

Table 10.5.2.1.4.1-1: Supported test configurations for EN-DC FR1 intra-frequency SS-RSRQ measurement accuracy with FR1 CCA serving cell and FR1 CCA target cell

|  |  |
| --- | --- |
| Configuration | Description |
| 10.5.2.1-1 | LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.5.2.1-2 | LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations for each supported band | |

Configure the test equipment and the DUT according to the parameters in Table 10.5.2.1.4.1-2.

Table 10.5.2.1.4.1-2: Initial conditions for EN-DC FR1 intra-frequency SS-RSRQ measurement accuracy with FR1 CCA serving cell and FR1 CCA target cell

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.5.2.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 10.5.2.1.5-1.

2. Message contents are defined in clause 10.5.2.1.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is the NR cell (PSCell) with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

10.5.2.1.4.2 Test procedure

In this test case all cells are on the same carrier frequency. The absolute accuracy of SS-RSRQ intra-frequency measurement is tested by using the parameters in Table 10.5.2.1.5-1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Table 10.5.2.1.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfiguration* message) on Cell 1 configuring the UE to perform [intra-frequency measurements in DBT windows] as specified in section 10.5.2.1.4.3.

4. The UE shall transmit an *RRCReconfigurationComplete* message (embedded in *RRCConnectionReconfigurationComplete* message) to acknowledge the configuration.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 5, the SS shall check the SS-RSRQ reported values in the periodic *MeasurementReport*. The SS-RSRQ value of Cell 3 reported by the UE is compared to the expected SS-RSRQ. If the value is outside the limits in Table 10.5.2.1.5-2 or the UE fails to report the measurement value for Cell 3, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 10.5.2.1.5-1.

10.5.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.5.2.1.4.3-1: Common Exception messages for EN-DC FR1 intra-frequency SS-RSRQ measurement accuracy on a CCA serving cell

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-5  Table H.3.1-7  Table H.3.4-1  Table H.3.4-1a  Table H.3.4-2  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 10.5.2.1.4.3-2: *ReportConfigNR* for EN-DC FR1 intra-frequency SS-RSRQ measurement accuracy with FR1 CCA serving cell and FR1 CCA target cell

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrq | true |  |  |
| sinr | false |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

10.5.2.1.5 Test requirements

Table 10.5.2.1.5-1 defines the primary level settings including test tolerances for EN-DC FR1 intra-frequency SS-RSRQ measurement accuracy on a CCA serving cell. Table 10.5.2.1.5-2 defines the absolute accuracy requirements.

Table 10.5.2.1.5-1: Cell specific test parameters for EN-DC FR1 intra-frequency SS-RSRQ measurement accuracy with FR1 CCA serving cell and FR1 CCA target cell

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Test 1 | | Test 3 | |
|  | | | |  | Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| SSB ARFCN | | | |  | freq1 | | | |
| Duplex mode | | Config 1, 2 | |  | TDD | | | |
| TDD configuration | | Config 1, 2 | |  | TDDConf.1.1 CCA | | | |
| BWchannel | | Config 1, 2 | | MHz | 40: NRB,c = 106 | | | |
| BWP configuration | | Initial DL BWP | |  | DLBWP.0.1 | | | |
|  | | Dedicated DL BWP | |  | DLBWP.1.1 | | | |
|  | | Initial UL BWP | |  | ULBWP.0.1 | | | |
|  | | Dedicated UL BWP | |  | ULBWP.1.1 | | | |
| DRX Cycle | | | | ms | Not Applicable | | | |
| PDSCH Reference measurement channel | | Config 1, 2 | |  | SR.1.1 CCA |  | SR.1.1 CCA |  |
| RMSI CORESET Reference Channel | | Config 1, 2 | |  | CR.1.1 CCA |  | CR.1.1 CCA |  |
| Control Channel RMC | | Config 1, 2 | |  | CCR.1.1 CCA |  | CCR.1.1 CCA |  |
| TRS configuration | | Config 1, 2 | |  | TRS.1.2 TDD |  | TRS.1.2 TDD |  |
| OCNG Patterns | | | |  | OP. 1 | | | |
| SS-RSSI-Measurement | | | |  | Not Applicable | | | |
| Time offset with Cell 2 | | Config 1, 2 | | μs | - | 3 | - | 3 |
| SMTC configuration | | Config 1, 2 | |  | TBD | | | |
| SSB configuration | | Semi-static channel access | Config 1, 2 |  | SSB.1 CCA  (As defined in A.3A.1.1) | | | |
|  | | Dynamic channel access |  | SSB.2 CCA  (As defined in A.3A.1.2) | | | |
| PDSCH/PDCCH | | Config 1, 2 | | kHz | 30kHz | | | |
| subcarrier spacing | |  |
| DBT Window Configuration | | Config 1, 2 | |  | DBT.1 (As defined in A.12.1) | | | |
| DL CCA model | | Config 1, 2 | |  | As specified in clause D.7.2.1 | | | |
| UL CCA model | | Config 1, 2 | |  | As specified in clause D.7.2.2 | | | |
| EPRE ratio of PSS to SSS | | | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | | |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | | |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | | |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | | |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | | |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | |  |  |  |  |
| Note2 | Config1, 2 | NR\_CCA\_FR1\_I | | Bm/15kHz | -91+TT | | -110+TT | |
|  |  | NR\_CCA\_FR1\_J | |  |  | | -109.5+TT | |
| Note2 | Config 1, 2 | NR\_CCA\_FR1\_I | | dBm/SC S | -88+TT | | -107+TT | |
|  |  | NR\_CCA\_FR1\_J | |  |  | | -106.5+TT | |
|  | | | | dB | -1.76+TT | | -5.46+TT | -5.46+TT |
|  | | | | dB | 3+TT | 3+TT | -4+TT | -4+TT |
| SS-RSRPNote3 | Config 1, 2 | NR\_CCA\_FR1\_I | | dBm/SCS | -85+TT | -85+TT | -111+TT | -111+TT |
|  |  | NR\_CCA\_FR1\_J | |  |  |  | -110.5+TT | -110.5+TT |
| SS-RSRQ Note3 | | NR\_CCA\_FR1\_I | | dB | -14.77+TT | -14.77+TT | -17.34+TT | -17.34+TT |
|  | | NR\_CCA\_FR1\_J | |  |  |  |  |
|  | |  |  |  |  |
|  | |  |  |  |  |
|  | |  |  |  |  |
|  | |  |  |  |  |
|  | |  |  |  |  |
|  | |  |  |  |  |
| IoNote3 | Config 1, 2 | NR\_CCA\_FR1\_I | | dBm/  38.16MHz | -50+TT | |  | -73.4+TT |
|  |  | NR\_CCA\_FR1\_J | |  |  | |  | -72.9+TT |
| Propagation condition | | | | - | AWGN | AWGN | AWGN | AWGN |
| Antenna configuration | | | |  | 1x2 | 1x2 | 1x2 | 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: SS-RSRQ, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in Clause 3A.4.1.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | |

Table 10.5.2.1.5-2: Absolute accuracy requirements for the reported values for EN-DC FR1 intra-frequency SS-RSRQ measurement accuracy with FR1 CCA serving cell and FR1 CCA target cell

|  |  |  |  |
| --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 3 | |
| Lowest SS-RSRQ reported value | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-RSRQ reported value | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in clause 3A.4.1, Table 3A.4.1-2A | | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 10.5.2.2 EN-DC FR1-FR1 inter-frequency SS-RSRQ measurement accuracy with serving cell and target cell under CCA

Editor's Note:

* MU and TT analysis is incomplete
* Message contents may need to be updated
* Call setup and test procedure may need to be updated
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements are FFS
* Some parameters and/or references are still in brackets
* SMTC config is still TBD

10.5.2.2.1 Test purpose

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.5.2.0.3 and 10.5.2.0.4 when both the serving cell and the target cell are subject to CCA.

10.5.2.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC, supporting NR-U and [inter-freq measurements on shared channel access].

10.5.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 10.5.2.0.3 and 10.5.2.0.4 for absolute and relative accuracy, correspondingly.

The normative reference for this requirement is TS 38.133 [6] clause A.10.5.2.2.

10.5.2.2.4 Test description

Supported test configurations are shown in Table 10.5.2.2.4.1-1. Both absolute and relative accuracy of SS-RSRQ inter-frequency measurements are tested by using the parameters in Table 10.5.2.2.5-1. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.6B. In all test cases, Cell 2 is the PSCell, and Cell 3 is the target cell. The inter-frequency measurements are supported by a measurement gap.

10.5.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.5.2.2.4.1-1.

Table 10.5.2.2.4.1-1: Supported test configurations for EN-DC FR1-FR1 inter-frequency SS-RSRQ measurement accuracy with CCA serving cell and CCA target cell

|  |  |
| --- | --- |
| Configuration | Description |
| 10.5.2.2-1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.5.2.2-2 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations for each supported band | |

Configure the test equipment and the DUT according to the parameters in Table 10.5.2.2.4.1-2.

Table 10.5.2.2.4.1-2: Initial conditions for EN-DC FR1-FR1 inter-frequency SS-RSRQ measurement accuracy with CCA serving cell and CCA target cell

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.5.2.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 10.5.2.2.5-1.

2. Message contents are defined in clause 10.5.2.2.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is the NR cell (PSCell) with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

10.5.2.2.4.2 Test procedure

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on a different frequency than the PSCell. Both Cell 2 and Cell 3 are subject to CCA and transmit SSBs in DBT windows according to DL CCA model.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Table 10.5.2.2.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfiguration* message) on Cell 1 configuring the UE to perform [measurements in DBT windows] in the target neighbouring frequency, as specified in section 10.5.2.2.4.3.

4. The UE shall transmit an *RRCReconfigurationComplete* message (embedded in *RRCConnectionReconfigurationComplete* message) to acknowledge the configuration.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 5, the SS shall check the SS-RSRQ reported values in the periodic *MeasurementReport*. The SS-RSRQ value of Cell 3 reported by the UE is compared to the expected SS-RSRQ. If the value is outside the limits in Table 10.5.2.2.5-2 or the UE fails to report the measurement value for Cell 3, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 10.5.2.2.5-1.

10.5.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.5.2.2.4.3-1: Common Exception messages for EN-DC FR1-FR1 inter-frequency SS-RSRQ measurement accuracy with CCA serving cell and CCA target cell

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with condition INTER-FREQ and GAP NEEDED  Table H.3.1-3 with Condition INTER-FREQ MO  Table H.3.1-5  Table H.3.1-7 with condition INTER-FREQ  Table H.3.4-1  Table H.3.4-1a  Table H.3.4-2  Table H.3.4-4 with Condition gapUE  Table H.3.4-5 with Condition Pattern#0  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 10.5.2.2.4.3-2: *ReportConfigNR* for EN-DC FR1-FR1 inter-frequency SS-RSRQ measurement accuracy with CCA serving cell and CCA target cell

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrq | true |  |  |
| sinr | false |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

10.5.2.2.5 Test requirements

Table 10.5.2.2.5-1 defines the primary level settings including test tolerances for EN-DC FR1-FR1 inter-frequency SS-RSRQ measurement accuracy with CCA serving cell and CCA target cell. Table 10.5.2.2.5-2 and Table 10.5.2.2.5-3 define the absolute and relative accuracy requirements, correspondingly.

Table 10.5.2.2.5-1: Cell specific test parameters for EN-DC FR1-FR1 inter-frequency SS-RSRQ measurement accuracy with CCA serving cell and CCA target cell

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | | Test 3 | |
|  | | |  | Cell 2 | Cell 3 | Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| SSB ARFCN | | |  | freq1 | freq2 | freq1 | freq2 | freq1 | freq2 |
| Duplex mode | | Config 1, 2 |  | TDD | | | | | |
| TDD configuration | | Config 1, 2 |  | TDDConf.1.1 CCA | | | | | |
| BWchannel | | Config 1, 2 |  | 40: NRB,c = 106 | | | | | |
| BWP BW | | Config 1, 2 | MHz | 40: NRB,c = 106 | | | | | |
| Gap pattern ID | |  |  | 0 | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | |
| PDSCH Reference measurement channel | | Config 1, 2 |  | SR.1.1 CCA |  | SR.1.1 CCA |  | SR.1.1 CCA |  |
| RMSI CORESET Reference Channel | | Config 1, 2 |  | CR.1.1 CCA |  | CR.1.1 CCA |  | CR.1.1 CCA |  |
| Dedicated CORESET Reference Channel | | Config 1, 2 |  | CCR.1.1 CCA |  | CCR.1.1 CCA |  | CCR.1.1 CCA |  |
| TRS configuration | | Config 1, 2 |  | TRS.1.2 TDD |  | TRS.1.2 TDD |  | TRS.1.2 TDD |  |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | | |
| Time offset with Cell 2 | | Config 1, 2 | μs | - | 3 | - | 3 | - | 3 |
| SMTC configuration | | Config 1, 2 |  | TBD | | | | | |
| SSB configuration | Semi-static channel access | Config 1, 2 |  | SSB.1 CCA | | | | | |
| Dynamic channel access | SSB.2 CCA | | | | | |
| DBT Window Configuration | | Config 1, 2 |  | DBT.1 | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2 | kHz | 30 kHz | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |  |  |  |
| Note2 | Config 1, 2 | NR\_CCA\_FR1\_I | dBm/15kHz | -86.27+TT | -86.27+TT | -113+TT | -113+TT | -112+TT | -112+TT |
|  |  | NR\_CCA\_FR1\_J |  |  |  |  |  | -111.5+TT | -111.5+TT |
| Note2 | Config 1, 2 | NR\_CCA\_FR1\_I | dBm/SCS | -83.27+TT | -83.27+TT | -110+TT | -110+TT | -109+TT | -109+TT |
|  |  | NR\_CCA\_FR1\_J |  |  |  |  |  | -108.5+TT | -108.5+TT |
|  | | | dB | -1.75+TT | -1.75+TT | -1.75+TT | -1.75+TT | 3+TT | -1.75+TT |
|  | | | dB | -1.75+TT | -1.75+TT | -1.75+TT | -1.75+TT | 3+TT | -1.75+TT |
| SS-RSRPNote3 | Config 1, 2 | NR\_CCA\_FR1\_I | dBm/SCS | -85.02+TT | -85.02+TT | -111.75+TT | -111.75+TT | -106+TT | -110.75+TT |
|  |  | NR\_CCA\_FR1\_J |  |  |  |  |  | -105.5+TT | -110.25+TT |
| SS-RSRQ Note3 | | NR\_CCA\_FR1\_I | dB | -14.77+TT | -14.77+TT | -40.59+TT | -40.59+TT | -12.56+TT | -14.76+TT |
| NR\_CCA\_FR1\_J |
| IoNote3 | Config 1, 2 | NR\_CCA\_FR1\_I | dBm/  38.16MHz | -50+TT | -50+TT | -76.73+TT | -76.73+TT | -73.19+TT | -75.23+TT |
| NR\_CCA\_FR1\_J | -72.69+TT | -74.73+TT |
| Propagation condition | | |  | AWGN | AWGN | AWGN | AWGN | AWGN | 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: SS-RSRQ, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in Clause 3A.4.1.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | | |

Table 10.5.2.2.5-2: Absolute accuracy requirements for the reported values for EN-DC FR1-FR1 inter-frequency SS-RSRQ measurement accuracy with CCA serving cell and CCA target cell

|  |  |  |  |
| --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2 | |
| Lowest SS-RSRQ reported value | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-RSRQ reported value | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in clause 3A.4.1, Table 3A.4.1-2A | | | |

Table 10.5.2.2.5-3: Relative accuracy requirements for the reported values for EN-DC FR1-FR1 inter-frequency SS-RSRQ measurement accuracy with CCA serving cell and CCA target cell

|  |  |  |
| --- | --- | --- |
|  | Test 1 | Test 2 |
|  | All bands | All bands |
| Normal Conditions | | |
| Lowest reported value (Cell 3) | RSRQ\_x - FFS | RSRQ\_x - FFS |
| Highest reported value (Cell 3) | RSRQ\_x + FFS | RSRQ\_x + FFS |
| Extreme Conditions | | |
| Lowest reported value (Cell 3) | RSRQ\_x - FFS | RSRQ\_x - FFS |
| Highest reported value (Cell 3) | RSRQ\_x + FFS | RSRQ\_x + FFS |
| RSRQ\_x is the reported value of Cell 2 | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

### 10.5.3 SS-SINR

#### 10.5.3.0 Minimum Conformance Requirements

##### 10.5.3.0.1 Intra-frequency absolute SS-SINR measurement accuracy requirements under CCA

Unless otherwise specified, the requirements for absolute accuracy of SS-SINR in this clause apply to a cell on the same frequency as that of the serving cell under CCA.

The accuracy requirements in Table 10.5.3.0.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to 38.133 [6] Annex B.2.9 for a corresponding Band for each relevant SSB.

Table 10.5.3.0.1-1: SS-SINR intra-frequency absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 3 | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±3.0 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±3.5 | ±4 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: The requirements apply for SSB Ês/Iot ≤ 25 dB.  NOTE 4: NR operating band groups are as defined in clause 3A.4.1. | | | | | | | |

The normative reference for this requirement is TS 38.133 [6] clause 10.1.31.1.1.

##### 10.5.3.0.2 Void

##### 10.5.3.0.3 Inter-frequency absolute SS-SINR measurement accuracy requirements under CCA

The requirements for absolute accuracy of SS-SINR in this clause apply to a cell on a frequency under CCA that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.5.3.0.3-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to 38.133 [6] Annex B.2.10 for a corresponding Band for each relevant SSB.

Table 10.5.3.0.3-1: SS-SINR inter-frequency absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 3 | Io Note 1 range | | | | |
|  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±3.0 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | 116.5 | -113.5 |
| ±3.5 | ±4 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: The requirements apply for SSB Ês/Iot ≤ 25 dB.  NOTE 4: NR operating band groups are as defined in clause 3A.4.1. | | | | | | | |

The normative reference for this requirement is TS 38.133 [6] clause 10.1.32.1.1.

##### 10.5.3.0.4 Inter-frequency relative SS-SINR measurement accuracy requirements under CCA

The relative accuracy of SS-SINR in inter frequency case is defined as the SS-SINR measured from one cell on a frequency compared to the SS-SINR measured from another cell on a different frequency, with at least one of the two frequencies being under CCA.

The accuracy requirements in Table 10.5.3.0.4-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to 38.133 [6] Annex B.2.10 for a corresponding Band for each relevant SSB.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

- |Channel 1\_Io ‑Channel 2\_Io | ≤ 20 dB

Table 10.5.3.0.4-1: SS-SINR inter-frequency relative accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 2,4 | NR operating band groups Note 5 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 120 kHz | SCSSSB = 240 kHz |  |  |
| ±3.5 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±4 | ±4 | ≥-6 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 4: The requirements apply for SSB Ês/Iot ≤ 25 dB.  NOTE 5: NR operating band groups are as defined in clause 3A.4.1. | | | | | | | |

The normative reference for this requirement is TS 38.133 [6] clause 10.1.32.1.2.

#### 10.5.3.1 EN-DC FR1 intra-frequency SS-SINR measurement accuracy on PSCC under CCA

Editor's Note:

* MU and TT analysis is incomplete
* Message contents may need to be updated
* Call setup and test procedure may need to be updated
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements are FFS
* Some parameters and/or references are still in brackets

10.5.3.1.1 Test purpose

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.5.3.0.1 when the serving and target cell are subject to CCA.

10.5.3.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC, supporting NR-U and [intra-frequency measurements on shared channel access].

10.5.3.1.3 Minimum conformance requirements

The minimum conformance requirement is specified in clause 10.5.3.0.1 for absolute SS-SINR accuracy.

The normative reference for this requirement is TS 38.133 [6] clause A.10.5.3.1.

10.5.3.1.4 Test description

Supported test configurations are shown in Table 10.5.3.1.4.1-1. Absolute accuracy of SS-SINR intra-frequency measurements is tested by using the parameters in Table 10.5.3.1.5-1. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.6B. In all test cases, Cell 2 is the PSCell under CCA, and Cell 3 is the target cell under CCA.

10.5.3.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.5.3.1.4.1-1.

Table 10.5.3.1.4.1-1: Supported test configurations for EN-DC FR1 intra-frequency SS-SINR measurement accuracy on PSCC under CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 10.5.3.1-1 | LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.5.3.1-2 | LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations for each supported band | |

Configure the test equipment and the DUT according to the parameters in Table 10.5.3.1.4.1-2.

Table 10.5.3.1.4.1-2: Initial conditions for EN-DC FR1 intra-frequency SS-SINR measurement accuracy on PSCC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.5.3.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 10.5.3.1.5-1.

2. Message contents are defined in clause 10.5.3.1.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is the NR cell (PSCell) with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

10.5.3.1.4.2 Test procedure

In this test case all cells are on the same carrier frequency. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table 10.5.3.1.5-1. In all test cases, Cell 2 is the PSCell with CCA and Cell 3 is the target cell with CCA. Two sub-tests (Test 1 and Test 2) are provided different Noc on Cells 2 and 3.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Table 10.5.3.1.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfiguration* message) on Cell 1 configuring the UE to perform [intra-frequency measurements in DBT windows] as specified in section 10.5.3.1.4.3.

4. The UE shall transmit an *RRCReconfigurationComplete* message (embedded in *RRCConnectionReconfigurationComplete* message) to acknowledge the configuration.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 5, the SS shall check the SS-SINR reported values in the periodic *MeasurementReport*. The SS-SINR value of Cell 3 reported by the UE is compared to the expected SS-SINR. If the value is outside the limits in Table 10.5.3.1.5-2 or the UE fails to report the measurement value for Cell 3, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 10.5.3.1.5-1.

10.5.3.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.5.3.1.4.3-1: Common Exception messages for EN-DC FR1 intra-frequency SS-SINR measurement accuracy on PSCC under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-5  Table H.3.1-7  Table H.3.4-1  Table H.3.4-1a  Table H.3.4-2  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 10.5.3.1.4.3-2: *ReportConfigNR* for EN-DC FR1 intra-frequency SS-SINR measurement accuracy on PSCC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrq | false |  |  |
| sinr | true |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

10.5.3.1.5 Test requirements

Table 10.5.3.1.5-1 defines the primary level settings including test tolerances for EN-DC FR1 intra-frequency SS-SINR measurement accuracy on a CCA serving cell. Table 10.5.3.1.5-2 defines the absolute accuracy requirements.

Table 10.5.3.1.5-1: Cell specific test parameters for EN-DC FR1 intra-frequency SS-SINR measurement accuracy on PSCC under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | |
|  | | |  | Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| SSB ARFCN | | |  | freq1 | | freq1 | |
| DL CCA model | | Config 1,2 |  | As specified in clause D.7.2.1 | | | |
| UL CCA model | | Config 1,2 |  | As specified in clause D.7.2.2 | | | |
| UL CCA probability | | PCCA\_UL |  | 1.0 | - | 1.0 | - |
| DL CCA probability for semi-static channel access Note 7, 8 | | PCCA\_DL |  | 0.9375 | - | 0.9375 | - |
| DL CCA probability for  dynamic channel access Note 8, 9 | | PCCA\_DL\_1 |  | 0.75 | - | 0.75 | - |
|  | | PCCA\_DL\_2 |  | 0.75 | - | 0.75 | - |
| Duplex mode | | Config 1,2 |  | TDD | | | |
| TDD configuration | | Config 1,2 |  | TDDConf.1.1 CCA | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | |
| Downlink dedicated BWP configuration | | |  | DLBWP.1.1 | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | |
| Uplink dedicated BWP configuration | | |  | ULBWP.1.1 | | | |
| DRX Cycle configuration | | | ms | Not Applicable | | | |
| TRS Configuration | | Config 1,2 |  | TRS.1.2 TDD |  | TRS.1.2 TDD |  |
| PDSCH Reference measurement channel | | Config 1,2 |  | SR.1.1 CCA |  | SR1.1 CCA |  |
| RMSI CORESET Reference Channel | | Config 1,2 |  | CR.1.1 CCA |  | CR.1.1 CCA |  |
| Dedicated CORESET Reference Channel | | Config 1,2 |  | CCR.1.1 CCA |  | CCR.1.1 CCA |  |
| OCNG Patterns | | |  | OP.1 | | | |
| SS-RSSI-Measurement | | |  | Not Applicable | | | |
| Time offset with Cell 2 | | Config 1,2 | μs | - | 3 | - | 3 |
| DBT Window Configuration | | Config 1,2 |  | DBT.1 | | | |
| SSB configuration | | Config 1,2 |  | SSB.1 CCA for semi-static channel access  SSB.2 CCA for dynamic channel access | | | |
| SMTC configuration | | Config 1,2 |  | SMTC.1 | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 30 | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |  |
| Note2 | | NR\_CCA\_FR1\_I | dBm/15kHz | -93+TT | | -112+TT | |
|  | | NR\_CCA\_FR1\_J |  |  | | -111.5+TT | |
| Note2 | Config 1,2 | NR\_CCA\_FR1\_I | dBm/SCS | -90+TT | | -109+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | | -108.5+TT | |
|  | | | dB | 0+TT | -3.19+TT | -5.46+TT | -5.46+TT |
|  | | | dB | 4.54+TT | 2.66+TT | -4+TT | -4+TT |
| SS-RSRPNote3 | Config 1,2 | NR\_CCA\_FR1\_I | dBm/SCS | -85.46+TT | -87.34+TT | -113+TT | -113+TT |
|  |  | NR\_CCA\_FR1\_J |  |  |  | -112.5+TT | -112.5+TT |
| SS-SINR Note3 | | NR\_CCA\_FR1\_I | dB | 0+TT | -3.19+TT | -5.46+TT | -5.46+TT |
|  | | NR\_CCA\_FR1\_J |  |  |  |  |  |
| IoNote3 | Config 1,2 | NR\_CCA\_FR1\_I | dBm/  38.16MHz | -51.41+TT | | -75.41+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | | -74.91+TT | |
| 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: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in Clause 3A.4.1.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configuration.  Note 7: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 8: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 9: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | |

Table 10.5.3.1.5-2: Absolute accuracy requirements for the reported values for EN-DC FR1 intra-frequency SS-SINR measurement accuracy on PSCC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2 | |
| Lowest SS-SINR reported value | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-SINR reported value | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in clause 3A.4.1, Table 3A.4.1-2A | | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 10.5.3.2 EN-DC FR1-FR1 inter-frequency SS-SINR measurement accuracy on PSCC under CCA

Editor's Note:

* MU and TT analysis is incomplete
* Message contents may need to be updated
* Call setup and test procedure may need to be updated
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements are FFS
* Some parameters and/or references are still in brackets
* SMTC config is still TBD

10.5.3.2.1 Test purpose

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.5.3.0.3 and 10.5.3.0.4 when both the serving cell and the target cell are subject to CCA.

10.5.3.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC, supporting NR-U and [inter-freq measurements on shared channel access].

10.5.3.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 10.5.3.0.3 and 10.5.3.0.4 for absolute and relative accuracy, correspondingly.

The normative reference for this requirement is TS 38.133 [6] clause A.10.5.3.2.

10.5.3.2.4 Test description

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table 10.5.3.2.4.1-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table 10.5.3.2.5-1. In all test cases, Cell 2 is the PSCell with CCA and Cell 3 is target cell with CCA. Cell 1 is the E-UTRA cell of which specific test parameters for this test case are specified in Table A.6B.

10.5.3.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.5.3.2.4.1-1.

Table 10.5.3.2.4.1-1: Supported test configurations for EN-DC FR1-FR1 inter-frequency SS-SINR measurement accuracy on PSCC under CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 10.5.3.2-1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.5.3.2-2 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations for each supported band | |

Configure the test equipment and the DUT according to the parameters in Table 10.5.3.2.4.1-2.

Table 10.5.3.2.4.1-2: Initial conditions for EN-DC FR1-FR1 inter-frequency SS-SINR measurement accuracy on PSCC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.5.3.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 10.5.3.2.5-1.

2. Message contents are defined in clause 10.5.3.2.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is the NR cell (PSCell) with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

10.5.3.2.4.2 Test procedure

Three sub-tests (Test 1, Test 2 and Test 3) are provided different Noc on Cells 2 and 3. In all test cases, Cell 2 is the PSCell under CCA, and Cell 3 is the target cell under CCA. The inter-frequency measurements are supported by a measurement gap.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Table 10.5.3.2.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfiguration* message) on Cell 1 configuring the UE to perform [measurements in DBT windows] in the target neighbouring frequency, as specified in section 10.5.3.2.4.3.

4. The UE shall transmit an *RRCReconfigurationComplete* message (embedded in *RRCConnectionReconfigurationComplete* message) to acknowledge the configuration.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 5, the SS shall check the SS-SINR reported values in the periodic *MeasurementReport*. The SS-SINR value of Cell 3 reported by the UE is compared to the expected SS-SINR. If the value is outside the limits in Table 10.5.3.2.5-2 or the UE fails to report the measurement value for Cell 3, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 10.5.3.2.5-1.

10.5.3.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.5.3.2.4.3-1: Common Exception messages for EN-DC FR1-FR1 inter-frequency SS-SINR measurement accuracy on PSCC under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with condition INTER-FREQ and GAP NEEDED  Table H.3.1-3 with Condition INTER-FREQ MO  Table H.3.1-5  Table H.3.1-7 with condition INTER-FREQ  Table H.3.4-1  Table H.3.4-1a  Table H.3.4-2  Table H.3.4-4 with Condition gapUE  Table H.3.4-5 with Condition Pattern#0  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 10.5.3.2.4.3-2: *ReportConfigNR* for EN-DC FR1-FR1 inter-frequency SS-SINR measurement accuracy on PSCC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrq | false |  |  |
| sinr | true |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

10.5.3.2.5 Test requirements

Table 10.5.3.2.5-1 defines the primary level settings including test tolerances for EN-DC FR1-FR1 inter-frequency SS-SINR measurement accuracy with CCA serving cell and CCA target cell. Table 10.5.3.2.5-2 and Table 10.5.3.2.5-3 define the absolute and relative accuracy requirements, correspondingly.

Table 10.5.3.2.5-1: Cell specific test parameters for EN-DC FR1-FR1 inter-frequency SS-SINR measurement accuracy on PSCC under CCA

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | | Test 3 | |
|  | | |  | Cell 2 | Cell 3 | Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| SSB ARFCN | | |  | freq1 | freq2 | freq1 | freq2 | freq1 | freq2 |
| DL CCA model | | Config 1,2 |  | As specified in clause D.7.2.1 | | | | | |
| UL CCA model | | Config 1,2 |  | As specified in clause D.7.2.2 | | | | | |
| UL CCA probability | | PCCA\_UL |  | 1.0 | - | 1.0 | - | 1.0 | - |
| DL CCA probability for semi-static channel access Note 7, 8 | | PCCA\_DL |  | 0.9375 | - | 0.9375 | - | 0.9375 | - |
| DL CCA probability for  dynamic channel access Note 8, 9 | | PCCA\_DL\_1 |  | 0.75 | - | 0.75 | - | 0.75 | - |
|  | | PCCA\_DL\_2 |  | 0.75 | - | 0.75 | - | 0.75 | - |
| Duplex mode | | Config 1,2 |  | TDD | | | | | |
| TDD configuration | | Config 1,2 |  | TDDConf.1.1 CCA | | | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | | | |
| Downlink dedicated BWP configuration | | |  | DLBWP.1.1 | | | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | | | |
| Uplink dedicated BWP configuration | | |  | ULBWP.1.1 | | | | | |
| DRX Cycle configuration | | | ms | Not Applicable | | | | | |
| Gap pattern ID | |  |  | 0 | - | 0 | - | 0 | - |
| TRS configuration | | Config 1,2 |  | TRS.1.2 TDD |  | TRS.1.2 TDD |  | TRS.1.2 TDD |  |
| PDSCH Reference measurement channel | | Config 1,2 |  | SR.1.1 CCA |  | SR.1.1 CCA |  | SR.1.1 CCA |  |
| RMSI CORESET Reference Channel | | Config 1,2 |  | CR.1.1 CCA |  | CR.1.1 CCA |  | CR.1.1 CCA |  |
| Dedicated CORESET Reference Channel | | Config 1,2 |  | CCR.1.1 CCA |  | CCR.1.1 CCA |  | CCR.1.1 CCA |  |
| OCNG Patterns | | |  | OP.1 | | | | | |
| SS-RSSI-Measurement | | |  | Not Applicable | | | | | |
| Time offset with Cell 2 | | Config 1,2 | μs | - | 3 | - | 3 | - | 3 |
| DBT Window configuration | | Config 1,2 |  | DBT.1 | | | | | |
| SSB configuration | | Config 1,2 |  | SSB.1 CCA for semi-static channel access  SSB.2 CCA for dynamic channel access | | | | | |
| SMTC configuration | | Config 1,2 |  | SMTC.1 | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 30 | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |  |  |  |
| Note2 |  | NR\_CCA\_FR1\_I | dBm/15kHz | -88+TT | | -108.5+TT | | -115.5+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | |  | | -116+TT | |
| Note2 | Config 1,2 | NR\_CCA\_FR1\_I | dBm/SCS | -85+TT | | -105.5+TT | | -112.5+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | |  | | -113+TT | |
|  | | | dB | -1.75+TT | | 20+TT | | -4.0+TT | |
|  | | | dB | -1.75+TT | | 20+TT | | -4.0+TT | |
| SS-RSRPNote3 | Config 1,2 | NR\_CCA\_FR1\_I |  | -86.75+TT | | -85.5+TT | | -116.5+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | |  | | -116+TT | |
| SS-SINR Note3 | | NR\_CCA\_FR1\_I | dB | -1.75+TT | | 20+TT | | -4.0+TT | |
|  | | NR\_CCA\_FR1\_J |  |  | |  | |  | |
| IoNote3 | Config 1,2 | NR\_CCA\_FR1\_I | dBm/  38.16MHz | -51.73+TT | | -54.41+TT | | -80+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | |  | | -79.5+TT | |
| 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: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in Clause 3A.4.1.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configuration  Note 7: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 8: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 9: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | | |

Table 10.5.3.2.5-2: Absolute accuracy requirements for the reported values for EN-DC FR1-FR1 inter-frequency SS-SINR measurement accuracy on PSCC under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2 All bands | Test 3 | |
| Lowest SS-SINR reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-SINR reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in clause 3A.4.1, Table 3A.4.1-2A | | | | |

Table 10.5.3.2.5-3: Relative accuracy requirements for the reported values for EN-DC FR1-FR1 inter-frequency SS-SINR measurement accuracy on PSCC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
|  | Test 1 | Test 2 | Test 3 |
|  | All bands | All bands | All bands |
| Normal Conditions | | | |
| Lowest reported value (Cell 3) | SINR\_x - FFS | SINR\_x - FFS | SINR\_x - FFS |
| Highest reported value (Cell 3) | SINR\_x + FFS | SINR\_x + FFS | SINR\_x + FFS |
| Extreme Conditions | | | |
| Lowest reported value (Cell 3) | SINR\_x - FFS | SINR\_x - FFS | SINR\_x - FFS |
| Highest reported value (Cell 3) | SINR\_x + FFS | SINR\_x + FFS | SINR\_x + FFS |
| SINR\_x is the reported value of Cell 2 | | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 10.5.3.3 EN-DC FR1 intra-frequency SS-SINR measurement accuracy on SCC under CCA

Editor's Note:

* MU and TT analysis is incomplete
* Message contents may need to be updated
* Call setup and test procedure may need to be updated
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements are FFS
* Some parameters and/or references are still in brackets

10.5.3.3.1 Test purpose

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.5.3.0.1 when the serving and target cell are subject to CCA.

10.5.3.3.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC, supporting NR-U and [intra-frequency measurements on shared channel access].

10.5.3.3.3 Minimum conformance requirements

The minimum conformance requirement is specified in clause 10.5.3.0.1 for absolute SS-SINR accuracy.

The normative reference for this requirement is TS 38.133 [6] clause A.10.5.3.1.

10.5.3.3.4 Test description

Supported test configurations are shown in Table 10.5.3.3.4.1-1. Absolute accuracy of SS-SINR intra-frequency measurements is tested by using the parameters in Table 10.5.3.3.5-1. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.6B. In all test cases, Cell 2 is the PSCell with CCA, Cell 3 is the SCell with CCA, and Cell 4 is the target cell with CCA.

10.5.3.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.5.3.3.4.1-1.

Table 10.5.3.3.4.1-1: Supported test configurations for EN-DC FR1 intra-frequency SS-SINR measurement accuracy on SCC under CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 10.5.3.3-1 | LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.5.3.3-2 | LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations for each supported band | |

Configure the test equipment and the DUT according to the parameters in Table 10.5.3.3.4.1-2.

Table 10.5.3.3.4.1-2: Initial conditions for EN-DC FR1 intra-frequency SS-SINR measurement accuracy on SCC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.5.3.3.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 10.5.3.3.5-1.

2. Message contents are defined in clause 10.5.3.3.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 and Cell 3 are the NR cell (PSCell) and NR SCell respectively, with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 4 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

10.5.3.3.4.2 Test procedure

In this test case Cell 2 (PSCell) in on frequency 1 while Cell 3 (SCell) and Cell 4 (target cell) which are intra-frequency neighbors, are on frequency 2. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table 10.5.3.3.5-1. Cell 2 is the PSCell with CCA, Cell 3 is the SCell with CCA, and Cell 4 is the target cell with CCA. Two sub-tests (Test 1 and Test 2) are provided different Noc on Cells 2, 3 and 4.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5.

2. The SS shall configure SCell (Cell 3) on the NR-U SCC as per TS 38.508-1 [14] [clause 7.5.2], with the message content exceptions defined in clause 10.5.3.3.4.3. NR *RRCReconfiguration* message is contained in *RRCConnectionReconfiguration* and NR *RRCReconfigurationComplete* message is contained in *RRCConnectionReconfigurationComplete*. Cell 3 is an activated SCell and is scheduled throughout the test as specified in Table 10.5.3.3.5-1.

3. Set the parameters according to Table 10.5.3.3.5-1 as appropriate.4. The SS shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfiguration* message) on Cell 1 configuring the UE to perform [SCC intra-frequency measurements in DBT windows] as specified in section 10.5.3.3.4.3.

5. The UE shall transmit an *RRCReconfigurationComplete* message (embedded in *RRCConnectionReconfigurationComplete* message) to acknowledge the configuration.

6. The UE shall transmit periodical *MeasurementReport* messages.

7. After 10s wait from Step 6, the SS shall check the SS-SINR reported values in the periodic *MeasurementReport*. The SS-SINR value of Cell 4 reported by the UE is compared to the expected SS-SINR. If the value is outside the limits in Table 10.5.3.3.5-2 or the UE fails to report the measurement value for Cell 4, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

8. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

9. Repeat steps 1-8 for each subtest defined in Table 10.5.3.3.5-1.

10.5.3.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.5.3.3.4.3-1: Common Exception messages for EN-DC FR1 intra-frequency SS-SINR measurement accuracy on SCC under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-5  Table H.3.1-7  Table H.3.4-1  Table H.3.4-1a  Table H.3.4-2  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 10.5.3.3.4.3-2: *RRCReconfiguration* (step 2, SCell addition) for EN-DC FR1 intra-frequency SS-SINR measurement accuracy on SCC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], [Table 4.6.1-13] with condition [NR\_MEAS and SCell\_add] | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReconfiguration ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcReconfiguration ::= SEQUENCE { |  |  |  |
| measConfig | MeasConfig-DEFAULT | Measurements configuration | NR\_MEAS |
| nonCriticalExtension SEQUENCE { |  |  |  |
| masterCellGroup | CellGroupConfig-SCell(n) | n is number of SCC to be added | SCell\_add |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 10.5.3.3.4.3-3: *ReportConfigNR* for EN-DC FR1 intra-frequency SS-SINR measurement accuracy on SCC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrq | false |  |  |
| sinr | true |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

10.5.3.3.5 Test requirements

Table 10.5.3.3.5-1 defines the primary level settings including test tolerances for EN-DC FR1 intra-frequency SS-SINR measurement accuracy on a CCA serving SCell. Table 10.5.3.3.5-2 defines the absolute accuracy requirements.

Table 10.5.3.3.5-1: Cell specific test parameters for EN-DC FR1 intra-frequency SS-SINR measurement accuracy on SCC under CCA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | | |
|  | | |  | Cell 2 / Cell 3 | Cell 4 | Cell 2 / Cell 3 | | Cell 4 |
| SSB ARFCN | | |  | freq1 for Cell 2  freq2 for Cell 3 | freq2 | freq1 for Cell 2  freq2 for Cell 3 | | freq2 |
| DL CCA model | | Config 1,2 |  | As specified in clause D.7.2.1 | | | | |
| UL CCA model | | Config 1,2 |  | As specified in clause D.7.2.2 | | | | |
| UL CCA probability | | PCCA\_UL |  | 1.0 | - | 1.0 | - | |
| DL CCA probability for semi-static channel access Note 7, 8 | | PCCA\_DL |  | 0.9375 | - | 0.9375 | - | |
| DL CCA probability for  dynamic channel access Note 8, 9 | | PCCA\_DL\_1 |  | 0.75 | - | 0.75 | - | |
|  | | PCCA\_DL\_2 |  | 0.75 | - | 0.75 | - | |
| Duplex mode | | Config 1,2 |  | TDD | | | | |
| TDD configuration | | Config 1,2 |  | TDDConf.1.1 CCA | | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | | |
| Downlink dedicated BWP configuration | | |  | DLBWP.1.1 | | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | | |
| Uplink dedicated BWP configuration | | |  | ULBWP.1.1 | | | | |
| DRX Cycle configuration | | | ms | Not Applicable | | | | |
| TRS Configuration | | Config 1,2 |  | TRS.1.2 TDD |  | TRS.1.2 TDD | |  |
| PDSCH Reference measurement channel | | Config 1,2 |  | SR.1.1 CCA |  | SR1.1 CCA | |  |
| RMSI CORESET Reference Channel | | Config 1,2 |  | CR.1.1 CCA |  | CR.1.1 CCA | |  |
| Dedicated CORESET Reference Channel | | Config 1,2 |  | CCR.1.1 CCA |  | CCR.1.1 CCA | |  |
| OCNG Patterns | | |  | OP.1 | | | | |
| SS-RSSI-Measurement | | |  | Not Applicable | | | | |
| Time offset with Cell 2 | | Config 1,2 | μs | 3 (for Cell 3) | 3 | 3 (for Cell 3) | | 3 |
| DBT Window Configuration | | Config 1,2 |  | DBT.1 | | | | |
| SSB configuration | | Config 1,2 |  | SSB.1 CCA for semi-static channel access  SSB.2 CCA for dynamic channel access | | | | |
| SMTC configuration | | Config 1,2 |  | SMTC.1 | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 30 | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  | |  |
| Note2 | | NR\_CCA\_FR1\_I | dBm/15kHz | -93+TT | | -112+TT | | |
|  | | NR\_CCA\_FR1\_J |  |  | | -111.5+TT | | |
| Note2 | Config 1,2 | NR\_CCA\_FR1\_I | dBm/SCS | -90+TT | | -109+TT | | |
|  |  | NR\_CCA\_FR1\_J |  |  | | -108.5+TT | | |
|  | | | dB | 0+TT | -3.19+TT | -5.46+TT | | -5.46+TT |
|  | | | dB | 4.54+TT | 2.66+TT | -4+TT | | -4+TT |
| SS-RSRPNote3 | Config 1,2 | NR\_CCA\_FR1\_I | dBm/SCS | -85.46+TT | -87.34+TT | -113+TT | | -113+TT |
|  |  | NR\_CCA\_FR1\_J |  |  |  | -112.5+TT | | -112.5+TT |
| SS-SINR Note3 | | NR\_CCA\_FR1\_I | dB | 0+TT | -3.19+TT | -5.46+TT | | -5.46+TT |
|  | | NR\_CCA\_FR1\_J |  |  |  |  | |  |
| IoNote3 | Config 1,2 | NR\_CCA\_FR1\_I | dBm/  38.16MHz | -51.41+TT | | -75.41+TT | | |
|  |  | NR\_CCA\_FR1\_J |  |  | | -74.91+TT | | |
| 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: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in Clause 3A.4.1.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configuration  Note 7: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 8: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 9: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | |

Table 10.5.3.3.5-2: Absolute accuracy requirements for the reported values for EN-DC FR1 intra-frequency SS-SINR measurement accuracy on SCC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2 | |
| Lowest SS-SINR reported value | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-SINR reported value | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in clause 3A.4.1, Table 3A.4.1-2A | | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

### 10.5.4 L1-RSRP measurement accuracy for beam reporting with CCA serving cell

#### 10.5.4.0 Minimum conformance requirements

10.5.4.0.1 Minimum conformance requitements for SSB-based L1-RSRP measurement accuracy for beam reporting under CCA

10.5.4.0.1.1 SSB-based L1-RSRP measurement absolute accuracy under CCA

Unless otherwise specified, the requirements for absolute accuracy of SSB based L1-RSRP in this clause apply to all SSBs of the serving cell configured for L1-RSRP measurement under CCA.

The accuracy requirements in Table 10.5.4.0.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.11.1 of TS 38.133 [6] for a corresponding Band for each relevant SSB.

Table 10.5.4.0.1.1-1: SSB based L1-RSRP absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±5.0 | ±9.5 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -70 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±8.5 | ±11.5 | ≥-3 | NR\_CCA\_FR1\_I | N/A | N/A | -70 | -50 |
| NR\_CCA\_FR1\_J |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups are as defined in clause 3A.4.1. | | | | | | | |

The reporting range for SS-RSRP is defined from -156dBm to -31dBm with 1dB resolution. The mapping of the measured quantity to the reported value is defined in TS 38.133 [6] Table 10.1.6.1-1.

The normative reference for this requirement is TS 38.133 [6] clauses 10.1.33.1 and 10.1.6.

10.5.4.0.1.2 SSB-based L1-RSRP measurement relative accuracy under CCA

The relative accuracy of SSB based L1-RSRP is defined as the L1-RSRP measured from one SSB compared to the largest measured value of L1-RSRP among all SSBs of the serving cell under CCA.

The accuracy requirements in Table 10.5.4.0.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for L1-RSRP measurements are fulfilled according to 38.133 [6] Annex B.2.11.1 for a corresponding Band for each relevant SSB.

Table 10.5.4.0.1.2-1: SSB based L1-RSRP relative accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±3 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of SSBs to which the requirement applies.  NOTE 3: NR operating band groups are as defined in clause 3A.4.1. | | | | | | | |

The reporting range for SS-RSRP is defined from -156dBm to -31dBm with 1dB resolution. The mapping of the measured quantity to the reported value is defined by TS 38.133 [6] Table 10.1.6.1-1.

The normative reference for this requirement is TS 38.133 [6] clauses 10.1.33.1 and 10.1.6.

#### 10.5.4.1 EN-DC FR1 SSB based L1-RSRP measurement accuracy with CCA

Editor's Note:

* MU and TT analysis is incomplete
* Statistical analysis to determine test case verdict is FFS
* Applicability needs to be updated

10.5.4.1.1 Test purpose

The purpose of this test is to verify that the SSB based L1-RSRP absolute measurement accuracy is within the specified limits for all bands. This test will verify the L1-RSRP measurement accuracy requirements in clauses 10.5.4.0.1.1 and 10.5.4.0.1.2.

10.5.4.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC FR1 with a shared spectrum NR carrier, RRM measurements and UL with a shared spectrum NR carrier.

10.5.4.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.5.4.0.

The normative reference for this requirement is TS 38.133 [6] clause A.10.5.4.1.

10.5.4.1.4 Test description

There are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell under CCA (Cell 2). Cell 2 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in Table A.6B.1-1. The test configurations and parameters for the Cell 2 are given in Table 10.5.4.1.4.1-1 and Table 10.5.4.1.5-1 below respectively. Two sub-tests (Test 1 and Test 2) are provided with different *Noc* on Cell 2. The absolute and relative accuracy of L1-RSRP measurements is tested by using the parameters in Table 10.5.4.1.5-2 and Table 10.5.4.1.5-3 respectively.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

10.5.4.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.5.4.1.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 10.5.4.1.4.1-2. Test environment parameters are given in Table 10.5.4.1.4.1-2.

Table 10.5.4.1.4.1-1: Supported test configurations for EN-DC FR1 SSB based L1-RSRP measurement accuracy with CCA

|  |  |
| --- | --- |
| Config | Description |
| 10.5.4.1-1 | LTE FDD  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 10.5.4.1-2 | LTE TDD  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table 10.5.4.1.4.1-2: Test Environment parameters for EN-DC FR1 SSB based L1-RSRP measurement accuracy with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.5.4.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. Message contents are defined in clause 10.5.4.1.4.3.

2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Table A.6B.1-1. Cell 2 is NR FR1 PSCell under CCA and is the target for SSB based L1-RSRP measurements.

10.5.4.1.4.2 Test procedure

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test. The SS shall provide sufficient UL grants to the UE such that no SR is required for measurement reporting.

Prior to the start of the time duration T1, the UE shall be fully synchronized to PSCell. The UE shall be configured for periodic CSI reporting in PUCCH format 2 with a reporting periodicity as mentioned in the table 10.5.4.1.5-1.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On,* according to TS 38.508-1 [14] clause 4.5 and general test parameters set according to Table 10.5.4.1.4.1-2.

2. The SS shall set the parameters according to Test 1 in Table 10.5.4.1.5-1 and enable DL and UL CCA model according to the same table.

3. The UE shall start sending L1-RSRP report including results of both SSB#0 and SSB#1 every 80 slots.

4. The SS shall check following requirements:

R1: The SS shall check the L1-RSRP reported values of SSB#0 or SSB#1 in the periodic L1-RSRP reports. If the value for the strongest SSB is within the limits in Table 10.5.4.1.5-2, the number of passed iterations is increased by one, otherwise the number of failed iterations is increased by one.

R2: The SS shall check the L1-RSRP reported values of SSB#0 and SSB#1 in the periodic L1-RSRP reports. The DIFF-RSRP value of SSB#0 or SSB#1 reported by the UE is compared to the expected DIFF-RSRP. If the DIFF-RSRP value is within the limits in Table 10.5.4.1.5-3, the number of passed iterations is increased by one, otherwise the number of failed iterations is increased by one.

5. The SS shall continue checking the L1-RSRP report messages transmitted by the UE until the confidence level according to [Table G.TBD in Annex G clause G.TBD] is achieved.

6. Set the parameters according Test 2 in Table 10.5.4.1.5-1 and repeat steps 3-5.

10.5.4.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.5.4.1.4.3-1: Common Exception messages for EN-DC FR1 SSB based L1-RSRP measurement accuracy with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.6-2 with conditions PERIODIC and SS-RSRP  Table H.3.6-3 with condition SSB  Table H.3.6-10  Table H.3.4-1  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access |

Table 10.5.4.1.4.3-2: *RadioLinkMonitoringConfig* for EN-DC FR1 SSB based L1-RSRP measurement accuracy with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-133 | | | |
| Information Element | Value/remark | Comment | Condition |
| RadioLinkMonitoringConfig ::= SEQUENCE { |  |  |  |
| failureDetectionResourcesToAddModList SEQUENCE (SIZE(1..maxNrofFailureDetectionResources)) OF SEQUENCE { | 1 entry |  |  |
| purpose | both | UE is configured to perform RLM and BFD based on the SSBs. |  |
| detectionResource CHOICE { |  |  |  |
| ssb-Index | 0 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

10.5.4.1.5 Test requirement

Table 10.5.4.1.5-1 defines the primary level settings for all tests for EN-DC FR1 SSB based L1-RSRP measurement accuracy with CCA. In both Test 1 and Test 2, the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.5.4.0.1.1 and 10.5.4.0.1.2 while meeting the corresponding absolute accuracy requirements in Table 10.5.4.1.5-2, and the corresponding relative accuracy requirements in Table 10.5.4.1.5-3 for all test configurations.

Table 10.5.4.1.5-1: Test parameters for EN-DC FR1 SSB based L1-RSRP measurement accuracy with CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Config** | **Unit** | **Test 1** | **Test 2** |
| SSB GSCN | | 1,2 |  | freq1 | freq1 |
| DL CCA model | | 1,2 |  | As specified in D.7.2.1 | As specified in D.7.2.1 |
| UL CCA model | | 1,2 |  | As specified in D.7.2.2 | As specified in D.7.2.2 |
| Duplex mode | | 1,2 |  | TDD | TDD |
| TDD Configuration | | 1,2 |  | TDDConf.1.1 CCA | TDDConf.1.1 CCA |
| BWchannel | | 1,2 | MHz | 40: NRB,c = 106 | 40: NRB,c = 106 |
| Duplex mode | | 1,2 |  | TDD | TDD |
| TDD configuration | | 1,2 |  | TDDConf.1.1 CCA | TDDConf.1.1 CCA |
| PDSCH Reference measurement channel | | 1,2 |  | SR.1.1 CCA | SR.1.1 CCA |
| RMSI CORESET Reference Channel | | 1,2 |  | CR.1.1 CCA | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | | 1,2 |  | CCR.1.1 CCA | CCR.1.1 CCA |
| SSB configuration for Semi-static channel access | | 1,2 |  | SSB.3 CCA | SSB.3 CCA |
| SSB configuration for Dynamic channel access | | 1,2 |  | SSB.4 CCA | SSB.4 CCA |
| OCNG Patterns | | 1,2 |  | OP.1 | OP.1 |
| TRS configuration | | 1,2 |  | TRS.1.2 TDD | TRS.1.2 TDD |
| Initial BWP Configuration | | 1,2 |  | DLBWP.0.1  ULBWP.0.1 | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | | 1,2 |  | DLBWP.1.1  ULBWP.1.1 | DLBWP.1.1  ULBWP.1.1 |
| DBT Window Configuration | | 1,2 |  | DBT.1 | DBT.1 |
| reportConfigType | | 1,2 |  | periodic | periodic |
| reportQuantity | | 1,2 |  | ssb-Index-RSRP | ssb-Index-RSRP |
| Number of reported RS | | 1,2 |  | 2 | 2 |
| L1-RSRP reporting period | | 1,2 |  | slot80 | slot80 |
| EPRE ratio of PSS to SSS | | 1,2 | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | 1,2 |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS | |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |  |  |  |
| Note2 | NR\_TDD\_FR1\_I | 1,2 | dBm/15kHz | -94.65+TT | [-113]+TT |
| Note2 | NR\_TDD\_FR1\_I | 1,2 | dBm/SCS | -91.65+TT | [-110]+TT |
|  | | 1,2 | dB | 10+TT | -3+TT |
| SS-RSRPNote3 | NR\_TDD\_FR1\_I | 1,2 | dBm/SCS | -81.65+TT | [-113]+TT |
| IoNote3 | NR\_TDD\_FR1\_I | 1,2 | dBm/  38.16MHz | -50.19+TT | [-77.19]+TT |
|  | | 1,2 | dB | 10+TT | -3+TT |
| Propagation condition | | 1,2 |  | AWGN | AWGN |
| Antenna configuration | | 1,2 |  | 1x2 | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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 Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification | | | | | |

Table 10.5.4.1.5-2: L1-RSRP absolute accuracy requirements for  
the reported values for test configurations 1 and 2

|  |  |  |  |
| --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2 | |
| Lowest reported value (Cell 2) | FFS | Bands NR\_CCA\_FR1\_I | FFS |
| Bands NR\_CCA\_FR1\_J | FFS |
| Highest reported value (Cell 2) | FFS | Bands NR\_CCA\_FR1\_I | FFS |
| Bands NR\_CCA\_FR1\_J | FFS |
| Extreme Conditions | Test 1  All bands | Test 2 | |
| Lowest reported value (Cell 2) | FFS | Bands NR\_CCA\_FR1\_I | FFS |
| Bands NR\_CCA\_FR1\_J | FFS |
| Highest reported value (Cell 2) | FFS | Bands NR\_CCA\_FR1\_I | FFS |
| Bands NR\_CCA\_FR1\_J | FFS |
| NOTE: NR operating band groups are defined in clause 3A.4.1, Table 3A.4.1-1 | | | |

Table 10.5.4.1.5-3: L1-RSRP relative accuracy requirements for  
the reported values for all test configurations

|  |  |  |
| --- | --- | --- |
|  | Test 1 | Test 2 |
|  | **All bands** | **All bands** |
| **Normal Conditions** | | |
| Lowest DIFF RSRP reported value | FFS | FFS |
| Highest DIFF RSRP reported value | FFS | FFS |
| **Extreme Conditions** | | |
| Lowest DIFF RSRP reported value | FFS | FFS |
| Highest DIFF RSRP reported value | FFS | FFS |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

### 10.5.5 RSSI

#### 10.5.5.0 Minimum Conformance Requirements

#### 10.5.5.0.1 Intra-frequency absolute RSSI measurement accuracy requirements in FR1

The accuracy requirements for intra-frequency RSSI measurements on a carrier frequency under CCA are specified in Table 10.5.5.0.1-1. The requirements apply for any configured RSSI *measDuration* [13], provided that:

- All symbols during each RSSI measurement duration are available for RSSI sampling within the same reporting interval.

The intra-frequency RSSI measurement bandwidth is the channel bandwidth defined in Clause 4 of TS 37.213 [37], where the channel has the centre frequency configured by *ARFCN-valueNR*.

Table 10.5.5.0.1-1: Intra-frequency RSSI accuracy under CCA

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | Io Note 1 range | | | | |
|  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| [±3.5] | [±6.5] | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -70 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| [±5.5] | [±8.5] | NR\_CCA\_FR1\_I | N/A | N/A | -70 | -50 |
| NR\_CCA\_FR1\_J |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups are as defined in clause 3A.4.1. | | | | | | |

The normative reference for this requirement is TS.38.133 [6] clause 10.1.34.1.

#### 10.5.5.0.2 Inter-frequency absolute RSSI measurement accuracy requirements in FR1

The accuracy requirements for inter-frequency RSSI measurements on a carrier frequency under CCA are the same as specified in clause 10.5.5.0.1.

The inter-frequency RSSI measurement bandwidth is the channel bandwidth defined in Clause 4 of TS 37.213 [37], where the channel has the centre frequency configured by *ARFCN-valueNR*.

The normative reference for this requirement is TS.38.133 [6] clause 10.1.34.2.

#### 10.5.5.1 EN-DC FR1 RSSI measurement accuracy on PSCC with CCA

Editor's Note:

* MU and TT analysis is incomplete
* Call setup and test procedure may need to be updated
* Statistical analysis to determine test case verdict is FFS
* Several test parameters are TBD
* Message contents need to be updated

10.5.5.1.1 Test purpose

The purpose of this test is to verify that RSSI measurement accuracy for PSCC is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in clause 10.5.5.0.1 when the PSCC is subject to CCA.

10.5.5.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting RRM and RSSI measurements on shared channel access.

10.5.5.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.5.5.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.10.5.5.1.

10.5.5.1.4 Test description

10.5.5.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.5.5.1.4.1-1.

Table 10.5.5.1.4.1-1: EN-DC FR1 RSSI measurement accuracy supported test configurations for PSCC under CCA

|  |  |
| --- | --- |
| Test Case ID | Description |
| 10.5.5.1-1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.5.5.1-2 | LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| NOTE: The UE is only required to pass in one of the supported test configurations above. | |

Configure the test equipment and the DUT according to the parameters in Table 10.5.5.1.4.1-2.

Table 10.5.5.1.4.1-2: Initial conditions for EN-DC FR1 RSSI measurement accuracy on PSCC under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.5.5.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 10.5.5.1.5-1.

2. Message contents are defined in clause 10.5.5.1.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is the PSCell and is the target cell for RSSI measurements. The connection setup is done according to the settings in clause C.1.2 and C.1.3.

10.5.5.1.4.2 Test procedure

In this set of test cases there are two cells, E-UTRAN PCell (Cell 1), FR1 PSCell under CCA (Cell 2). Cell 2 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *EN-DC*, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On,* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Table 10.5.5.1.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfiguration* message) on Cell 1 configuring the UE to perform RSSI measurements in DBT windows as specified in section 10.5.5.1.4.3.

4. The UE shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfigurationComplete* message) to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 10.5.5.1.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 5, the SS shall check the RSSI reported values in the periodic *MeasurementReport*. The RSSI value of Cell 2 reported by the UE is compared to the expected RSSI. If the value is outside the limits in Table 10.5.5.1.5-2 or the UE fails to report the measurement value for Cell 2 [for FFS consecutive transmissions], the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

10.5.5.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.5.5.1.4.3-1: Common Exception messages for EN-DC FR1 RSSI measurement accuracy for PSCC under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3  Table H.3.1-5  Table H.3.1-7  Table H.3.4-1  Table H.3.4-1a  Table H.3.4-2  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access  Table H.3.10-3 |

Table 10.5.5.1.4.3-2: *ReportConfigNR* for EN-DC FR1 RSSI measurement accuracy for PSCC under CCA

[FFS]

10.5.5.1.5 Test requirement

Table 10.5.5.1.5-1 defines the primary level settings including test tolerances for EN-DC FR1 RSSI measurement accuracy for PSCC under CCA. Each RSSI measurement report shall meet the corresponding accuracy requirements in Table 10.5.5.1.5-3.

Table 10.5.5.1.5-1: Cell specific test parameters for EN-DC FR1 RSSI measurement accuracy for PSCC under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Configurations | Unit | Test 1 |
| Cell 2 |
| RF Channel Number | |  |  | 1 |
| BWchannel | |  | MHz | 40 |
| SSB configuration | Semi-static channel access Note 1, 3 | 1,2 |  | SSB.1 CCA |
| Dynamic channel access Note 2, 3 | 1,2 |  | SSB.2 CCA |
| PCCA\_DL | |  |  | TBD |
| PCCA\_UL | |  |  | TBD |
| DL CCA model | |  |  | As specified in D.7.2.1 |
| UL CCA model | |  |  | As specified in D.7.2.2 |
| Measurement bandwidth | |  |  | Same as channel access bandwidth |
| Channel access bandwidth | |  | MHz | 20 |
| DRX Cycle configuration | |  | ms | Not Applicable |
| PDSCH Reference measurement channel | |  |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | |  |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | |  |  | CCR.1.1 CCA |
| OCNG Patterns | |  |  | OP.1 |
| EPRE ratio of PSS to SSS | |  | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -106+TT |
| in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -87+TT |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dB | 2.5+TT |
| in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dB | -Infinity |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -103.5+TT |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) | |  |  | -Infinity |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/BW | -101.6+TT |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/BW | -87+TT |
| Propagation condition | |  | - | AWGN |
| Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | |

Table 10.5.5.1.5-2: EN-DC FR1 RSSI RMTC parameters for EN-DC FR1 RSSI measurement accuracy for PSCC under CCA

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

Table 10.5.5.1.5-3: Requirements for the reported values for EN-DC FR1 RSSI measurement accuracy for PSCC under CCA

|  |  |
| --- | --- |
| Normal Conditions | Test 1  All bands |
| Lowest RSSI reported value | FFS |
| Highest RSSI reported value | FFS |
| Note 1: NR operating band groups are defined in clause 3A.4, Table 3A.4.1-1 | |

For the test to pass, the ratio of successful reported values shall be more than 90% with a confidence level of 95%.

#### 10.5.5.2 EN-DC FR1 RSSI measurement accuracy on SCC with CCA

Editor's Note:

* MU and TT analysis is incomplete
* Call setup and test procedure may need to be updated
* Statistical analysis to determine test case verdict is FFS
* Several test parameters are TBD
* Message contents need to be updated

10.5.5.2.1 Test purpose

The purpose of this test is to verify that RSSI measurement accuracy for SCC is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in clause 10.5.5.0.1 when SCC is subject to CCA.

10.5.5.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting RRM and RSSI measurements on shared channel access.

10.5.5.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 10.5.5.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A. 10.5.5.2.

10.5.5.2.4 Test description

10.5.5.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.5.5.2.4.1-1.

Table 10.5.5.2.4.1-1: Supported test configurations for EN-DC FR1 RSSI measurement accuracy on SCC with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 10.5.5.2-1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.5.5.2-2 | LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations for each supported band | |

Configure the test equipment and the DUT according to the parameters in Table 10.5.5.2.4.1-2.

Table 10.5.5.2.4.1-2: Initial conditions for EN-DC FR1 RSSI measurement accuracy on SCC with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.5.5.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 10.5.5.2.5-1.

2. Message contents are defined in clause 10.5.5.2.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is the NR cell (PSCell) with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is the NR cell (SCC) also with the power level set according to clauses C.1.2 and C.1.3 for this test.

10.5.5.2.4.2 Test procedure

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 SCC cell (Cell 3) on a different frequency than the PSCell. Both Cell 2 and Cell 3 are subject to CCA and transmit SSBs in DBT windows according to DL CCA model. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On,* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Table 10.5.5.2.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfiguration* message) on Cell 1 configuring the UE to perform measurements in DBT windows in the target SCC frequency, as specified in section 10.5.5.2.4.3.

4. The UE shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfigurationComplete* message) to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 10.5.5.2.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 5, the SS shall check the RSSI reported values in the periodic *MeasurementReport*. The RSSI value of Cell 3 reported by the UE is compared to the expected RSSI. If the value is outside the limits in Table 10.5.5.2.5-2 or the UE fails to report the measurement value for Cell 3 [for FFS consecutive transmissions], the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

10.5.5.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.5.5.2.4.3-1: Common Exception messages for EN-DC FR1 RSSI measurement accuracy on SCC with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3  Table H.3.1-5  Table H.3.1-7  Table H.3.4-1  Table H.3.4-1a  Table H.3.4-2  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access  Table H.3.10-3 |

Table 10.5.5.2.4.3-2: *ReportConfigNR* for EN-DC FR1 RSSI measurement accuracy on SCC with CCA

[FFS]

10.5.5.2.5 Test requirements

Table 10.5.5.2.5-1 defines the primary level settings including test tolerances for EN-DC FR1 RSSI measurement accuracy on SCC with CCA. Each RSSI measurement report shall meet the corresponding accuracy requirements in Table 10.5.5.2.5-3.

Table 10.5.5.2.5-1: Cell specific test parameters for EN-DC FR1 RSSI measurement accuracy on SCC with CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Configurations | Unit | Test 1 | |
| Cell 2 | Cell 3 |
| RF Channel Number | |  |  | 1 | 2 |
| BWchannel | |  | MHz | 40 | 40 |
| SSB configuration | Semi-static channel access Note 1, 3 | 1,2 |  | SSB.1 CCA | SSB.1 CCA |
| Dynamic channel access Note 2, 3 | 1,2 |  | SSB.2 CCA | SSB.2 CCA |
| PCCA\_DL | |  |  | 1 | TBD |
| PCCA\_UL | |  |  | 1 | TBD |
| DL CCA model | |  |  | N/A | As specified in D.7.2.1 |
| UL CCA model | |  |  | N/A | As specified in D.7.2.2 |
| Measurement bandwidth | |  |  | Same as channel access bandwidth | |
| Channel access bandwidth | |  | MHz | 20 | |
| DRX Cycle configuration | |  | ms | Not Applicable | |
| PDSCH Reference measurement channel | |  |  | SR.1.1 CCA | SR.1.1 CCA |
| RMSI CORESET Reference Channel | |  |  | CR.1.1 CCA | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | |  |  | CCR.1.1 CCA | CCR.1.1 CCA |
| OCNG Patterns | |  |  | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS | |  | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -106+TT | -106+TT |
| in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -106+TT | -87+TT |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dB | 2.5+TT | 2.5+TT |
| in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dB | 2.5+TT | -Infinity |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -103.5+TT | -103.5+TT |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) | |  |  | -103.5+TT | -Infinity |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/BW | -101.6+TT | -101.6+TT |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/BW | -101.6+TT | -87+TT |
| Propagation condition | |  | - | AWGN | |
| Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | |

Table 10.5.5.2.5-2: EN-DC FR1 RSSI RMTC parameters for EN-DC FR1 RSSI measurement accuracy on SCC with CCA

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

Table 10.5.5.2.5-3: Requirements for the reported values for EN-DC FR1 RSSI measurement accuracy on SCC with CCA

|  |  |
| --- | --- |
| Normal Conditions | Test 1  All bands |
| Lowest RSSI reported value | FFS |
| Highest RSSI reported value | FFS |
| Note 1: NR operating band groups are defined in clause 3A.4, Table 3A.4.1-1 | |

For the test to pass, the ratio of successful reported values shall be more than 90% with a confidence level of 95%.

#### 10.5.5.3 EN-DC FR1-FR1 RSSI measurement accuracy on a carrier with CCA

Editor's Note:

* MU and TT analysis is incomplete
* Call setup and test procedure may need to be updated
* Statistical analysis to determine test case verdict is FFS
* Several test parameters are TBD
* Message contents need to be updated

10.5.5.3.1 Test purpose

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.5.5.0.2 when both the serving cell and the target cell are subject to CCA.

10.5.5.3.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting inter-frequency RRM and RSSI measurements on shared channel access.

10.5.5.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 10.5.5.0.2 for absolute accuracy.

The normative reference for this requirement is TS 38.133 [6] clause A.10.5.5.3.

10.5.5.3.4 Test description

Supported test configurations are shown in Table 10.5.5.3.4.1-1. Absolute accuracy of RSSI inter-frequency measurements are tested by using the parameters in Table 10.5.5.3.5-1. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.6B. In all test cases, Cell 2 is the PSCell, and Cell 3 is the target cell. The inter-frequency measurements are supported by a measurement gap.

10.5.5.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.5.5.3.4.1-1.

Table 10.5.5.3.4.1-1: Supported test configurations for EN-DC FR1-FR1 RSSI measurement accuracy on a carrier with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 10.5.5.3-1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.5.5.3-2 | LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations for each supported band | |

Configure the test equipment and the DUT according to the parameters in Table 10.5.5.3.4.1-2.

Table 10.5.5.3.4.1-2: Initial conditions for EN-DC FR1-FR1 RSSI measurement accuracy on a carrier with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.5.5.3.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 10.5.5.3.5-1.

2. Message contents are defined in clause 10.5.5.3.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is the NR cell (PSCell) with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

10.5.5.3.4.2 Test procedure

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on a different frequency than the PSCell. Both Cell 2 and Cell 3 are subject to CCA and transmit SSBs in DBT windows according to DL CCA model. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On,* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Table 10.5.5.3.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfiguration* message) on Cell 1 configuring the UE to perform measurements in DBT windows in the target neighbouring frequency, as specified in section 10.5.5.3.4.3.

4. The UE shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfigurationComplete* message) to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 10.5.5.3.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 5, the SS shall check the RSSI reported values in the periodic *MeasurementReport*. The RSSI value of Cell 3 reported by the UE is compared to the expected RSSI. If the value is outside the limits in Table 10.5.5.3.5-3 or the UE fails to report the measurement value for Cell 3 [for FFS consecutive transmissions], the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

10.5.5.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.5.5.3.4.3-1: Common Exception messages for EN-DC FR1-FR1 RSSI measurement accuracy on a carrier with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with condition INTER-FREQ and GAP NEEDED  Table H.3.1-3 with Condition INTER-FREQ MO  Table H.3.1-5  Table H.3.1-7 with condition INTER-FREQ  Table H.3.4-1  Table H.3.4-1a  Table H.3.4-2  Table H.3.4-4 with Condition gapUE  Table H.3.4-5 with Condition Pattern#0  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access  Table H.3.10-3 |

Table 10.5.5.3.4.3-2: *ReportConfigNR* for EN-DC FR1-FR1 RSSI measurement accuracy on a carrier with CCA

[FFS]

10.5.5.3.5 Test requirements

Table 10.5.5.3.5-1 defines the primary level settings including test tolerances for EN-DC FR1-FR1 RSSI measurement accuracy on a carrier with CCA. Each RSSI measurement report shall meet the corresponding accuracy requirements in Table 10.5.5.3.5-3.

Table 10.5.5.3.5-1: Cell specific test parameters for EN-DC FR1-FR1 RSSI measurement accuracy on a carrier with CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Configurations | Unit | Test 1 | |
| Cell 2 | Cell 3 |
| RF Channel Number | |  |  | 1 | 2 |
| BWchannel | |  | MHz | 40 | 40 |
| SSB configuration | Semi-static channel access Note 1, 3 | 1,2 |  | SSB.1 CCA | SSB.1 CCA |
| Dynamic channel access Note 2, 3 | 1,2 |  | SSB.2 CCA | SSB.2 CCA |
| PCCA\_DL | |  |  | 1 | TBD |
| PCCA\_UL | |  |  | 1 | TBD |
| DL CCA model | |  |  | N/A | As specified in D.7.2.1 |
| UL CCA model | |  |  | N/A | As specified in D.7.2.2 |
| Measurement bandwidth | |  |  | Same as channel access bandwidth | |
| Channel access bandwidth | |  | MHz | 20 | |
| DRX Cycle configuration | |  | ms | Not Applicable | |
| PDSCH Reference measurement channel | |  |  | SR.1.1 TDD | NA |
| RMSI CORESET Reference Channel | |  |  | CR.1.1 TDD | NA |
| Dedicated CORESET Reference Channel | |  |  | CCR.1.1 TDD | NA |
| OCNG Patterns | |  |  | OP.1 | NA |
| EPRE ratio of PSS to SSS | |  | dB | 0 | NA |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -106+TT | -106+TT |
| in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -106+TT | -87+TT |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dB | 2.5+TT | 2.5+TT |
| in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dB | 2.5+TT | -Infinity |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -103.5+TT | -103.5+TT |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) | |  |  | -103.5+TT | -Infinity |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/BW | -101.6+TT | -101.6+TT |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/BW | -101.6+TT | -87+TT |
| Propagation condition | |  | - | AWGN | |
| Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | |

Table 10.5.5.3.5-2: EN-DC FR1 RSSI RMTC parameters for EN-DC FR1-FR1 RSSI measurement accuracy on a carrier with CCA

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

Table 10.5.5.3.5-3: Absolute accuracy requirements for the reported values for EN-DC FR1-FR1 RSSI measurement accuracy on a carrier with CCA

|  |  |
| --- | --- |
| Normal Conditions | Test 1  All bands |
| Lowest RSSI reported value | FFS |
| Highest RSSI reported value | FFS |
| Note 1: NR operating band groups are defined in clause 3A.4, Table 3A.4.1-1 | |

For the test to pass, the ratio of successful reported values shall be more than 90% with a confidence level of 95%.

### 10.5.6 Channel occupancy

#### 10.5.6.0 Minimum Conformance Requirements

#### 10.5.6.0.1 Intra-frequency channel occupancy measurement accuracy requirements in FR1

The UE shall be able to correctly evaluate the intra-frequency channel occupancy configured according to TS 38.331 [13], provided that the following conditions are met:

- All symbols during each RSSI measurement duration are available for RSSI sampling within the same reporting interval,

- RSSI at the UE receiver meets the following condition with respect to the configured *channelOccupancyThreshold* [13]:

- RSSI at the UE receiver is below *channelOccupancyThreshold*-, or

- RSSI at the UE receiver is above *channelOccupancyThreshold*+,

- where  is the applicable RSSI measurement accuracy value from the RSSI measurement accuracy requirements specified in clause 10.5.5.0.1.

The channel occupancy measurement bandwidth is the same as the RSSI measurement bandwidth in Clause 10.5.5.0.1.

The normative reference for this requirement is TS.38.133 [6] clause 10.1.35.1.

#### 10.5.6.0.2 Inter-frequency channel occupancy measurement accuracy requirements in FR1

The UE shall be able to correctly evaluate the inter-frequency channel occupancy configured according to TS 38.331 [13], provided that the following conditions are met:

- All symbols during each RSSI measurement duration are available for RSSI sampling within the same reporting interval,

- RSSI at the UE receiver meets the following condition with respect to the configured *channelOccupancyThreshold* [2]:

- RSSI at the UE receiver is below *channelOccupancyThreshold*-, or

- RSSI at the UE receiver is above *channelOccupancyThreshold*+,

- where  is the applicable RSSI measurement accuracy value from the RSSI measurement accuracy requirements specified in clause 10.5.5.0.2.

The channel occupancy measurement bandwidth is the same as the RSSI measurement bandwidth in Clause 10.5.5.0.2.

The normative reference for this requirement is TS.38.133 [6] clause 10.1.35.2.

#### 10.5.6.1 EN-DC FR1 Channel occupancy measurement accuracy on PSCC with CCA

Editor's Note:

* MU and TT analysis is incomplete
* Call setup and test procedure may need to be updated
* Statistical analysis to determine test case verdict is FFS
* Several test parameters are TBD
* Message contents need to be updated

10.5.6.1.1 Test purpose

The purpose of this test is to verify that Channel occupancy measurement accuracy for PSCC is within the specified limits. This test will partially verify the Channel occupancy measurement accuracy requirements in clause 10.5.6.0.1 when the PSCC is subject to CCA.

10.5.6.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting RRM and Channel occupancy measurements on shared channel access.

10.5.6.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 10.5.6.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.10.5.6.1.

10.5.6.1.4 Test description

10.5.6.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.5.6.1.4.1-1.

Table 10.5.6.1.4.1-1: Supported test configurations for EN-DC FR1 Channel occupancy measurement accuracy on PSCC with CCA

|  |  |
| --- | --- |
| Test Case ID | Description |
| 10.5.6.1-1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.5.6.1-2 | LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| NOTE: The UE is only required to pass in one of the supported test configurations above. | |

Configure the test equipment and the DUT according to the parameters in Table 10.5.6.1.4.1-2.

Table 10.5.6.1.4.1-2: Initial conditions for EN-DC FR1 Channel occupancy measurement accuracy on PSCC with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.5.6.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 10.5.6.1.5-1.

2. Message contents are defined in clause 10.5.6.1.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B.Cell 2 is the PSCell and is the target cell for Channel occupancy measurements. The connection setup is done according to the settings in clause C.1.2 and C.1.3.

10.5.6.1.4.2 Test procedure

In this set of test cases there are two cells, E-UTRAN PCell (Cell 1), FR1 PSCell under CCA (Cell 2). Cell 2 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On,* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Table 10.5.6.1.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfiguration* message) on Cell 1 configuring the UE to perform Channel occupancy measurements in DBT windows as specified in section 10.5.6.1.4.3.

4. The UE shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfigurationComplete* message) to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 10.5.6.1.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 5, the SS shall check the Channel occupancy reported values in the periodic *MeasurementReport*. The Channel occupancy value of Cell 2 reported by the UE is compared to the expected Channel occupancy. If the value is outside the limits in Table 10.5.6.1.5-2 or the UE fails to report the measurement value for Cell 2 [for FFS consecutive transmissions], the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

10.5.6.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.5.6.1.4.3-1: Common Exception messages for EN-DC FR1 Channel occupancy measurement accuracy on PSCC with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3  Table H.3.1-5  Table H.3.1-7  Table H.3.4-1  Table H.3.4-1a  Table H.3.4-2  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access  Table H.3.10-3 |

Table 10.5.6.1.4.3-2: *ReportConfigNR* for EN-DC FR1 Channel occupancy measurement accuracy on PSCC with CCA

FFS

10.5.6.1.5 Test requirement

Table 10.5.6.1.5-1 defines the primary level settings including test tolerances for EN-DC FR1 Channel occupancy measurement accuracy on PSCC with CCA. Each Channel occupancy measurement report shall meet the corresponding accuracy requirements in Table 10.5.6.1.5-3.

Table 10.5.6.1.5-1: Cell specific test parameters for EN-DC FR1 Channel occupancy measurement accuracy on PSCC with CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Configurations | Unit | Test 1 |
| Cell 2 |
| RF Channel Number | |  |  | 1 |
| BWchannel | |  | MHz | 40 |
| SSB configuration | Semi-static channel access Note 1, 3 | 1,2 |  | SSB.1 CCA |
| Dynamic channel access Note 2, 3 | 1,2 |  | SSB.2 CCA |
| PCCA\_DL | |  |  | TBD |
| PCCA\_UL | |  |  | TBD |
| DL CCA model | |  |  | As specified in D.7.2.1 |
| UL CCA model | |  |  | As specified in D.7.2.2 |
| Measurement bandwidth | |  |  | Same as channel access bandwidth |
| Channel access bandwidth | |  | MHz | 20 |
| DRX Cycle configuration | |  | ms | Not Applicable |
| PDSCH Reference measurement channel | |  |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | |  |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | |  |  | CCR.1.1 CCA |
| OCNG Patterns | |  |  | OP.1 |
| EPRE ratio of PSS to SSS | |  | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -106+TT |
| in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -87+TT |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dB | 2.5+TT |
| in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dB | -Infinity |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -103.5+TT |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) | |  |  | -Infinity |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/BW | -101.6+TT |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/BW | -87+TT |
| Propagation condition | |  | - | AWGN |
| channelOccupancyThreshold | |  | dBm | -83+TT |
| Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | |

Table 10.5.6.1.5-2: EN-DC FR1 Channel occupancy RMTC parameters for EN-DC FR1 Channel occupancy measurement accuracy on PSCC with CCA

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

Table 10.5.6.1.5-3: Requirements for the reported values for EN-DC FR1 Channel occupancy measurement accuracy on PSCC with CCA

|  |  |
| --- | --- |
| Normal Conditions | Test 1  All bands |
| Lowest channelOccupancy reported value | FFS |
| Highest channelOccupancy reported value | FFS |
| Note 1: NR operating band groups are defined in clause 3A.4, Table 3A.4.1-1 | |

For the test to pass, the ratio of successful reported values shall be more than 90% with a confidence level of 95%.

#### 10.5.6.2 EN-DC FR1 Channel occupancy measurement accuracy on SCC with CCA

Editor's Note:

* MU and TT analysis is incomplete
* Call setup and test procedure may need to be updated
* Statistical analysis to determine test case verdict is FFS
* Several test parameters are TBD
* Message contents need to be updated

10.5.6.2.1 Test purpose

The purpose of this test is to verify that Channel occupancy measurement accuracy for SCC is within the specified limits. This test will partially verify the Channel occupancy measurement accuracy requirements in clause 10.5.6.0.1 when SCC is subject to CCA.

10.5.6.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting RRM and Channel occupancy measurements on shared channel access.

10.5.6.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 10.5.6.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.10.5.6.2.

10.5.6.2.4 Test description

10.5.6.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.5.6.2.4.1-1.

Table 10.5.6.2.4.1-1: Supported test configurations for EN-DC FR1 Channel occupancy measurement accuracy on SCC with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 10.5.6.2-1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.5.6.2-2 | LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations for each supported band | |

Configure the test equipment and the DUT according to the parameters in Table 10.5.6.2.4.1-2.

Table 10.5.6.2.4.1-2: Initial conditions for EN-DC FR1 Channel occupancy measurement accuracy on SCC with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.5.6.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 10.5.6.2.5-1.

2. Message contents are defined in clause 10.5.6.2.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is the NR cell (PSCell) with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is the NR cell (SCC) also with the power level set according to clauses C.1.2 and C.1.3 for this test.

10.5.6.2.4.2 Test procedure

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 SCC cell (Cell 3) on a different frequency than the PSCell. Both Cell 2 and Cell 3 are subject to CCA and transmit SSBs in DBT windows according to DL CCA model. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On,* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Table 10.5.6.2.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfiguration* message) on Cell 1 configuring the UE to perform measurements in DBT windows in the target SCC frequency, as specified in section 10.5.6.2.4.3.

4. The UE shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfigurationComplete* message) to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 10.5.6.2.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 5, the SS shall check the Channel occupancy reported values in the periodic *MeasurementReport*. The Channel occupancy value of Cell 3 reported by the UE is compared to the expected Channel occupancy. If the value is outside the limits in Table 10.5.6.2.5-2 or the UE fails to report the measurement value for Cell 3 [for FFS consecutive transmissions], the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

10.5.6.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.5.6.2.4.3-1: Common Exception messages for EN-DC FR1 Channel occupancy measurement accuracy on SCC with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3  Table H.3.1-5  Table H.3.1-7  Table H.3.4-1  Table H.3.4-1a  Table H.3.4-2  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access  Table 3.10-3 |

Table 10.5.6.2.4.3-2: *ReportConfigNR* for EN-DC FR1 Channel occupancy measurement accuracy on SCC with CCA

FFS

10.5.6.2.5 Test requirements

Table 10.5.6.2.5-1 defines the primary level settings including test tolerances for EN-DC FR1 Channel occupancy measurement accuracy on SCC with CCA. Each Channel occupancy measurement report shall meet the corresponding accuracy requirements in Table 10.5.6.2.5-3.

Table 10.5.6.2.5-1: Cell specific test parameters for EN-DC FR1 Channel occupancy measurement accuracy on SCC with CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Configurations | Unit | Test 1 | |
| Cell 2 | Cell 3 |
| RF Channel Number | |  |  | 1 | 2 |
| BWchannel | |  | MHz | 40 | 40 |
| SSB configuration | Semi-static channel access Note 1, 3 | 1,2 |  | SSB.1 CCA | SSB.1 CCA |
| Dynamic channel access Note 2, 3 | 1,2 |  | SSB.2 CCA | SSB.2 CCA |
| PCCA\_DL | |  |  | 1 | TBD |
| PCCA\_UL | |  |  | 1 | TBD |
| DL CCA model | |  |  | N/A | As specified in D.7.2.1 |
| UL CCA model | |  |  | N/A | As specified in D.7.2.2 |
| Measurement bandwidth | |  |  | Same as channel access bandwidth | |
| Channel access bandwidth | |  | MHz | 20 | |
| DRX Cycle configuration | |  | ms | Not Applicable | |
| PDSCH Reference measurement channel | |  |  | SR.1.1 CCA | SR.1.1 CCA |
| RMSI CORESET Reference Channel | |  |  | CR.1.1 CCA | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | |  |  | CCR.1.1 CCA | CCR.1.1 CCA |
| OCNG Patterns | |  |  | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS | |  | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -106+TT | -106+TT |
| in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -106+TT | -87+TT |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dB | 2.5+TT | 2.5+TT |
| in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dB | 2.5+TT | -Infinity |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -103.5+TT | -103.5+TT |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) | |  |  | -103.5+TT | -Infinity |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/BW | -101.6+TT | -101.6+TT |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/BW | -101.6+TT | -87+TT |
| Propagation condition | |  | - | AWGN | |
| channelOccupancyThreshold | |  | dBm | -83+TT | |
| Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | |

Table 10.5.6.2.5-2: EN-DC FR1 Channel occupancy RMTC parameters for EN-DC FR1 Channel occupancy measurement accuracy on SCC with CCA

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

Table 10.5.6.2.5-3: Requirements for the reported values for EN-DC FR1 Channel occupancy measurement accuracy on SCC with CCA

|  |  |
| --- | --- |
| Normal Conditions | Test 1  All bands |
| Lowest channelOccupancy reported value | FFS |
| Highest channelOccupancy reported value | FFS |
| Note 1: NR operating band groups are defined in clause 3A.4, Table 3A.4.1-1 | |

For the test to pass, the ratio of successful reported values shall be more than 90% with a confidence level of 95%.

#### 10.5.6.3 EN-DC FR1-FR1 Channel occupancy measurement accuracy on a carrier with CCA

Editor's Note:

* MU and TT analysis is incomplete
* Call setup and test procedure may need to be updated
* Statistical analysis to determine test case verdict is FFS
* Several test parameters are TBD
* Message contents need to be updated

10.5.6.3.1 Test purpose

The purpose of this test is to verify that the Channel occupancy measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.5.6.0.2 when both the serving cell and the target cell are subject to CCA.

10.5.6.3.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting EN-DC with a shared spectrum NR carrier and supporting inter-frequency RRM and Channel occupancy measurements on shared channel access.

10.5.6.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 10.5.6.0.2 for absolute accuracy.

The normative reference for this requirement is TS 38.133 [6] clause A.10.5.6.3.

10.5.6.3.4 Test description

Supported test configurations are shown in Table 10.5.6.3.4.1-1. Absolute accuracy of Channel occupancy inter-frequency measurements are tested by using the parameters in Table 10.5.6.3.5-1. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.6B. In all test cases, Cell 2 is the PSCell, and Cell 3 is the target cell. The inter-frequency measurements are supported by a measurement gap.

10.5.6.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 10.5.6.3.4.1-1.

Table 10.5.6.3.4.1-1: Supported test configurations for EN-DC FR1-FR1 Channel occupancy measurement accuracy on a carrier with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 10.5.6.3-1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 10.5.6.3-2 | LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations for each supported band | |

Configure the test equipment and the DUT according to the parameters in Table 10.5.6.3.4.1-2.

Table 10.5.6.3.4.1-2: Initial conditions for EN-DC FR1-FR1 Channel occupancy measurement accuracy on a carrier with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.8-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.5.6.3.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | N/A | |  |

1. The general test parameter settings are set up according to Table 10.5.6.3.5-1.

2. Message contents are defined in clause 10.5.6.3.4.3.

3. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6B. Cell 2 is the NR cell (PSCell) with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 3 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

10.5.6.3.4.2 Test procedure

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on a different frequency than the PSCell. Both Cell 2 and Cell 3 are subject to CCA and transmit SSBs in DBT windows according to DL CCA model. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* and Test Mode *On,* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Table 10.5.6.3.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfiguration* message) on Cell 1 configuring the UE to perform measurements in DBT windows in the target neighbouring frequency, as specified in section 10.5.6.3.4.3.

4. The UE shall transmit an *RRCReconfiguration* message (embedded in *RRCConnectionReconfigurationComplete* message) to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 10.5.6.3.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 5, the SS shall check the Channel occupancy reported values in the periodic *MeasurementReport*. The Channel occupancy value of Cell 3 reported by the UE is compared to the expected Channel occupancy. If the value is outside the limits in Table 10.5.6.3.5-3 or the UE fails to report the measurement value for Cell 3 [for FFS consecutive transmissions], the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

10.5.6.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 10.5.6.3.4.3-1: Common Exception messages for EN-DC FR1-FR1 Channel occupancy measurement accuracy on a carrier with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with condition INTER-FREQ and GAP NEEDED  Table H.3.1-3 with Condition INTER-FREQ MO  Table H.3.1-5  Table H.3.1-7 with condition INTER-FREQ  Table H.3.4-1  Table H.3.4-1a  Table H.3.4-2  Table H.3.4-4 with Condition gapUE  Table H.3.4-5 with Condition Pattern#0  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access  Table H.3.10-3 |

Table 10.5.6.3.4.3-2: *ReportConfigNR* for EN-DC FR1-FR1 Channel occupancy measurement accuracy on a carrier with CCA

[FFS]

10.5.6.3.5 Test requirements

Table 10.5.6.3.5-1 defines the primary level settings including test tolerances for EN-DC FR1-FR1 Channel occupancy measurement accuracy on a carrier with CCA. Each Channel occupancy measurement report shall meet the corresponding accuracy requirements in Table 10.5.6.3.5-3.

Table 10.5.6.3.5-1: Cell specific test parameters for EN-DC FR1-FR1 Channel occupancy measurement accuracy on a carrier with CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Configurations | Unit | Test 1 | |
| Cell 2 | Cell 3 |
| RF Channel Number | |  |  | 1 | 2 |
| BWchannel | |  | MHz | 40 | 40 |
| SSB configuration | Semi-static channel access Note 1, 3 | 1,2 |  | SSB.1 CCA | SSB.1 CCA |
| Dynamic channel access Note 2, 3 | 1,2 |  | SSB.2 CCA | SSB.2 CCA |
| PCCA\_DL | |  |  | 1 | TBD |
| PCCA\_UL | |  |  | 1 | TBD |
| DL CCA model | |  |  | N/A | As specified in D.7.2.1 |
| UL CCA model | |  |  | N/A | As specified in D.7.2.2 |
| Measurement bandwidth | |  |  | Same as channel access bandwidth | |
| Channel access bandwidth | |  | MHz | 20 | |
| DRX Cycle configuration | |  | ms | Not Applicable | |
| PDSCH Reference measurement channel | |  |  | SR.1.1 TDD | NA |
| RMSI CORESET Reference Channel | |  |  | CR.1.1 TDD | NA |
| Dedicated CORESET Reference Channel | |  |  | CCR.1.1 TDD | NA |
| OCNG Patterns | |  |  | OP.1 | NA |
| EPRE ratio of PSS to SSS | |  | dB | 0 | NA |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -106+TT | -106+TT |
| in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -106+TT | -87+TT |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dB | 2.5+TT | 2.5+TT |
| in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dB | 2.5+TT | -Infinity |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/SCS | -103.5+TT | -103.5+TT |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) | |  |  | -103.5+TT | -Infinity |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/BW | -101.6+TT | -101.6+TT |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) | |  | dBm/BW | -101.6+TT | -87+TT |
| Propagation condition | |  | - | AWGN | |
| channelOccupancyThreshold | |  | dBm | -83+TT | |
| Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | |

Table 10.5.6.3.5-2: EN-DC FR1 Channel occupancy RMTC parameters for EN-DC FR1-FR1 Channel occupancy measurement accuracy on a carrier with CCA

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

Table 10.5.6.3.5-3: Absolute accuracy requirements for the reported values for EN-DC FR1-FR1 Channel occupancy measurement accuracy on a carrier with CCA

|  |  |
| --- | --- |
| Normal Conditions | Test 1  All bands |
| Lowest channelOccupancy reported value | FFS |
| Highest channelOccupancy reported value | FFS |
| Note 1: NR operating band groups are defined in clause 3A.4, Table 3A.4.1-1 | |

For the test to pass, the ratio of successful reported values shall be more than 90% with a confidence level of 95%.

# 11 NR Standalone Tests with NR PCell under CCA and Other NR Cells in FR1

Editor’s note: Test cases for NR SA with NR PCell under CCA and SCell under CCA are also included here.

## 11.0 General

### 11.0.1 Principle of testing for UE capable of EN-DC with only NR bands with shared spectrum access

Test cases in table 11.0.1-1 are defined for UE capable of NR SA operation with only NR band(s) with shared spectrum access and are not required for UE supporting also other NR band(s) (i.e. band with no shared spectrum access).

Table 11.0.1-1: Test cases applicable to UE supporting SA operation with only NR bands with shared spectrum access

|  |  |  |
| --- | --- | --- |
| Test category | Section | Test case |
| Active BWP switching | 11.4.5.2.1 | NR SA FR1 - NR FR1 DL active BWP switch of PCell under CCA with non-DRX |
| 11.4.5.2.2 | NR SA FR1 DL active BWP switch with non-DRX under CCA |
| 11.4.5.3.1 | NR SA FR1 DL active BWP switch of Cell with non-DRX under CCA |

## 11.1 RRC\_IDLE state mobility

FFS

## 11.2 RRC\_CONNECTED state mobility

### 11.2.1

### 11.2.2 RRC connection mobility control

#### 11.2.2.1 RRC re-establishment

#### 11.2.2.2 Random Access

#### 11.2.2.3 RRC connection release with redirection

##### 11.2.2.3.0 Minimum conformance requirements

The UE shall be capable of performing the RRC connection release with redirection to the target NR cell subject to CCA within Tconnection\_release\_redirect\_NR\_CCA.

The time delay (Tconnection\_release\_redirect\_NR\_CCA) is the time between the end of the last slot containing the RRC command, “*RRCRelease*” (TS 38.331 [2]) on the NR PDSCH and the time the UE starts to send random access to the target NR cell. The time delay (Tconnection\_release\_redirect\_NR\_CCA) shall be less than:

Tconnection\_release\_redirect\_NR\_CCA = TRRC\_procedure\_delay + Tidentify-NR\_CCA + TSI-NR\_CCA + TRACH\_CCA

The target NR cell shall be considered detectable when for each relevant SSB, the side conditions should be met that,

- the conditions of SSB\_RP and SSB Ês/Iot as defined in Annex B.2.5 of TS 38.133 for a corresponding NR Band are fulfilled.

- TRRC\_procedure\_delay: It is the RRC procedure delay for processing the received message “*RRCRelease*” as defined in clause 6.2.2 of TS 38.331 [2].

- Tidentify-NR\_CCA: It is the time to identify the target NR cell and is defined as:

- Tidentify-NR\_CCA = TPSS/SSS-sync + Tmeas; TPSS/SSS-sync is the cell search time and Tmeas is the measurement time due to cell selection criteria evaluation.

- For FR1 target NR cell: Tidentify-NR\_CCA = MAX (680 ms, (L1+11) × Trs);

- where L1 is the number of SMTC occasions not available at the UE due to DL CCA failures and L1´ is the number of SMTC occasion groups not available at the UE due to DL CCA failures. An SMTC occasion group consists of N consecutive SMTC occasions. An SMTC occasion group is not available, when at least one SMTC occasion in the group is not transmitted by the gNB. N is equal to 12. If L1 > L1,max or L1´ > L1,max then the UE shall initiate cell selection procedures for the selected PLMN as defined in TS 38.304 [1]; where L1,max is defined in Table 11.2.2.3.0-1.

- TSI-NR\_CCA: It is the time required for acquiring all the relevant system information of the target NR cell. This time depends upon whether the UE is provided with the relevant system information of the target NR cell or not by the old NR cell before the RRC connection is released.

- TRACH\_CCA: It is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell:

- TRACH\_CCA = (1+L2)×TSSB,RO + 10 ms TPRACH; where:

- L2 is the consecutive number of SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failures. L2 = 0 for Type 2C UL channel access procedure as defined in TS 37.213 [33]. L3 = 0 if *ra-ChannelAccess-r17* is not configured in FR2-2.

- TSSB,RO is the SSB to PRACH occasion association period as defined in the table 8.1-1 of TS 38.213 [3].

- The value of L2 is limited by *PREAMBLE\_TRANSMISSION\_COUNTER*, which is increased when PRACH occasion is unavailable for PRACH transmission due to UL CCA failure as specified in TS 38.321 [7]. The UE behaviour when *PREAMBLE\_TRANSMISSION\_COUNTER* reaches the *preambleTransMax* is specified in TS 38.321 [7].

- Trs is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the redirection command, otherwise Trs is the SMTC periodicity configured in the *measObjectNR* having the same SSB frequency and subcarrier spacing configured for the RRC connection release with redirection. If the UE is not provided with SMTC configuration or measurement object for the frequency which is also configured for the RRC connection release with redirection then:

- the requirement in this clause is applied with Trs = 20 ms if the SSB transmission periodicity is not larger than 20 ms;

- otherwise, there is no requirement if the SSB transmission periodicity is larger than 20ms.

Table 11.2.2.3.0-1: Maximum allowed number of missed SMTC occasions during cell identification

|  |  |
| --- | --- |
| SMTC periodicity (Trs) [ms] | Maximum allowed number of missed SMTC occasions (L1,max) |
| Trs ≤ 40 | 8 |
| Trs > 40 | 4 |

The normative reference for this requirement is TS 38.133 [6] clause 6.2.3.2.3.

##### 11.2.2.3.1 NR SA FR1 Redirection from NR FR1 carrier under CCA to NR FR1 carrier under CCA

Editor's Note:

- MU and TT analysis is incomplete

11.2.2.3.1.1 Test purpose

The purpose of this test is to verify that UE shall perform RRC connection release with redirection from NR FR1 carrier under CCA to NR FR1 carrier under CCA within limits.

11.2.2.3.1.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U.

11.2.2.3.1.3 Minimum conformance requirement

The minimum requirements are specified in clause 11.2.2.3.0

The normative reference for this requirement is TS 38.133 [6] clause A.11.2.2.3.1.

11.2.2.3.1.4 Test description

11.2.2.3.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.2.2.3.1.4.1-1.

Table 11.2.2.3.1.4.1-1: Redirection from NR to NR test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 11.2.2.3.1.4.1-2.

Table 11.2.2.3.1.4.1-2: NR SA FR1 Redirection from NR FR1 carrier under CCA to NR FR1 carrier under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.2-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.2.2.3.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. Message contents are defined in clause 11.2.2.3.1.4.3.

2. There is one NR carrier and two NR cells specified in the test. Cell 1 and Cell 2 are configured according to Annex C.1.1 and C.1.2.

3. The test parameters are given in Table 11.2.2.3.1.4.1-3.

Table 11.2.2.3.1.4.1-3: General test parameters for Redirection from NR to NR test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 | On the carrier under CCA |
|  | Neighbouring cell |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell |  | Cell 2 | On the carrier under CCA |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| DL CCA model | Dynamic channel accessNote 1, 3 |  | As specified in clause A.3.26.2.1 |  |
| Semi-static channel access Note 2, 3 |
| UL CCA model | Dynamic channel access Note 1, 3 |  | As specified in clause A.3.26.2.2 |  |
| Semi-static channel access Note 2,3 |
| T1 | | s | 5 |  |
| T2 | | s | ≥ Tconnection\_release\_redirect\_NR\_CCA | Tconnection\_release\_redirect\_NR\_CCA ­is defined in clause 6.2.3.2.3 |
| NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | |

11.2.2.3.1.4.2 Test Procedure

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The “*RRCRelease*” message 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.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On and Test Mode *On* according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell.

2. Set the parameters according to T1 in Table 11.2.2.3.1.5-1. T1 starts.

3. SS shall transmit an *RRCRelease* during period T1.

4. The SS shall switch the power setting from T1 to T2 as specified in Table 11.2.2.3.1.5-1. When the last TTI containing the *RRCRelease* message is sent to UE, T2 starts.

5. If the UE transmits the PRACH to Cell 2 in less than Tconnection\_release\_redirect\_NR\_CCA ms from the beginning of time period T2 then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.

6. After T2 expires, the UE shall be switched off. Then ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On and Test Mode *On* according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell and Cell 2 shall be powered OFF.

7. The SS shall set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

8. Repeat step 2-7 until the confidence level [according to Table G.2.3-1 in Annex G clause G.2 is achieved].

11.2.2.3.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

**Table 11.2.2.3.1.4.3-1: Common exceptions for NR SA FR1 Redirection from NR FR1 carrier under CCA to NR FR1 carrier under CCA**

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

Table 11.2.2.3.1.4.3-2: RRCRelease for NR RRC redirection

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1-16 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| redirectedCarrierInfo CHOICE { |  |  |  |
| nr SEQUENCE { |  |  |  |
| carrierFreq | ARFCN-ValueNR | Frequency of Cell 2 |  |
| ssbSubcarrierSpacing | kHz30 |  |  |
| smtc SEQUENCE { |  |  |  |
| duration | sf1 |  | SMTC.1 |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

11.2.2.3.1.5 Test Requirement

Table 11.2.2.3.1.5-1 defines the cell-specific test parameters for redirection from NR to NR test case.

Table 11.2.2.3.1.5-1: Cell specific test parameters for Redirection from NR to NR test case

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | Cell 2 | |
|  | | |  | T1 | T2 | T1 | T2 |
| NR RF Channel Number | | |  | 1 | | 2 | |
| PCCA\_DL for dynamic channel access Note 4,6 | | | - | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | |
| PCCA\_DL for semi-static channel access Note 5,6 | | | - | PCCA\_DL=0.9375 | | PCCA\_DL=0.9375 | |
| PCCA\_UL for dynamic channel access Note 4,6 | | | - | 1 | | 1 | |
| PCCA\_UL for semi-static channel access Note 5,6 | | | - | 1 | | 1 | |
| LCCA\_DL Note 7 | | |  | N/A | | 8 | |
| WCCA\_DL Note 7 | | | ms | N/A | | Tidentify-NR\_CCA | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | |
| BWchannel | | Config 1 |  | 40: NRB,c = 106 | | | |
| BWP BW | | Config 1 |  | 40: NRB,c = 106 | | | |
| DRX Cycle | | | ms | Not Applicable | | | |
| PDSCH Reference | | Config 1 |  | SR.1.1 CCA | | | |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA | | | |
| Dedicated CORESET RMC configuration | | Config 1 |  | CCR.1.1 CCA | | | |
| TRS configuration | | Config 1 |  | TRS.1.2 TDD | | | |
| OCNG Patterns | | |  | OP.1 | | | |
| SMTC Configuration | | |  | SMTC.1 | | | |
| DBT configuration | | |  | DBT.1 | | | |
| SSB configuration for semi-static channel access Note 4, 6 | | Config 1 |  | SSB.1 CCA | | | |
| SSB configuration for dynamic channel access Note 5, 6 | | Config 1 |  | SSB.2 CCA | | | |
| ssb-PositionQCL | | Config 1 |  | [1] | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 under CCA | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH DMRS | | |
| EPRE ratio of PDCCH DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |
| EPRE ratio of PDSCH DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |
| Note2 | | | dBm/15kHz | -98+TT | | | |
| Note2 | Config 1 | | dBm/SCS | -95+TT | | | |
|  | | | dB | 4+TT | 4+TT | -infinity | 4+TT |
|  | | | dB | 4+TT | 4+TT | -infinity | 4+TT |
| IoNote3 | Config 1 | | dBm/  38.16MHz | -58.49+TT | -58.49+TT | -63.94 | -58.49+TT |
| Propagation condition | | | - | AWGN | | 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.  Note 7: As defined in clause 6.2.3.2.3 for Trs ≤ 40 ms. | | | | | | | |

The UE shall start to transmit the PRACH to Cell 2 less than Tconnection\_release\_redirect\_NR\_CCA ms from the beginning of time period T2, where Tconnection\_release\_redirect\_NR\_CCA is defined in clause 11.2.2.3.0.

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

Tconnection\_release\_redirect\_NR\_CCA = TRRC\_procedure\_delay + Tidentify-NR\_CCA + TSI-NR\_CCA + TRACH\_CCA,

where:

TRRC\_procedure\_delay = 110 ms in the test.

Tidentify-NR\_CCA = MAX (680 ms, (L1+11) × 20 ms) in the test.

TSI-NR\_CCA = 1280 ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

TRACH\_CCA is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell.

L1 is the number of SMTC occasions not available at the UE due to DL CCA failures. The test equipment ensures that number of L1 in target cell does not exceed L1,max using the configured LCCA\_DL as in clause A.3.26.2.1 of TS 38.133[6].

##### 11.2.2.3.2 NR SA FR1 Redirection from NR FR1 carrier without CCA to NR FR1 carrier under CCA

Editor's Note:

- MU and TT analysis is incomplete

11.2.2.3.2.1 Test purpose

The purpose of this test is to verify that UE shall perform RRC connection release with redirection from NR FR1 carrier without CCA to NR FR1 carrier under CCA within limits.

11.2.2.3.2.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U.

11.2.2.3.2.3 Minimum conformance requirement

The minimum requirements are specified in clause 11.2.2.3.0

The normative reference for this requirement is TS 38.133 [6] clause A.11.2.2.3.2.

11.2.2.3.2.4 Test description

11.2.2.3.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.2.2.3.2.4.1-1.

Table 11.2.2.3.2.4.1-1: Redirection from NR to NR test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Source cell without CCA | Target cell with CCA |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

Configure the test equipment and the DUT according to the parameters in Table 11.2.2.3.2.4.1-2.

Table 11.2.2.3.2.4.1-2: NR SA FR1 Redirection from NR FR1 carrier without CCA to NR FR1 carrier under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.2-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.2.2.3.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. Message contents are defined in clause 11.2.2.3.2.4.3

2. There is one NR carrier and two NR cells specified in the test. Cell 1 and Cell 2 are configured according to Annex C.1.1 and C.1.2.3. The test parameters are given in Table 11.2.2.3.2.4.1-3.

Table 11.2.2.3.2.4.1-3: General test parameters for Redirection from NR to NR test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 | On the carrier without CCA |
|  | Neighbouring cell |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell |  | Cell 2 | On the carrier under CCA |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| DL CCA model | Dynamic channel accessNote 1, 3 |  | As specified in clause A.3.26.2.1 |  |
| Semi-static channel access Note 2, 3 |
| UL CCA model | Dynamic channel access Note 1, 3 |  | As specified in clause A.3.26.2.2 |  |
| Semi-static channel access Note 2,3 |
| T1 | | s | 5 |  |
| T2 | | s | ≥ Tconnection\_release\_redirect\_NR\_CCA | Tconnection\_release\_redirect\_NR\_CCA ­is defined in clause 6.2.3.2.3 |
| NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | |

11.2.2.3.2.4.2 Test Procedure

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The “*RRCRelease*” message 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.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On and Test Mode *On* according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell.

2. Set the parameters according to T1 in Table 11.2.2.3.1.5-1. T1 starts.

3. SS shall transmit an *RRCRelease* during period T1.

4. The SS shall switch the power setting from T1 to T2 as specified in Table 11.2.2.3.1.5-1. When the last TTI containing the *RRCRelease* message is sent to UE, T2 starts.

5. If the UE transmits the PRACH to Cell 2 in less than Tconnection\_release\_redirect\_NR\_CCA ms from the beginning of time period T2 then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.

6. After T2 expires, the UE shall be switched off. Then ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On and Test Mode *On* according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell and Cell 2 shall be powered OFF.

7. The SS shall set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

8. Repeat step 2-7 until the confidence level [according to Table G.2.3-1 in Annex G clause G.2 is achieved].

11.2.2.3.2.4.3 Message Contents

Same as 11.2.2.3.1.4.3 with the following exceptions:

Table 11.2.2.3.2.4.3-1: RRCRelease for NR RRC redirection

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1-16 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| redirectedCarrierInfo CHOICE { |  |  |  |
| nr SEQUENCE { |  |  |  |
| carrierFreq | ARFCN-ValueNR | Frequency of Cell 2 |  |
| ssbSubcarrierSpacing | kHz30 |  |  |
| smtc SEQUENCE { | sf1 |  | SMTC.1 |
| duration | sf5 |  | SMTC.2 |
|  |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

11.2.2.3.2.5 Test Requirement

Table 11.2.2.3.2.5-1 defines the cell-specific test parameters for redirection from NR to NR test case.

Table 11.2.2.3.2.5-1: Cell specific test parameters for Redirection from NR to NR test case

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | Cell 2 | | |
|  | | |  | T1 | T2 | T1 | | T2 |
| NR RF Channel Number | | |  | 1 | | 2 | | |
| PCCA\_DL for dynamic channel access Note 4,6 | | |  | N/A | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | |
| PCCA\_DL for semi-static channel access Note 5,6 | | |  | N/A | | PCCA\_DL=0.9375 | PCCA\_DL=0.9375 | |
| PCCA\_UL for dynamic channel access Note 4,6 | | |  | N/A | | 1 | 1 | |
| PCCA\_UL for semi-static channel access Note 5,6 | | |  | N/A | | 1 | 1 | |
| LCCA\_DL Note 7 | | |  | N/A | | 8 | | |
| WCCA\_DL Note 7 | | | ms | N/A | | Tidentify-NR\_CCA | | |
| Duplex mode | | Config 1 |  | FDD | | TDD | | |
|  | | Config 2,3 |  | TDD | | | | |
| TDD configuration | | Config 1 |  | Not Applicable | | TDDConf.1.1 CCA | | |
|  | | Config 2 |  | TDDConf.1.1 | | TDDConf.1.1 CCA | | |
|  | | Config 3 |  | TDDConf.2.1 | | TDDConf.1.1 CCA | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | | SR.1.1 CCA | | |
| Config 2 |  | SR.1.1 TDD | | SR.1.1 CCA | | |
| Config 3 |  | SR2.1 TDD | | SR.1.1 CCA | | |
| RMSI CORESET RMC configuration | | Config 1 |  | CR.1.1 FDD | | CR.1.1 CCA | | |
| Config 2 |  | CR.1.1 TDD | | CR.1.1 CCA | | |
| Config 3 |  | CR.2.1 TDD | | CR.1.1 CCA | | |
| Dedicated CORESET RMC configuration | | Config 1 |  | CCR.1.1 FDD | | CCR.1.1 CCA | | |
| Config 2 | CCR.1.1 TDD | | CCR.1.1 CCA | | |
| Config 3 | CCR.2.1 TDD | | CCR.1.1 CCA | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | |
| SSB Configuration | Semi-static channel access | Config 1,2 |  | SSB.1 FR1 | | SSB.1 CCA | | |
| Dynamic channel access | Config 3 |  | SSB.2 FR1 | | SSB.2 CCA | | |
| Semi-static channel access | Config 1,2 |  | SSB.1 FR1 | | SSB.1 CCA | | |
| Dynamic channel access | Config 3 |  | SSB.2 FR1 | | SSB.2 CCA | | |
| SMTC configuration | | Config 1,2 |  | SMTC.1 FR1 | | SMTC.2 FR1 | | |
|  | | Config 3 |  | SMTC.2 FR1 | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | 30 kHz | | |
| Config 3 |  | 30 kHz | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | 30 kHz | | |
| Config 3 |  | 30 kHz | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 under CCA in Table A.3.8A.2.1-1 | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH DMRS | | |
| EPRE ratio of PDCCH DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |
| EPRE ratio of PDSCH DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH | | |
| EPRE ratio of OCNG DMRS to SSS (Note 1) | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |
| Note2 | | | dBm/15kHz | -98+TT | | | | |
| Note2 | | Config 1,2 | dBm/SCS | -98+TT | | -95+TT | | |
| Config 3 |  | -95+TT | | | | |
|  | | | dB | 4+TT | 4+TT | -infinity | | 4+TT |
|  | | | dB | 4+TT | 4+TT | -infinity | | 4+TT |
| IoNote3 | | Config 1,2 | dBm/9.36MHz | -64.59+TT | -64.59+TT | N/A | | N/A |
| Config 3 | dBm/38.16MHz | -58.49+TT | -58.49+TT | -63.94+TT | | -58.49+TT |
| 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.  Note 7: As defined in clause 6.2.3.2.3 for Trs ≤ 40 ms. | | | | | | | | |

The UE shall start to transmit the PRACH to Cell 2 less than Tconnection\_release\_redirect\_NR\_CCA ms from the beginning of time period T2, where Tconnection\_release\_redirect\_NR\_CCA is defined in clause 11.2.2.3.0.

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

Tconnection\_release\_redirect\_NR\_CCA = TRRC\_procedure\_delay + Tidentify-NR\_CCA + TSI-NR\_CCA + TRACH\_CCA,

where:

TRRC\_procedure\_delay = 110 ms in the test.

Tidentify-NR\_CCA = MAX (680 ms, (L1+11) × 20 ms) in the test.

TSI-NR\_CCA = 1280 ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

TRACH\_CCA is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell. TRACH\_CCA = (1+L2)´TSSB,RO + 10 ms; where TSSB,RO = 10 ms for FR1 PRACH configuration 1.

L1 is the number of SMTC occasions not available at the UE due to DL CCA failures. The test equipment ensures that number of L1 in target cell does not exceed L1,max using the configured LCCA\_DL as in clause A.3.26.2.1 of TS 38.133[6];

L2 is the consecutive number of SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failures. L2 = 0 in the test.

The total delay, Tconnection\_release\_redirect\_NR\_CCA, shall be less than 1410 + MAX (680, (L1+11)´20) ms.

## 11.3 Timing

FFS

## 11.4 Signalling characteristics

### 11.4.1 Radio link monitoring

#### 11.4.1.0 General

Same as in clause 10.3.1.0.

##### 11.4.1.0.1 Minimum conformance requirements for SSB based radio link monitoring under CCA

Same as in clause 10.3.1.0.1.

11.4.1.0.1.1 Minimum requirement for SSB based Radio Link Monitoring under CCA

Same as in clause 10.3.1.0.1.1.

11.4.1.0.1.2 Measurement restrictions for SSB based RLM under CCA

Same as in clause 10.3.1.0.1.2.

#### 11.4.1.1 Requirements for determining UE in-sync or out-of-sync status

In the test cases specified in clause 11.4.1, any uplink signal transmitted by the UE is used for detecting the in-/out-of-sync state of the UE. In terms of measurement, the uplink signal is verified based on the UE output power:

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [2]) means uplink signal.

- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [2]) means no uplink signal.

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

The normative reference for this requirement is TS 38.133 [6] clause A.11.4.1.1.

#### 11.4.1.2 NR SA FR1 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

Editor's Note:

- Statistical analysis to determine test case verdict is FFS

11.4.1.2.1 Test purpose

The purpose of this test is to verify that the UE properly detects the out-of-sync and in-sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 PCell radio link monitoring requirements in clause 11.4.1.0.

11.4.1.2.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and supporting UL and SSB-based RLM on shared channel access.

11.4.1.2.3 Minimum conformance requirement

The minimum requirements are specified in clause 11.4.1.0.1. The measurement restrictions for SSB based RLM under CCA are specified in clause 11.4.1.0.2. DRX configuration is not used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.11.4.1.2.

11.4.1.2.4 Test description

In the test, UE is configured to perform RLM based on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in Table 11.4.1.2.4.1-1. The test parameters are given in Tables 11.4.1.2.4.1-3, 11.4.1.2.5-1, and 11.4.1.2.5-2 below. There is one cell (Cell 1), which is the active NR cell in FR1, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

The test consists of three successive time periods, with time duration of T1, T2 and T3, respectively. Figure 11.4.1.2.4-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE transmits according to UL CCA model. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40 ms) in the test.

A picture containing diagram

Description automatically generated

Figure 11.4.1.2.4-1: SNR variation for NR SA FR1 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

11.4.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.4.1.2.4.1-1.

Table 11.4.1.2.4.1-1: Supported test configurations for NR SA FR1 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 11.4.1.2-1 | TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Configure the test equipment and the DUT according to the parameters in Table 11.4.1.2.4.1-2.

Table 11.4.1.2.4.1-2: Initial conditions for NR SA FR1 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.9-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.4.1.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. Message contents are defined in clause 11.4.1.2.4.3.

2. The power levels and settings for Cell 1 are set according to Annex C.1.2 and C.1.3.

3. The test parameters are given in Table 11.4.1.2.4.1-3.

Table 11.4.1.2.4.1-3: General test parameters for NR SA FR1 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
| Test 1 |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| DL CCA model | | |  | As specified in clause D.7.2.1 |
| UL CCA model | | |  | As specified in clause D.7.2.2 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 | MHz | 40: NRB,c = 106 |
| DL initial BWP configuration | | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1 |  | ULBWP.1.1 |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA |
| SSB configuration for semi-static channel accessNote 3, 5 | | Config 1 |  | SSB.1 CCA |
| SSB configuration for dynamic channel accessNote 4, 5 | | Config 1 |  | SSB.2 CCA |
| DBT window configuration | | Config 1 |  | DBT.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 30 kHz |
| PRACH Configuration | | Config 1 |  | FR1 PRACH configuration 1 under CCA |
| SSB index assigned as RLM RS | | |  | 0 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |
| Out of sync transmission parameters | DCI format | |  | 1-0 |
| Number of Control OFDM symbols | |  | 2 |
| Aggregation level | | CCE | 8 |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
| DMRS precoder granularity | |  | REG bundle size |
| REG bundle size | |  | 6 |
| DRX | | |  | OFF |
| Gap pattern ID | | |  | gp0 |
| Layer 3 filtering | | |  | Enabled |
| T310 timer | | | ms | 0 |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS configuration for CSI reporting | | Config 1 |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1 |  | TRS.1.2 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 1.04 |
| T3 | | | s | 1.04 |
| D1 | | | s | 1 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | |

11.4.1.2.4.2 Test Procedure

The test consists of a single NR cell (PCell). Prior to the start of the time duration T1, the UE shall be fully synchronized to the PCell. The UE shall be configured for periodic CSI reporting in PUCCH format 2 with a reporting periodicity as mentioned in the above table 11.4.1.2.4.1-3.

The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in State RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell.

2. The SS sends an *RRCReconfiguration* message to the UE to configure inter-frequency measurement with the corresponding gap pattern and periodic CSI reporting.

3. The UE sends an *RRCReconfigurationComplete* message.

4. Set the parameters of NR Cell according to T1 in Table 11.4.1.2.5-1. Propagation conditions are set according to clause C.2.3. The SS shall enable DL and UL CCA model according to Table 11.4.1.2.5-1. T1 starts.

5. When T1 expires the SS shall change the SNR value to T2 as specified in Table 11.4.1.2.5-1. T2 starts.

6. When T2 expires the SS shall change the SNR value to T3 as specified in Table 11.4.1.2.5-1. T3 starts.

7. If the SS:

a) detects uplink power equal to or higher than minimum output power, according to section 11.4.1.1, in each subframe configured for CSI transmission (according to configured CSI periodicity on PUCCH format 2) during the period from time point A to time point B; and

b) does not detect any uplink power higher than OFF power, according to section 11.4.1.1, from time point C (D1 after the start of T3) until T3 expires, the number of successful tests is increased by one.

Otherwise, the number of failed tests is increased by one and proceed with step 10.

8. When T3 expires the SS shall change the SNR value to T1 as specified in Table 11.4.1.2.5-1.

9. If the UE has re-established the connection within 2 seconds, proceed with step 11. Otherwise, proceed with step 10.

10. The SS shall switch off and then on the UE and then proceed with step 1.

11. Repeat steps 1-9 until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

11.4.1.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clauses 4.6.1 and 7.3 with the following exceptions:

Table 11.4.1.2.4.3-1: Common Exception messages for NR SA FR1 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition INTER-FREQ, L3 FILTERING NEEDED,  Table H.3.1-3 with Condition INTER-FREQ MO (where ssbFrequency is set to the ARFCN value of carrier centre of High range)  Table H.3.1-4 with A3-offset = 0  Table H.3.1-6 with conditions gapUE and RLM  Table H.3.1-8 with Condition SSB RLM  Table H.3.5-4  Table H.3.5-9  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

Table 11.4.1.2.4.3-2: *RLF-TimersAndConstants* for NR SA FR1 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-150 | | | |
| Information Element | Value/remark | Comment | Condition |
| RLF-TimersAndConstants ::= SEQUENCE { |  |  |  |
| t310 | ms0 |  |  |
| n310 | n1 |  |  |
| t311 | ms1000 |  |  |
| n311 | n1 |  |  |
| } |  |  |  |

11.4.1.2.5 Test Requirement

Table 11.4.1.2.5-1 defines the cell specific primary level settings including test tolerances for NR SA FR1 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA.

Table 11.4.1.2.5-1: Cell-specific test parameters for NR SA FR1 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | |
| T1 | T2 | T3 |
| DL CCA probability PCCA\_DL | | Note 6,8 |  | PCCA\_DL=0.9375 | | |
| Note 7,8 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | |
| UL CCA probability PCCA\_UL | | |  | 1 | | |
| EPRE ratio of PDCCH DMRS to SSS | | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | | dB | 0 | | |
| EPRE ratio of PBCH to PBCH DMRS | | | dB |
| EPRE ratio of PSS to SSS | | | dB |
| EPRE ratio of PDSCH DMRS to SSS | | | dB |
| EPRE ratio of PDSCH to PDSCH DMRS | | | dB |
| EPRE ratio of OCNG DMRS to SSS | | | dB |
| EPRE ratio of OCNG to OCNG DMRS | | | dB |
| SNRNote 3,4 on RLM-RS | Config 1 | | dB | 1.8 | -6.2 | -15.8 |
| SNR on other channels and signals | Config 1 | | dB | 1 | | |
|  | Config 1 | | dBm/SCS | -95 | | |
| Propagation condition | | |  | TDL-C 300 ns 100 Hz | | |
| NOTE 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in slots with RMC burst transmission and is not transmitted during muted slots or during DBT windows.  NOTE 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  NOTE 3: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT windows.  NOTE 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3, respectively, in Figure 11.4.1.2.4-1.  NOTE 5: The SNR values are specified for testing a UE which supports 2 RX on at least one band. For testing of a UE which supports 4 RX on all bands, the SNR during T3 is D.4A.  NOTE 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 8: For UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | |

Table 11.4.1.2.5-2: Measurement gap configuration for NR SA FR1 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |
| --- | --- | --- |
| Field | Test 1 |  |
| Value |  |
| *gapOffset* | 0 |  |
| NOTE: Ensure that RLM RS is partially overlapped with measurement gap0 | | |

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

- During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

- The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

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

#### 11.4.1.3 NR SA FR1 Radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

Editor's Note:

- Statistical analysis to determine test case verdict is FFS

11.4.1.3.1 Test purpose

The purpose of this test is to verify that the UE properly detects the out-of-sync and in-sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 PCell radio link monitoring requirements in clause 11.4.1.0.

11.4.1.3.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and supporting UL and SSB-based RLM on shared channel access.

11.4.1.3.3 Minimum conformance requirement

The minimum requirements are specified in clause 11.4.1.0.1. The measurement restrictions for SSB based RLM under CCA are specified in clause 11.4.1.0.2. DRX configuration is not used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.11.4.1.3.

11.4.1.3.4 Test description

In the test, UE is configured to perform RLM based on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table 11.4.1.3.4.1-1. The test parameters are given in Tables 11.4.1.3.4.1-3 and 11.4.1.3.5-1. There is one cell (Cell 1), which is the active NR cell in FR1, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5, respectively. Figure 11.4.1.3.4-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE transmits according to UL CCA model.

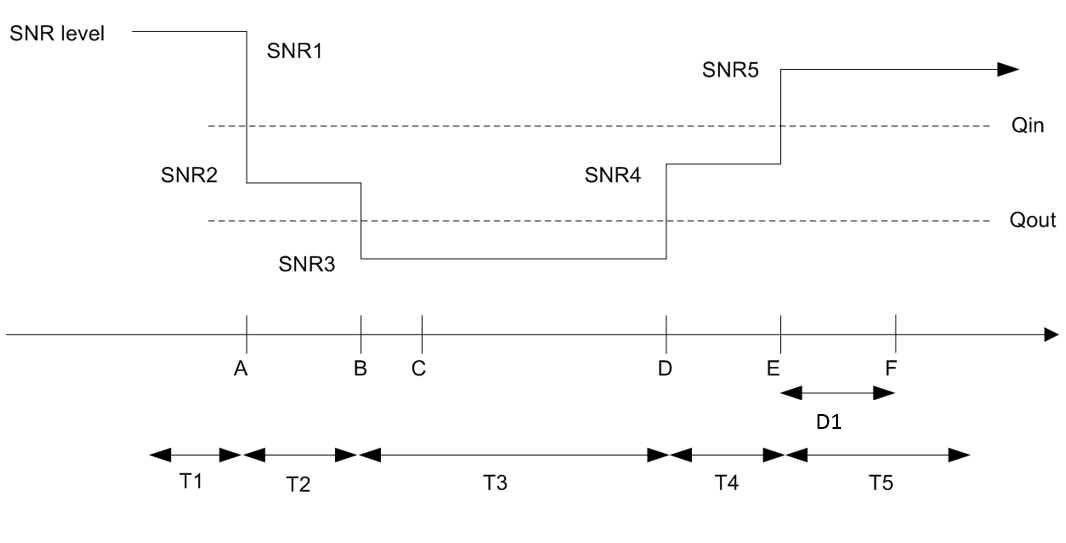


Figure 11.4.1.3.4-1: SNR variation for NR SA FR1 Radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

11.4.1.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.4.1.3.4.1-1.

Table 11.4.1.3.4.1-1: Supported test configurations for NR SA FR1 Radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 11.4.1.3-1 | TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Configure the test equipment and the DUT according to the parameters in Table 11.4.1.3.4.1-2.

Table 11.4.1.3.4.1-2: Initial conditions for NR SA FR1 Radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.9-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.4.1.3.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. Message contents are defined in clause 11.4.1.3.4.3.

2. The power levels and settings for Cell 1 are set according to Annex C.1.2 and C.1.3.

3. The test parameters are given in Table 11.4.1.3.4.1-3.

Table 11.4.1.3.4.1-3: General test parameters for NR SA FR1 Radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
| Test 1 |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| DL CCA model | | |  | As specified in clause D.7.2.1 |
| UL CCA model | | |  | As specified in clause D.7.2.2 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 | MHz | 40: NRB,c = 106 |
| DL initial BWP configuration | | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1 |  | TDDConf.1.1 CCA |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA |
| SSB configuration for semi-static channel accessNote 3, 5 | | Config 1 |  | SSB.1 CCA |
| SSB configuration for dynamic channel accessNote 4,5 | | Config 1 |  | SSB.2 CCA |
| DBT window configuration | | Config 1 |  | DBT.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 30 kHz |
| PRACH Configuration | | Config 1 |  | FR1 PRACH configuration 1 under CCA |
| SSB index assigned as RLM RS | | |  | 0 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |
| In sync transmission parameters | DCI format | |  | 1-0 |
| Number of Control OFDM symbols | |  | 2 |
| Aggregation level | | CCE | 4 |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 0 |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 0 |
| DMRS precoder granularity | |  | REG bundle size |
| REG bundle size | |  | 6 |
| Out of sync transmission parameters | DCI format | |  | 1-0 |
| Number of Control OFDM symbols | |  | 2 |
| Aggregation level | | CCE | 8 |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
| DMRS precoder granularity | |  | REG bundle size |
| REG bundle size | |  | 6 |
| DRX | | |  | OFF |
| Gap pattern ID | | |  | N/A |
| Layer 3 filtering | | |  | Enabled |
| T310 timer | | | ms | 2000 |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS configuration for CSI reporting | Config 1 | |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | Config 1 | |  | TRS.1.2 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.2 |
| T3 | | | s | 0.52 |
| T4 | | | s | 0.2 |
| T5 | | | s | 2.04 |
| D1 | | | s | 2 |
| NOTE 1: All configurations are assigned to the UE prior to the start of time period T1.  NOTE 2: UE-specific PDCCH is not transmitted after T1 starts.  NOTE 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | |

11.4.1.3.4.2 Test Procedure

The test consists of a single NR cell (PCell). Prior to the start of the time duration T1, the UE shall be fully synchronized to the PCell. The UE shall be configured for periodic CSI reporting in PUCCH format 2 with a reporting periodicity as mentioned in the above table 11.4.1.3.4.1-3. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in State RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell.

2. The SS sends an *RRCReconfiguration* message to the UE to configure periodic CSI reporting.

3. The UE sends an *RRCReconfigurationComplete* message.

4. Set the parameters of NR Cell according to T1 in Table 11.4.1.3.5-1. Propagation conditions are set according to clause C.2.3. The SS shall enable DL and UL CCA model according to Table 11.4.1.3.5-1. T1 starts.

5. When T1 expires the SS shall change the SNR value to T2 as specified in Table 11.4.1.3.5-1. T2 starts.

6. When T2 expires the SS shall change the SNR value to T3 as specified in Table 11.4.1.3.5-1. T3 starts.

7. When T3 expires the SS shall change the SNR value to T4 as specified in Table 11.4.1.3.5-1. T4 starts.

8. When T4 expires the SS shall change the SNR value to T5 as specified in Table 11.4.1.3.5-1. T5 starts.

9. If the SS detects uplink power equal to or higher than minimum output power, according to section 11.4.1.1, in each subframe configured for CSI transmission (according to configured CSI periodicity on PUCCH format 2) during the period from time point A to time point F (D1 seconds after the start of time duration T5), the number of successful tests is increased by one. After the expiration of T5, the SS shall proceed with step 11 for the next iteration, or with step 10.

Otherwise, the number of failed tests is increased by one and proceed with step 10.

10. The SS shall switch off and then on the UE and then proceed with step 1.

11. Repeat steps 4-9 until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

11.4.1.3.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clauses 4.6.1 and 7.3 with the following exceptions:

Table 11.4.1.3.4.3-1: Common Exception messages for NR SA FR1 Radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition L3 FILTERING NEEDED,  Table H.3.1-3 with Condition RLM  Table H.3.1-4 with A3-offset = 0  Table H.3.1-8 with Condition SSB RLM  Table H.3.5-4  Table H.3.5-9  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

Table 11.4.1.3.4.3-2: *RLF-TimersAndConstants* for NR SA FR1 Radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-150 | | | |
| Information Element | Value/remark | Comment | Condition |
| RLF-TimersAndConstants ::= SEQUENCE { |  |  |  |
| t310 | ms2000 |  |  |
| n310 | n1 |  |  |
| t311 | ms1000 |  |  |
| n311 | n1 |  |  |
| } |  |  |  |

11.4.1.3.5 Test Requirement

Table 11.4.1.3.5-1 defines the cell specific primary level settings including test tolerances for NR SA FR1 Radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA.

Table 11.4.1.3.5-1: Cell-specific test parameters for NR SA FR1 Radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in non-DRX mode under CCA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | | | |
| T1 | T2 | T3 | T4 | T5 |
| DL CCA probability PCCA\_DL | | Note 6,8 |  | PCCA\_DL=0.9375 | | | | |
| Note 7,8 |  | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | |
| UL CCA probability PCCA\_UL | | |  | 1 | | | | |
| LCCA\_DL | | |  | 7 | | | | |
| WCCA\_DL | | | ms | TEvaluate\_in\_SSB,CCANOTE 9 | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | dB | 4 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | | | dB | 0 | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | dB |
| EPRE ratio of PSS to SSS | | | dB |
| EPRE ratio of PDSCH DMRS to SSS | | | dB |
| EPRE ratio of PDSCH to PDSCH DMRS | | | dB |
| EPRE ratio of OCNG DMRS to SSS | | | dB |
| EPRE ratio of OCNG to OCNG DMRS | | | dB |
| SNR on RLM-RS | Config 1 | | dB | 1.8 | -6.2 | -15.8 | -5.3 | 1.8 |
| SNR on other channels and signals | Config 1 | | dB | 1 | | | | |
|  | Config 1 | | dBm/SCS | -95 | | | | |
| Propagation condition | | |  | TDL-C 300ns 100Hz | | | | |
| NOTE 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in slots with RMC burst transmission and is not transmitted during muted slots or during DBT windows.  NOTE 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  NOTE 3: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT windows.  NOTE 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure 11.4.1.3.4-1.  NOTE 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4 RX on all bands, the SNR during T3 and T4 is modified as specified in clause D.4A.  NOTE 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 8: For UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.  NOTE 9: As defined in Table 11.4.1.0.1-1. | | | | | | | | |

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

- During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

### 11.4.2 Interruptions

FFS

### 11.4.3 SCell activation and deactivation delay

FFS

### 11.4.4 Beam failure detection and link recovery procedures

#### 11.4.4.0 General

Same as in clause 10.3.4.0.

##### 11.4.4.0.1 Minimum conformance requirements for SSB based Beam Failure Detection under CCA

Same as in clause 10.3.4.0.1.

11.4.4.0.1.1 Minimum requirement for SSB based Beam Failure Detection under CCA

Same as in clause 10.3.4.0.1.1.

11.4.4.0.1.2 Measurement restriction for SSB based Beam Failure Detection under CCA

Same as in clause 10.3.4.0.1.2.

##### 11.4.4.0.2 Void

Same as in clause 10.3.4.0.2.

##### 11.4.4.0.3 Scheduling availability of UE during beam failure detection under CCA

Same as in clause 10.3.4.0.3.

11.4.4.0.3.1 Scheduling availability of UE performing beam failure detection under CCA with a same subcarrier spacing as PDSCH/PDCCH

Same as in clause 10.3.4.0.3.1.

##### 11.4.4.0.4 Scheduling availability of UE during candidate beam detection under CCA

Same as in clause 10.3.4.0.4.

11.4.4.0.4.1 Scheduling availability of UE performing L1-RSRP measurement under CCA with a same subcarrier spacing as PDSCH/PDCCH on FR1

Same as in clause 10.3.4.0.4.1.

#### 11.4.4.1 NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode under CCA

Editor's Note:

- Statistical analysis to determine test case verdict is FFS

11.4.4.1.1 Test purpose

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 11.4.4.0.1.

11.4.4.1.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and supporting UL and SSB-based RLM and link recovery on shared channel access.

11.4.4.1.3 Minimum conformance requirement

The minimum requirements are specified in clause 11.4.4.0.1. DRX configuration is not used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.11.4.4.1.

11.4.4.1.4 Test description

The test parameters are given in Tables 11.4.4.1.4.1-3 and 11.4.4.1.5-1 below. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 11.4.4.1.4-1 shows the variation of the downlink SNR of the SSB in set q0 in the active cell to emulate SSB based beam failure. Figure 11.4.4.1.4-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery.

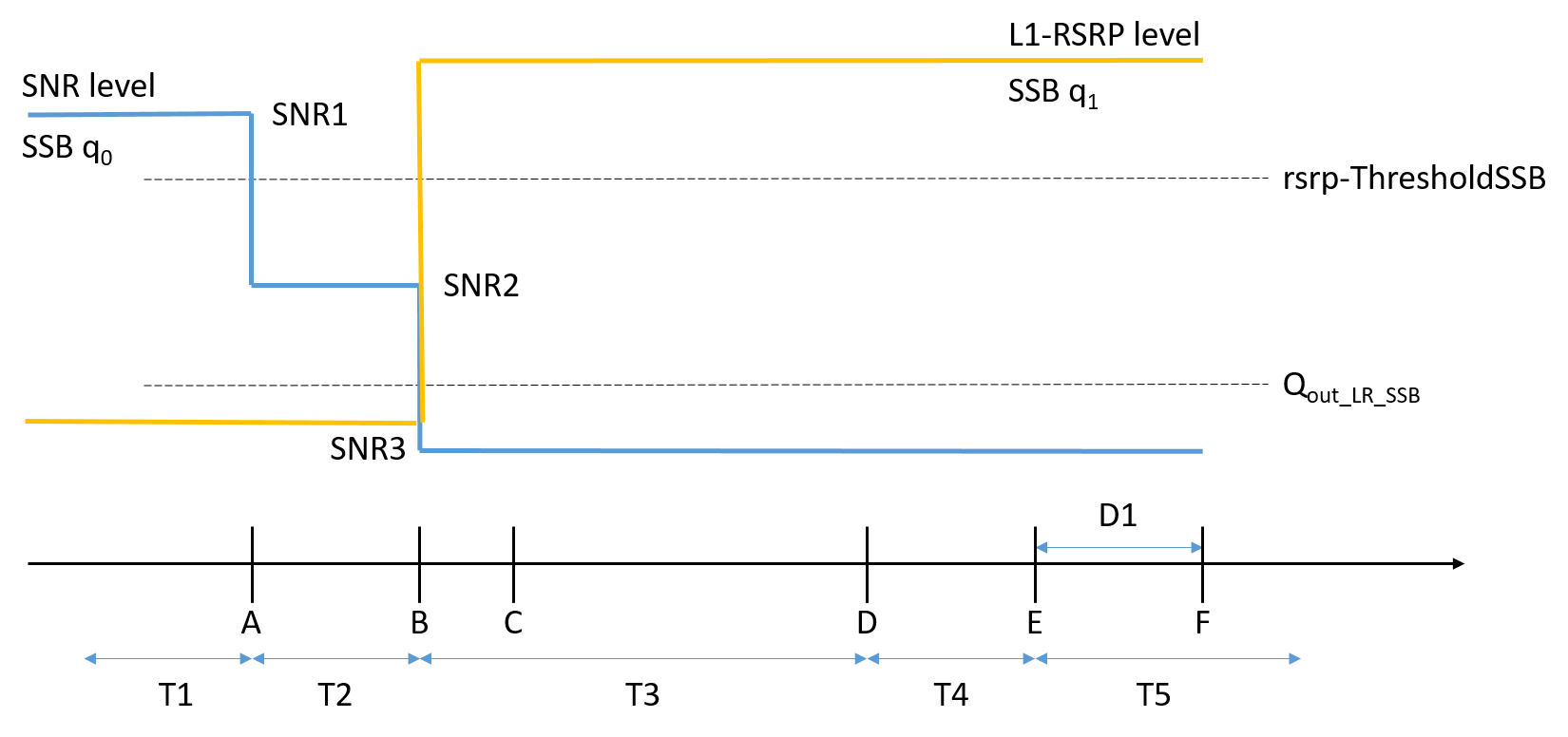


Figure 11.4.4.1.4-1: SNR variation for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode under CCA

11.4.4.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.4.4.1.4.1-1.

Table 11.4.4.1.4.1-1: Supported test configurations for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode under CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 11.4.4.1-1 | TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Configure the test equipment and the DUT according to the parameters in Table 11.4.4.1.4.1-2.

Table 11.4.4.1.4.1-2: Initial conditions for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.9-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.4.4.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. Message contents are defined in clause 11.4.4.1.4.3.

2. The power levels and settings for Cell 1 are set according to Annex C.1.2 and C.1.3.

3. The test parameters are given in Table 11.4.4.1.4.1-3.

Table 11.4.4.1.4.1-3: General test parameters for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode under CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value | Comment |
|  | | |  | Test 1 |  |
| Active PSCell | | |  | Cell 1 |  |
| RF Channel Number | | |  | 1 |  |
| DL CCA model | | |  | As specified in D.7.2.1 |  |
| UL CCA model | | |  | As specified in D.7.2.2 |  |
| Duplex mode | | Config 1 |  | TDD |  |
| BWchannel | | Config 1 | MHz | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | Config 1 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | Config 1 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | Config 1 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | Config 1 |  | ULBWP.1.1 |  |
| TDD Configuration | | Config 1 |  | TDDConf.1.1 CCA |  |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA |  |
| SSB Configuration | | Config 1 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |  |
| DBT Window Configuration | | Config 1 |  | DBT.1 |  |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 30 KHz |  |
| PRACH Configuration | | Config 1 |  | Table A.7.1A.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | |  | 0 |  |
| SSB Index assigned as CBD RS (q1) | | |  | 1 |  |
| OCNG parameters | | |  | OP.1 |  |
| CP length | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |  |
| Beam failure detection transmission parameters | DCI format | |  | 1-0 |  |
|  | Number of Control OFDM symbols | |  | 2 |  |
|  | Aggregation level | | CCE | 8 |  |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 0 |  |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 0 |  |
|  | DMRS precoder granularity | |  | REG bundle size |  |
|  | REG bundle size | |  | 6 |  |
| DRX | | |  | OFF |  |
| Gap pattern ID | | |  | gp0 |  |
| gapOffset | | |  | 0 |  |
| rlmInSyncOutOfSyncThreshold | | |  | absent | When the field is absent, the UE applies the value 0. (TS 38.133 [6] Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1 | | dBm/SCS kHz | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | |  | n1 | see clause 5.17 of TS 38.321 [12] |
| beamFailureDetectionTimer | | |  | pbfd4 | see clause 5.17 of TS 38.321 [12] |
| CSI-RS configuration for CSI reporting | Config 1 | |  | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | Config 1 | |  | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS |  | |  | 0,1 |  |
| T310 Timer |  | | ms | 1000 |  |
| N310 |  | |  | 2 |  |
| T1 | | | s | 0.2 | During this time the UE shall be fully synchronized to cell 1 |
| T2 | | | s | 0.93 |  |
| T3 | | | s | 0.52 |  |
| T4 | | | s | 0 |  |
| T5 | | | s | 0.45 |  |
| D1 | | | s | 0.41 |  |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

11.4.4.1.4.2 Test Procedure

There is one cell, cell 1 which is the active cell, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. The UE transmits the reporting according to UL CCA mode. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40 ms) in test 1. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in State RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell.

2. The SS sends an *RRCReconfiguration* message to the UE to configure inter-frequency measurement with the corresponding gap pattern and periodic CSI reporting.

3. The UE sends an *RRCReconfigurationComplete* message.

4. Set the parameters of NR Cell according to T1 in Table 11.4.4.1.5-1. Propagation conditions are set according to clause C.2.3. The SS shall enable DL and UL CCA model according to Table 11.4.4.1.5-1. T1 starts.

5. When T1 expires the SS shall change the SNR value to T2 as specified in Table 11.4.4.1.5-1. T2 starts.

6. When T2 expires the SS shall change the SNR value to T3 as specified in Table 11.4.4.1.5-1. T3 starts.

7. When T3 expires the SS shall change the SNR value to T4 as specified in Table 11.4.4.1.5-1. T4 starts.

8. When T4 expires the SS shall change the SNR value to T5 as specified in Table 11.4.4.1.5-1. T5 starts.

9. If the SS:

a) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in each slot configured for CSI transmission (according to CSI reporting on PUCCH) during the period from time point A to time point B; and

b) does not detect preamble on a beam associated with the candidate beam set q1 before time point B; and

c) detects preamble on a beam associated with the candidate beam set q1 before time point F (D1 after the start of T5), the number of successful tests is increased by one. Proceed with step 10.

Otherwise, the number of failed tests is increased by one. Switch off and then on the UE and proceed with step 1.

10. Repeat steps 2-9 for all subtests until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

11.4.4.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clauses 4.6.1 and 7.3 with the following exceptions:

Table 11.4.4.1.4.3-1: Common Exception messages for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition INTER-FREQ, L3 FILTERING NEEDED,  Table H.3.1-3 with Condition INTER-FREQ MO (where ssbFrequency is set to the ARFCN value of carrier centre of High range)  Table H.3.1-4 with A3-offset = 0  Table H.3.1-6 with conditions gapUE and BFD  Table H.3.1-8 with Condition SSB BFD  Table H.3.1-10 with Condition SSB  Table H.3.1-10A  Table H.3.5-4  Table H.3.5-9  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access |

Table 11.4.4.1.4.3-2: PDCCH *Search Space* for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode under CCA

| Derivation Path: TS 38.508-1 [14], Table 4.6.3-162 | | | |
| --- | --- | --- | --- |
| Information Element | Value/remark | Comment | Condition |
| SearchSpace ::= SEQUENCE { |  |  |  |
| searchSpaceId | 3 | BFR |  |
| controlResourceSetId | 2 | BFR |  |
| monitoringSlotPeriodicityAndOffset CHOICE { |  |  |  |
| sl1 | NULL |  |  |
| } |  |  |  |
| monitoringSymbolsWithinSlot | 10000000000000 | Symbols 0 and 1 |  |
| nrofCandidates SEQUENCE { |  |  |  |
| aggregationLevel1 | n0 |  |  |
| aggregationLevel2 | n0 |  |  |
| aggregationLevel4 | n0 |  |  |
| aggregationLevel8 | n1 | AL8 |  |
| aggregationLevel16 | n0 |  |  |
| } |  |  |  |
| searchSpaceType CHOICE { |  |  |  |
| ue-Specific SEQUENCE { |  |  | USS |
| dci-Formats | formats0-0-And-1-0 | DCI Format 1\_0 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.4.1.4.3-3: *RLF-TimersAndConstants* for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-150 | | | |
| Information Element | Value/remark | Comment | Condition |
| RLF-TimersAndConstants ::= SEQUENCE { |  |  |  |
| t310 | ms1000 |  |  |
| n310 | n2 |  |  |
| } |  |  |  |

Table 11.4.4.1.4.3-4: *PDCCH-Config* for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.501-1 [14],Table 4.6.3-95 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDCCH-Config ::= SEQUENCE { |  |  |  |
| controlResourceSetToAddModList SEQUENCE(SIZE (1..3)) OF ControlResourceSet { | 2 entries |  |  |
| ControlResourceSet[2] | ControlResourceSet | entry 2, BFR |  |
| } |  |  |  |
| controlResourceSetToReleaseList | Not present |  |  |
| searchSpacesToAddModList SEQUENCE(SIZE (1..10)) OF SearchSpace { | 2 entries |  |  |
| SearchSpace[2] | SearchSpace | entry 2, BFR |  |
| } |  |  |  |
| searchSpacesToReleaseList | Not present |  |  |
| downlinkPreemption | Not present |  |  |
| tpc-PUSCH | Not present |  |  |
| tpc-PUCCH | Not present |  |  |
| tpc-SRS | Not present |  |  |
| } |  |  |  |

Table 11.4.4.1.4.3-5: *ControlResourceSet* for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.501-1 [14],Table 7.3.1-15 | | | |
| Information Element | Value/remark | Comment | Condition |
| ControlResourceSet ::= SEQUENCE { |  |  |  |
| controlResourceSetId | 2 |  |  |
| duration | 2 |  |  |
| cce-REG-MappingType CHOICE { |  |  |  |
| interleaved ::= SEQUENCE { |  |  |  |
| reg-BundleSize | n6 |  |  |
| interleaverSize | n2 |  |  |
| shiftIndex | 0 |  |  |
| } |  |  |  |
| tci-StatesPDCCH-ToAddList | Not present |  |  |
| } |  |  |  |

11.4.4.1.5 Test Requirement

Table 11.4.4.1.5-1 defines the cell specific primary level settings including test tolerances for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode under CCA.

Table 11.4.4.1.5-1: Cell-specific test parameters for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode under CCA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | | | |
|  | | |  | T1 | T2 | T3 | T4 | T5 |
| DL CCA probability PCCA,DL | | Note 10, 12 |  | 1.0 | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
|  | | Note 11, 12 |  | 1.0/1.0 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA,UL | | |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LCCA\_DL | | |  | N/A | 7 | | | |
| WCCA\_DL | | | ms | N/A | TEvaluate\_CBD\_SSB\_CCA Note 13 | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | | dB |  | | | | |
| SNR\_SSB of set q0 | Config 1 | | dB | 5.8 | -2.2 | -12.8 | -12.8 | -12.8 |
| SNR\_SSB of set q1 | Config 1 | | dB | -10.2 | -10.2 | 10.2 | 10.2 | 10.2 |
| SSB\_RP of set q1 | Config 1 | | dBm/SCS kHz | -105.2 | -105.2 | -84.8 | -84.8 | -84.8 |
|  | Config 1 | | dBm/15 KHz | -98 | | | | |
| Propagation condition | | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio the transmitted SSS REs during DBT window.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure 11.4.4.1.4-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause D.4A.  Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2.  Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only.  Note 13: As defined in TS 38.133 [6] Table 8.5A.5.2-1. | | | | | | | | |

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

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 410 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

#### 11.4.4.2 NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode under CCA

Editor's Note:

- Statistical analysis to determine test case verdict is FFS

11.4.4.2.1 Test purpose

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 11.4.4.0.

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 11.4.4.0.

11.4.4.2.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and supporting UL and SSB-based RLM and link recovery on shared channel access.

11.4.4.2.3 Minimum conformance requirement

The minimum requirements are specified in clause 11.4.4.0. DRX configuration is not used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.11.4.4.2.

11.4.4.2.4 Test description

The test parameters are given in Tables 11.4.4.2.4.1-3 and 11.4.4.2.5-1 below. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 11.4.4.2.4-1 shows the variation of the downlink SNR of the SSB in set q0 in the active cell to emulate SSB based beam failure. Figure 11.4.4.2.4-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery.

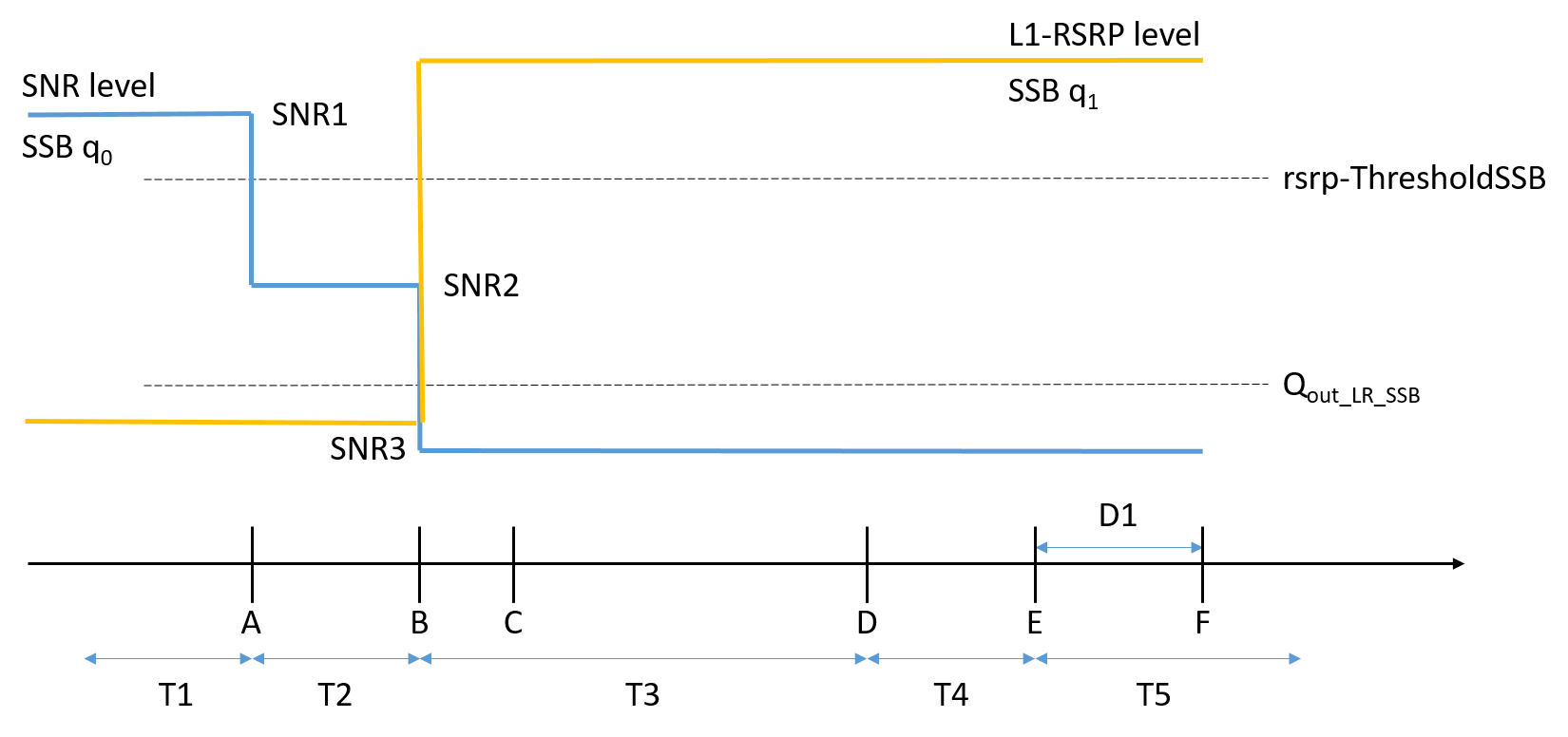


Figure 11.4.4.2.4-1: SNR variation for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode under CCA

11.4.4.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.4.4.2.4.1-1.

Table 11.4.4.2.4.1-1: Supported test configurations for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode under CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 11.4.4.2-1 | TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Configure the test equipment and the DUT according to the parameters in Table 11.4.4.2.4.1-2.

Table 11.4.4.2.4.1-2: Initial conditions for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.9-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.4.4.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part | |  |

1. Message contents are defined in clause 11.4.4.2.4.3.

2. The power levels and settings for Cell 1 are set according to Annex C.1.2 and C.1.3.

3. The test parameters are given in Table 11.4.4.2.4.1-3.

Table 11.4.4.2.4.1-3: General test parameters for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode under CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value | Comment |
|  | | |  | Test 1 |  |
| Active PSCell | | |  | Cell 1 |  |
| RF Channel Number | | |  | 1 |  |
| DL CCA model | | |  | As specified in D.7.2.1 |  |
| UL CCA model | | |  | As specified in D.7.2.2 |  |
| Duplex mode | | Config 1 |  | TDD |  |
| BWchannel | | Config 1 | MHz | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | Config 1 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | Config 1 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | Config 1 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | Config 1 |  | ULBWP.1.1 |  |
| TDD Configuration | | Config 1 |  | TDDConf.1.1 CCA |  |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA |  |
| SSB Configuration | | Config 1 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |  |
| DBT Window Configuration | | Config 1 |  | DBT.1 |  |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 30 KHz |  |
| PRACH Configuration | | Config 1 |  | Table A.7.1A.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | |  | 0 |  |
| SSB Index assigned as CBD RS (q1) | | |  | 1 |  |
| OCNG parameters | | |  | OP.1 |  |
| CP length | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |  |
| Beam failure detection transmission parameters | DCI format | |  | 1-0 |  |
|  | Number of Control OFDM symbols | |  | 2 |  |
|  | Aggregation level | | CCE | 8 |  |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 0 |  |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 0 |  |
|  | DMRS precoder granularity | |  | REG bundle size |  |
|  | REG bundle size | |  | 6 |  |
| DRX | | |  | DRX.7 |  |
| Gap pattern ID | | |  | N.A. |  |
| gapOffset | | |  | N.A. |  |
| rlmInSyncOutOfSyncThreshold | | |  | absent | When the field is absent, the UE applies the value 0. (38.133 [6] Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1 | | dBm/SCS kHz | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | |  | n1 | see clause 5.17 of TS 38.321 [12] |
| beamFailureDetectionTimer | | |  | pbfd4 | see clause 5.17 of TS 38.321 [12] |
| CSI-RS configuration for CSI reporting | Config 1 | |  | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | Config 1 | |  | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS |  | |  | 0,1 |  |
| T310 Timer |  | | ms | 1000 |  |
| N310 |  | |  | 2 |  |
| T1 | | | s | 1 | During this time the UE shall be fully synchronized to cell 1 |
| T2 | | | s | 9.01 |  |
| T3 | | | s | 5.16 |  |
| T4 | | | s | 0 |  |
| T5 | | | s | 3.89 |  |
| D1 | | | s | 3.85 |  |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

11.4.4.2.4.2 Test Procedure

There is one cell, cell 1 which is the active cell, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. The UE transmits the reporting according to UL CCA mode. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in State RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell.

2. The SS sends an *RRCReconfiguration* message to the UE to configure DRX and periodic CSI reporting.

3. The UE sends an *RRCReconfigurationComplete* message.

4. Set the parameters of NR Cell according to T1 in Table 11.4.4.2.5-1. Propagation conditions are set according to clause C.2.3. The SS shall enable DL and UL CCA model according to Table 11.4.4.2.5-1. T1 starts.

5. When T1 expires the SS shall change the SNR value to T2 as specified in Table 11.4.4.2.5-1. T2 starts.

6. When T2 expires the SS shall change the SNR value to T3 as specified in Table 11.4.4.2.5-1. T3 starts.

7. When T3 expires the SS shall change the SNR value to T4 as specified in Table 11.4.4.2.5-1. T4 starts.

8. When T4 expires the SS shall change the SNR value to T5 as specified in Table 11.4.4.2.5-1. T5 starts.

9. If the SS:

a) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in each slot configured for CSI transmission (according to CSI reporting on PUCCH) during the period from time point A to time point B; and

b) does not detect preamble on a beam associated with the candidate beam set q1 before time point B; and

c) detects preamble on a beam associated with the candidate beam set q1 before time point F (D1 after the start of T5), the number of successful tests is increased by one. Proceed with step 10.

Otherwise, the number of failed tests is increased by one. Switch off and then on the UE and proceed with step 1.

10. Repeat steps 2-9 for all subtests until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

11.4.4.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clauses 4.6.1 and 7.3 with the following exceptions:

Table 11.4.4.2.4.3-1: Common Exception messages for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-8 with Condition SSB BFD  Table H.3.1-10 with Condition SSB  Table H.3.1-10A  Table H.3.5-4  Table H.3.5-9  Table H.3.7-1 with Condition DRX.7  Table H.3.10-1 with Condition SSB.3 CCA and SemiStatic, for semi-static channel access; or Condition SSB.4 CCA and Dynamic, for dynamic channel access |

Table 11.4.4.2.4.3-2: PDCCH *Search Space* for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode under CCA

| Derivation Path: TS 38.508-1 [14], Table 4.6.3-162 | | | |
| --- | --- | --- | --- |
| Information Element | Value/remark | Comment | Condition |
| SearchSpace ::= SEQUENCE { |  |  |  |
| searchSpaceId | 3 | BFR |  |
| controlResourceSetId | 2 | BFR |  |
| monitoringSlotPeriodicityAndOffset CHOICE { |  |  |  |
| sl1 | NULL |  |  |
| } |  |  |  |
| monitoringSymbolsWithinSlot | 10000000000000 | Symbols 0 and 1 |  |
| nrofCandidates SEQUENCE { |  |  |  |
| aggregationLevel1 | n0 |  |  |
| aggregationLevel2 | n0 |  |  |
| aggregationLevel4 | n0 |  |  |
| aggregationLevel8 | n1 | AL8 |  |
| aggregationLevel16 | n0 |  |  |
| } |  |  |  |
| searchSpaceType CHOICE { |  |  |  |
| ue-Specific SEQUENCE { |  |  | USS |
| dci-Formats | formats0-0-And-1-0 | DCI Format 1\_0 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.4.2.4.3-3: *RLF-TimersAndConstants* for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-150 | | | |
| Information Element | Value/remark | Comment | Condition |
| RLF-TimersAndConstants ::= SEQUENCE { |  |  |  |
| t310 | ms1000 |  |  |
| n310 | n2 |  |  |
| } |  |  |  |

Table 11.4.4.2.4.3-4: *PDCCH-Config* for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.501-1 [14],Table 4.6.3-95 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDCCH-Config ::= SEQUENCE { |  |  |  |
| controlResourceSetToAddModList SEQUENCE(SIZE (1..3)) OF ControlResourceSet { | 2 entries |  |  |
| ControlResourceSet[2] | ControlResourceSet | entry 2, BFR |  |
| } |  |  |  |
| controlResourceSetToReleaseList | Not present |  |  |
| searchSpacesToAddModList SEQUENCE(SIZE (1..10)) OF SearchSpace { | 2 entries |  |  |
| SearchSpace[2] | SearchSpace | entry 2, BFR |  |
| } |  |  |  |
| searchSpacesToReleaseList | Not present |  |  |
| downlinkPreemption | Not present |  |  |
| tpc-PUSCH | Not present |  |  |
| tpc-PUCCH | Not present |  |  |
| tpc-SRS | Not present |  |  |
| } |  |  |  |

Table 11.4.4.2.4.3-5: *ControlResourceSet* for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.501-1 [14],Table 7.3.1-15 | | | |
| Information Element | Value/remark | Comment | Condition |
| ControlResourceSet ::= SEQUENCE { |  |  |  |
| controlResourceSetId | 2 |  |  |
| duration | 2 |  |  |
| cce-REG-MappingType CHOICE { |  |  |  |
| interleaved ::= SEQUENCE { |  |  |  |
| reg-BundleSize | n6 |  |  |
| interleaverSize | n2 |  |  |
| shiftIndex | 0 |  |  |
| } |  |  |  |
| tci-StatesPDCCH-ToAddList | Not present |  |  |
| } |  |  |  |

11.4.4.2.5 Test Requirement

Table 11.4.4.2.5-1 defines the cell specific primary level settings including test tolerances for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode under CCA.

Table 11.4.4.2.5-1: Cell-specific test parameters for NR SA FR1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode under CCA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | | | |
|  | | |  | T1 | T2 | T3 | T4 | T5 |
| DL CCA probability PCCA,DL | | Note 10, 12 |  | 1.0 | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
|  | | Note 11, 12 |  | 1.0/1.0 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA,UL | | |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LCCA\_DL | | |  | N/A | 7 | | | |
| WCCA\_DL | | | ms | N/A | TEvaluate\_CBD\_SSB\_CCA Note 13 | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | | dB |  | | | | |
| SNR\_SSB of set q0 | Config 1 | | dB | 5.8 | -2.2 | -12.8 | -12.8 | -12.8 |
| SNR\_SSB of set q1 | Config 1 | | dB | -10.2 | -10.2 | 10.2 | 10.2 | 10.2 |
| SSB\_RP of set q1 | Config 1 | | dBm/SCS kHz | -105.2 | -105.2 | -84.8 | -84.8 | -84.8 |
|  | Config 1 | | dBm/15 KHz | -98 | | | | |
| Propagation condition | | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio the transmitted SSS REs during DBT window.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure 11.4.4.2.4-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause D.4A.  Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2.  Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only.  Note 13: As defined in TS 38.133 [6] Table 8.5A.5.2-1. | | | | | | | | |

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

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 410 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

### 11.4.5 Active BWP switching

#### 11.4.5.1 NR SA FR1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA

Editor's Note:

* Statistical analysis to determine test case verdict is FFS

11.4.5.1.1 Test purpose

The purpose of this test is to verify the UL BWP switch delay requirement defined in 38.133 [6] clause 8.6.4.

11.4.5.1.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U, RRM measurements and UL with a shared spectrum NR carrier, BWP adaptation of at least 2BWPs, DCI and timer-based active BWP switching delay Type1 or Type2 on shared channel access, and UL LBT detection and recovery.

11.4.5.1.3 Minimum conformance requirements

Upon detection of consistent UL CCA failure is slot#n in PCell when UE detects *lbt-FailureInstanceMaxCount* number ofCCA failure within *lbt-FailureDetectionTimer*, the UE shall switch the active UL BWP to an UL BWP configured with PRACH occasion and for which consistent CCA failure has not been triggered as defined in TS 38.321 [12] clause 5.21. The UE shall be ready to transmit PRACH on the new UL BWP of the PCell on the first UL slot occurs right after slot n+TBWPswitchDelay +1, where TBWPswitchDelay is defined in 38.133 [6] Table 8.6.2-1. The UE shall finish the UL BWP switch within the time duration TBWPswitchDelay depending on UE capability *bwp-SwitchingDelay* [13].

Note: Additional delay in acquiring the first available RACH occasion will be derived in a way similar to that in handover in 38.133 [6] clause 6.1B.1.

The UE is not required to transmit UL signals or receive DL signals during time duration TBWPswitchDelay on the PCell in the UL BWP switch. The UE is not required to follow the requirements defined in this clause when performing a UL BWP switch between the UL BWPs in disjoint channel bandwidths or in partially overlapping channel bandwidths.

The normative reference for this requirement is TS 38.133 [6] clause 8.6.4.

11.4.5.1.4 Test description

The test scenario comprises of one NR PCell (Cell 1) as given in 11.4.5.1.4.1-3. Cell-specific parameters of NR PCell are specified in Table 11.4.5.1.5-1. SRS configuration used in the test is specified in Table 11.4.5.1.5-2.

The UE shall be configured with PRACH configuration on UL BWP on which the UE shall switch after the consistent UL LBT failure detection.

The test consists of 2 successive time periods, with durations of T1 and T2, respectively.

During T1,

- Time period T1 starts when the UE has received the SRS configuration for periodic SRS transmission on active UL BWP-1.

- The UE shall perform UL CCA before SRS transmission.

- The parameter UL CCA probability PCCA is set to 0 during T1. This requires the test system to set energy level above the detection level during portion of the UL slot where the UE performs UL CCA. This in turn forces the UE to fail the UL CCA. The UE consistently fails UL CCA during T1 and is therefore unable to transmit SRS.

During T2,

- T2 starts when the UE detects consistent UL LBT failures i.e. when total number of UL LBT failures in cell1 on active UL BWP-1 exceeds *lbt-FailureInstanceMaxCount* during *lbt-FailureDetectionTimer.*

- The UE upon detected consistent UL LBT failure starts the LBT recovery mechanism, which requires the UE to switch to active UL BWP-2 in Cell 1 and to send PRACH in the active UL BWP-2.

- Staring from T2, the UE shall be able to send PRACH in the active UL BWP-2 within the delay specified in 38.133 [6] clause 8.6.4.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

11.4.5.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.4.5.1.4.1-1.

Table 11.4.5.1.4.1-1: Supported test configurations for NR SA FR1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA

|  |  |
| --- | --- |
| Config | Description |
| 11.4.5.1-1 | With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |

Configure the test equipment and the DUT according to the parameters in Table 11.4.5.1.4.1-2.

Table 11.4.5.1.4.1-2: Initial conditions for NR SA FR1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.4.5.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | - For 4Rx capable Ues without any 2Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE part. | |  |

1. The general test parameter settings are set up according to Table 11.4.5.1.4.1-3.

2. Message contents are defined in clause 11.4.5.1.4.3.

3. The test scenario comprises of one NR PCell (Cell 1) with CCA transmitting SSBs in DBT windows according to DL CCA model. The power levels and settings for Cell 1 are configured according to clause C.1.2 and C.1.3.

4. Before the test starts:

- UE is connected to Cell 1 on radio channel 1.

- UE is configured with 2 different UE-specific downlink and uplink bandwidth parts: DL BWP-1, DL BWP-2, UL BWP-1 and UL BWP-2 before starting the test. DL BWP-1 and DL BWP-2 always include bandwidth of the initial DL BWP and SSB. UL BWP-1 and UL BWP-2 always include bandwidth of the SRS.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis DL BWP-1.

- UE is indicated in *firstActiveUplinkBWP-Id* that the active UL BWPis UL BWP-1.

- UE is configured with *LBT-FailureRecoveryConfig* parameters for Cell 1.

All cells have constant signal levels throughout the test.

Table 11.4.5.1.4.1-3: General test parameters for NR SA FR1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test |
| Active Pcell |  | Cell 1 | Pcell on RF channel number 1. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| *lbt-FailureDetectionTimer* | ms | 80 | Parameter configured by IE: *LBT-FailureRecoveryConfig* [13] |
| *lbt-FailureInstanceMaxCount* |  | 4 | Parameter configured by IE: *LBT-FailureRecoveryConfig* [13] |
| T1 | s | 0.1 | During T1 consistent LBT failure is detected on active UL BWP-1 |
| T2 | s | 0.1 | During T2 UE sends PRACH on active UL BWP-2 |

11.4.5.1.4.2 Test procedure

Cell 1 has constant signal level throughout the test. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Tables 11.4.5.1.4.1-3 and 11.4.5.1-5-1. Propagation conditions are set according to Annex C clauses C.2.2.

3. The SS shall transmit an *RRCReconfiguration* message releasing the dedicated configuration of the *initialDownlinkBWP* and the *initialUplinkBWP*. This message also configures 2 different UE-specific bandwidth parts, BWP-1 and BWP-2, which always include the bandwidth of the initial DL BWP and SSB. The SS indicates BWP-1 as the active DL BWP using *firstActiveDownlinkBWP-Id*, and as the active UL BWP using *firstActiveUplinkBWP-Id* according to Table 11.4.5.1.4.3-2. UE is configured with *LBT-FailureRecoverConfig* parameters for Cell 2 according to Table 11.4.5.1.4.3-5, PRACH configuration on UL BWP-2 according to Table 11.4.5.1.4.3-4 and periodic SRS transmissions on UL BWP-1 according to Tables 11.4.5.1.4.3-4 and 11.4.5.1.5-2.

4. The UE shall transmit an *RRCReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 11.4.5.1.5-1. T1 starts.

5. During T1 the UE shall perform UL CCA before each SRS transmission. The parameter UL CCA probability PCCA is set to 0 during T1. This requires the test system to set energy level above the detection level during portion of the UL slot where the UE performs UL CCA. This in turn forces the UE to fail the UL CCA. The UE consistently fails UL CCA during T1 and is therefore unable to transmit SRS.

6. When T1 expires T2 starts. The SS shall change the UL CCA probability PCCA to 1 during T2. This will make the SS to not occupy the channel anymore.

7. The UE shall attempt to recover the link by transmitting PRACH on UL BWP-2. If the UE transmits PRACH on UL BWP-2 within 21.5ms from the start of T2 (for UE capable of *bwp-SwitchingDelay* *type1*) or within 23ms from the start of T2 (for UE capable of *bwp-SwitchingDelay* *type2*), then the number of successful tests is increased by one. If the UE does not transmit PRACH on UL BWP-2 during the required time, the number of failures is increased by one.

8. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1), then send an *RRCRelease* message to release the PCell, then the UE is switched OFF/ON, then proceed with step 1.

9. Repeat steps 2-8 for until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

11.4.5.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.4.5.1.4.3-1: Common Exception messages for NR SA FR1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

Table 11.4.5.1.4.3-1A: *RRCReconfiguration* (Step3) for NR SA FR1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1-13 with condition NR | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReconfiguration ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcReconfiguration SEQUENCE { |  |  |  |
| secondaryCellGroup | CellGroupConfig | Table 11.4.5.1.4.3-1B |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.1.4.3-1B: *CellGroupConfig* (Table 11.4.5.1.4.3-1A) forNR SA FR1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| CellGroupConfig ::= SEQUENCE { |  |  |  |
| cellGroupId | 1 |  |  |
| spCellConfig SEQUENCE { |  |  |  |
| servCellIndex | ServCellIndex of NR PCell |  |  |
| spCellConfigDedicated | ServingCellConfig | Table 11.4.5.1.4.3-2 |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.1.4.3-2: *ServingCellConfig* (Table 11.4.5.1.4.3-1B) for NR SA FR1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-167 | | | |
| Information Element | Value/remark | Comment | Condition |
| ServingCellConfig ::= SEQUENCE { |  |  |  |
| initialDownlinkBWP SEQUENCE { |  |  |  |
| pdcch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| pdsch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| radioLinkMonitoringConfig CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
|  |  |  |  |
| downlinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF SEQUENCE { | 2 entries |  |  |
| BWP-Downlink[1] | BWP-Downlink with condition BWP1 | entry 1  Table 11.4.5.1.4.3-3 | BWP1 |
| BWP-Downlink[2] | BWP-Downlink with condition BWP2 | entry 2  Table 11.4.5.1.4.3-3 | BWP2 |
| } |  |  |  |
| firstActiveDownlinkBWP-Id | 1 | According to BWP-1 |  |
| defaultDownlinkBWP-Id | 1 | According to BWP-1 |  |
| uplinkConfig SEQUENCE { |  |  |  |
| initialUplinkBWP SEQUENCE { |  |  |  |
|  |  |  |  |
| pucch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| pusch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| srs-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| uplinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF SEQUENCE { | 2 entries |  |  |
| BWP-Uplink[1] | BWP-Uplink with condition BWP1 | entry 1  Table 11.4.5.1.4.3-4 | BWP1 |
| BWP-Uplink[2] | BWP-Uplink with condition BWP2 | entry 2  Table 11.4.5.1.4.3-4 | BWP2 |
| firstActiveUplinkBWP-Id | 1 | According to BWP-1 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.1.4.3-3: *BWP-Downlink* (Table 11.4.5.1.4.3-2) for NR SA FR1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| BWP-Downlink ::= SEQUENCE { |  |  |  |
| bwp-Id | 1 | BWP-1 | BWP1 |
|  | 2 | BWP-2 | BWP2 |
| bwp-Common SEQUENCE { |  |  |  |
| genericParameters | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.1 |  | BWP1 |
|  | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.3 |  | BWP2 |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.1.4.3-4: *BWP-Uplink* (Table 11.4.5.1.4.3-2) for NR SA FR1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-13 | | | |
| Information Element | Value/remark | Comment | Condition |
| BWP-Uplink ::= SEQUENCE { |  |  |  |
| bwp-Id | 1 | BWP-1 | BWP1 |
|  | 2 | BWP-2 | BWP2 |
| bwp-Common SEQUENCE { |  |  |  |
| genericParameters | RIV defined in TS 38.214 [9] that corresponds to ULBWP.1.1 | BWP-1 | BWP1 |
|  | RIV defined in TS 38.214 [9] that corresponds to ULBWP.1.3 | BWP-2 | BWP2 |
| rach-ConfigCommon CHOICE { |  |  |  |
| setup | RACH-ConfigCommon | Table A.7.1A.1-1 | BWP2 |
| } |  |  |  |
| } |  |  |  |
| bwp-Dedicated SEQUENCE { |  |  |  |
| srs-Config CHOICE { |  |  | BWP1 |
| setup | SRS-Config | Table 11.4.5.1.5-2 |  |
| } |  |  |  |
| lbt-FailureRecoveryConfig-r16 CHOICE { |  |  | BWP2 |
| setup | LBT-FailureRecoveryConfig-r16 | Table 11.4.5.1.4.3-5 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.1.4.3-5: *LBT-FailureRecoveryConfig* for NR SA FR1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA DC

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-64A | | | |
| Information Element | Value/remark | Comment | Condition |
| LBT-FailureRecoveryConfig-r16 ::= SEQUENCE { |  |  |  |
| lbt-FailureInstanceMaxCount-r16 | n4 |  |  |
| lbt-FailureDetectionTimer-r16 | ms80 |  |  |
| } |  |  |  |

11.4.5.1.5 Test requirements

Tables 11.4.5.1.5-1 and 11.4.5.1.5-2 define the primary level settings including test tolerances for NR SA FR1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA.

Table 11.4.5.1.5-1: NR Cell specific test parameters for NR SA FR1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | |
| T1 | T2 |
| TDD configuration | | Config 1, 2 |  | TDDConf.1.1 CCA | |
| BWchannel | | Config 1, 2 |  | 40 MHz: NRB,c = 106 | |
| DL CCA model | | Config 1, 2 |  | As specified in clause D.7.2.1 | |
| UL CCA model | | Config 1, 2 |  | As specified in clause D.7.2.2 | |
| Active BWP ID | | Config 1, 2 |  | 1, 2 | |
| Initial DL BWP Configuration | | Config 1, 2 |  | DLBWP.0.2 Note 4 | |
| Active DL BWP-1 Configuration | | Config 1, 2 |  | DLBWP.1.1 Note 4 | |
| Active DL BWP-2 Configuration | | Config 1, 2 |  | DLBWP.1.3 Note 4 | |
| Initial UL BWP Configuration | | Config 1, 2 |  | ULBWP.0.2 Note 4 | |
| Active UL BWP-1 Configuration | | Config 1, 2 |  | ULBWP.1.1 Note 4 | |
| Active UL BWP-2 Configuration | | Config 1, 2 |  | ULBWP.1.3 Note 4 | |
| PDSCH Reference measurement channel | | Config 1, 2 |  | SR.1.1 CCA | |
| RMSI CORESET parameters | | Config 1, 2 |  | CR.1.1 CCA | |
| Dedicated CORESET parameters | | Config 1, 2 |  | CCR.1.1 CCA | |
| OCNG Patterns | | Config 1, 2 |  | OP.1 | |
| SSB Configuration | Semi- static channel access | Config 1, 2 |  | SSB.1 CCA | |
| Dynamic channel access | Config 1, 2 |  | SSB.2 CCA | |
| SMTC Configuration | | Config 1, 2 |  | SMTC.1 FR1 | |
| Correlation Matrix and Antenna Configuration | | Config 1, 2 |  | 1x2 Low | |
| TRS Configuration | | Config 1, 2 |  | TRS.1.2 TDD | |
| DL CCA probability for semi-static channel access (PCCA\_DL) | | Config 1, 2 |  | 1 | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_1) | | Config 1, 2 |  | 1 | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_2) | | Config 1, 2 |  | 1 | 1 |
| UL CCA probability (PCCA\_UL) | | Config 1, 2 |  | 0 | 1 |
| PRACH configuration | | Config 1, 2 |  | N/A | Table A.7.1A.1-1 |
| EPRE ratio of PSS to SSS | | | dB | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | |  |  | |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  | |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  | |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  | |
| EPRE ratio of PDSCH to PDSCH | | |  |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  | |
| NocNote 2 | | Config 1, 2 | dBm/SCS | -101 | |
| SS-RSRP Note 3 | | Config 1, 2 | dBm/SCS | -84 | |
| Ês/Iot | | Config 1, 2 | dB | 17 | |
| Ês/Noc | | Config 1, 2 | dB | 17 | |
| IoNote3 | | Config 1, 2 | dBm/  38.16MHz | -52.86 | |
| Propagation Condition | | |  | AWGN | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [8].  Note 5: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in section D.7.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | |

Table 11.4.5.1.5-2: Sounding Reference Symbol Configuration for NR SA FR1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| c-SRS | 24 | Frequency hopping is disabled |
| b-SRS | 0 |  |
| b-hop | 0 |  |
| freqDomainPosition | 0 | Frequency domain position of SRS |
| freqDomainShift | 0 |  |
| groupOrSequenceHopping | neither | No group or sequence hopping |
| SRS-PeriodicityAndOffset | sl5=4 for SCS 30kHz | Once every 5 slots |
| pathlossReferenceRS | ssb-Index=0 | SSB #0 is used for SRS path loss estimation |
| usage | Codebook | Codebook based UL transmission |
| startPosition | 0 | resourceMapping setting: SRS on last symbol of slot, and 1symbols for SRS without repetition. |
| nrofSymbols | n1 |  |
| repetitionFactor | n1 |  |
| combOffset-n2 | 0 | transmissionComb setting |
| cyclicShift-n2 | 0 |  |
| nrofSRS-Ports | port1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 38.331 [13]. | | |

The UE capable of *bwp-SwitchingDelay* *type1* [13] shall start to transmit the PRACH on active UL BWP-2 of Cell 2 (PCell) less than 21.5 ms from the beginning of time period T1.

The UE capable of *bwp-SwitchingDelay* *type2* [13] shall start to transmit the PRACH on active UL BWP-2 of Cell 2 (PCell) less than 23 ms from the beginning of time period T1.

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

NOTE: The above delay is calculated as follows:

The active UL BWP switch delay from UL BWP-1 to UL BWP-2 can be expressed as:

TBWPswitchDelay\*Tslot +1\*Tslot + (1+ L3)\*TSSB,RO + 10 ms

Where:

- TBWPswitchDelay = 1 ms (2 slots) and 2.5 ms (5 slots) for *bwp-SwitchingDelay* [13] *type1* and *type2* UE capabilities according to 38.133 [6] clause 8.6.4.

- Tslot = It is the slot length. It is 0.5 ms for 30 kHz.

- L3 = It is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. L3= 0 during T2 since PCCA = 1.

- TSSB,RO = 10 ms according to FR1 PRACH configuration 1.

This gives a total of 21.5 ms and 23 ms for *type1* and *type2* UE respectively.

#### 11.4.5.2 DCI-based and Timer-based Active BWP Switch

##### 11.4.5.2.0 Minimum conformance requirements

11.4.5.2.0.1 Minimum conformance requirements for DCI-based and timer-based active BWP switch

Same as section 10.3.5.2.0.1.

11.4.5.2.0.2 Minimum conformance requirements for Interruptions due to Active BWP switching

The requirements for DCI-based BWP switch, timer-based BWP switch or UL BWP switch triggered by consistent uplink CCA failures in this clause apply to the case that the BWP switch is performed on a single CC or multiple CCs.

When either of the DCI-based, timer-based or RRC-based downlink BWP switch and/or uplink BWP switch occur on multiple CCs simultaneously or over partially overlapping period, the interruption requirements described in this clause apply for each BWP switch. Further, the requirements in this clause are applicable to UE capable of independent beam management in FR2 inter-band CA and UE capable of FR2 intra-band CA and FR1.

When UE receives a DCI indicating UE to switch its active BWP involving changes in any of the parameters listed in Table 11.4.5.2.0.2-2, the UE is allowed to cause interruption of up to X slot to other active serving cells if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 11.4.5.2.0.2-2 and the UE is capable of per-FR gap the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 11.4.5.2.0.2-1. The starting time of interruption is only allowed within the BWP switching delay TBWPswitchDelay as defined in 38.133 [6] clause 8.6.2 when BWP switch occurs on a single CC. The starting time of interruption caused by each BWP switch is only allowed within the BWP switch delay TMultipleBWPswitchDelay +Y as defined in 38.133 [6] clause 8.6.2A.1 when BWP switch occurs on multiple CCs. Interruptions are not allowed during BWP switch involving any other parameter change.

When a BWP timer *bwp-InactivityTimer* defined in TS 38.331 [13] expires, UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 11.4.5.2.0.2-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 11.4.5.2.0.2-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 11.4.5.2.0.2-1. The starting time of interruption is only allowed within the BWP switching delay TBWPswitchDelay as defined in 38.133 [6] clause 8.6.2 when BWP switch occurs on a single CC. The starting time of interruption caused by each BWP switch is only allowed within the BWP switch delay TMultipleBWPswitchDelay as defined in 38.133 [6] clause 8.6.2B.1 when BWP switch occurs on multiple CCs simultaneously or TMultipleBWPswitchDelayTotal as defined in 38.133 [6] clause 8.6.2B.2 when BWP switch occurs on multiple CCs over partially overlapping time period. Interruptions are not allowed during BWP switch involving any other parameter change.

When UE receives an RRC reconfiguration that only requests UE to switch its active BWP on one single CC, the UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 11.4.5.2.0.2-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 11.4.5.2.0.2-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 11.4.5.2.0.2-1. The interruption is only allowed within the delay TRRCprocessingDelay + TBWPswitchDelayRRC defined in 38.133 [6] clause 8.6.3 when BWP switch occurs on a single CC. The interruption is only allowed within the delay TRRCprocessingDelay + TBWPswitchDelayRRC + DRRC\*(N-1) as defined in 38.133 [6] clause 8.6.3A when BWP switch occurs on multiple CCs.

When UL BWP switch is triggered by consistent uplink CCA failures [12], UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active UL BWP involving changes in any of the parameters listed in Table 11.4.5.2.0.2-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the UL BWP switch imposes changes in any of the parameters listed in Table 11.4.5.2.0.2-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing UL BWP switching. X is defined in Table 11.4.5.2.0.2-1. The starting time of interruption is only allowed within the UL BWP switching delay TBWPswitchDelay as defined in 38.133 [6] clause 8.6.2. Interruptions are not allowed during BWP switch involving other parameter change.

Table 11.4.5.2.0.2-1: Interruption length X

|  |  |  |
| --- | --- | --- |
|  | NR Slot | Interruption length X (slots) |
|  | length (ms) |  |
| 0 | 1 | 1 |
| 1 | 0.5 | 1 |
| 2 | 0.25 | 3 |
| 3 | 0.125 | 5 |
| 5 | 0.03125 | 17 |
| 6 | 0.015625 | 33 |
| Note1: void | | |

Table 11.4.5.2.0.2-2: Parameters which cause interruption other than SCS

|  |  |
| --- | --- |
| Parameters | Comment |
| *locationAndBandwidth* | From TS 38.331 [13] |
| *nrofSRS-Ports* |  |
| *maxMIMO-Layers-r16* |  |

The normative reference for this requirement is TS 38.133 [6] clause 8.2.2.2.5.

##### 11.4.5.2.1 NR SA FR1 DCI-based DL active BWP switch of PCell with non-DRX under CCA

Editor's Note:

* Statistical analysis to determine test case verdict is FFS

11.4.5.2.1.1 Test purpose

The purpose of this test is to verify the DL BWP switch delay and interruption requirements on other active serving cell defined in clause 11.4.5.2.0.

11.4.5.2.1.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U, RRM measurements and UL with a shared spectrum NR carrier, BWP adaptation of at least 2BWPs, DCI and timer-based active BWP switching delay Type1 or Type2 on shared channel access and 2 DL CA.

11.4.5.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 11.4.5.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.11.4.5.2.1.

11.4.5.2.1.4 Test description

The test scenario comprises of one PCell (Cell 1) and one SCell (Cell 2) as given in Table 11.4.5.2.4.1-3. NR Cell-specific parameters are specified in Table 11.4.5.2.1.5-1 below.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1\_1 command for PCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PCell’s slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of PCell’s DL slot (*i+TBWPswitchDelay*) as defined in clause 11.4.5.2.0 and starts to report valid ACK/NACK for the PCell no later than the first UL slot that occurs after the beginning of slot (*i+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on PCell’s BWP-2 no later than the first DL slot that occurs after the beginning of slot (*i+TBWPswitchDelay*).

The starting time of SCell (Cell 2) interruption due to BWP switch on PCell shall occur within the BWP switch delay.

During T2, the test equipment won’t transmit DCI format for PDSCH reception on PCell (Cell 1).

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the subframe immediately after *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of PCell’s slot (*j+TBWPswitchDelay*) as defined in clause 11.4.5.2.0 and starts to report valid ACK/NACK for the SCell at latest on the first UL slot that occurs after the beginning of slot (*j+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on PCell’s BWP-1 no later than the first DL slot that occurs after the beginning of slot (*j+TBWPswitchDelay*).

The starting time of SCell (Cell 2) interruption due to BWP switch of PCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to SCell is carried out in the correct time span by monitoring ACK/NACK sent in SCell during BWP switch of PCell, respectively.

11.4.5.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.4.5.2.1.4.1-1.

Table 11.4.5.2.1.4.1-1: Supported test configurations for NR SA FR1 DCI-based DL active BWP switch of PCell with non-DRX under CCA

|  |  |
| --- | --- |
| Config | Description |
| 11.4.5.2.1-1 | With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE supporting SA operation with only NR band(s) with shared spectrum access is required to be tested. | |

Configure the test equipment and the DUT according to the parameters in Table 11.4.5.2.1.4.1-2.

Table 11.4.5.2.1.4.1-2: Initial conditions for NR SA FR1 DCI-based DL active BWP switch of PCell with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.4.5.2.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | - For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE part. | |  |

1. The general test parameter settings are set up according to Table 11.4.5.2.1.4.1-3.

2. Message contents are defined in clause 11.4.5.2.1.4.3.

3. The test scenario comprises of two NR Cells, PCell (Cell 1) and SCell (Cell 2), both with CCA transmitting SSBs in DBT windows according to DL CCA model. The power levels and settings for Cell 1 and Cell 2 is configured according to clause C.1.2 and C.1.3.

4. Before the test starts:

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).

- UE is configured with 2 different UE-specific downlink bandwidth parts for PCell, BWP-1 and BWP-2, in Cell 1 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for SCell, BWP-0 in Cell 2 before starting the test.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 in PCell.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-0 in SCell.

- UE is configured with a *bwp-InactivityTimer* timer value for PCell.

All cells have constant signal levels throughout the test.

Table 11.4.5.2.1.4.1-3: General test parameters for NR SA FR1 DCI-based DL active BWP switch of PCell with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 1, 2 | Two NR radio channels are used in this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active SCell |  | Cell 2 | SCell on RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF | For both PCell and SCell |
| DL CCA model |  | As specified in clause D.7.2.1 |  |
| UL CCA model |  | As specified in clause D.7.2.2 |  |
| *bwp-InactivityTimer* | ms | 200 |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC. |
| Cell2 timing offset to cell1 | μs | 3 | Time alignment error as specified in TS 38.104 [28] clause 6.5.3.1. |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |
| T3 | s | 0.2 |  |

11.4.5.2.1.4.2 Test procedure

The test consists of three successive time periods, with durations of T1, T2, and T3, respectively. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 1 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

All cells have constant signal levels throughout the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Tables 11.4.5.2.1.4.1-3 and 11.4.5.2.1.5-1. Propagation conditions are set according to Annex C clauses C.2.2.

3. The SS shall transmit an *RRCReconfiguration* message releasing the dedicated configuration of the *initialDownlinkBWP* and the *initialUplinkBWP*. This message also configures 2 different UE-specific bandwidth parts, BWP-1 and BWP-2, which always include the bandwidth of the initial DL BWP and SSB. The SS indicates BWP-1 as the active DL BWP using *firstActiveDownlinkBWP-Id*, according to Table 11.4.5.2.1.4.3-2. UE is configured with a *bwp-InactivityTimer* timer value for PCell.

4. The UE shall transmit an *RRCReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 11.4.5.2.1.5-1.

5. The SS shall send a DCI format 1\_1 command for PCell DL BWP switch.

6. The UE shall receive the DCI format 1\_1 command in PCell's slot # denoted i, then T1 starts and the UE switch its bandwidth part from BWP-1 to BWP-2:

a) If the UE starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of the DL slot (*i+*TBWPswitchDelay+k1); and

b) During the BWP switch delay interval checked in a), if the number of consecutive missing ACK/NACK for SCell is no more than 1 (based on Table 11.4.5.2.0.2-1).

Then, the number of successful subtests is increased by one. Otherwise, count a fail for the test, switch off/on the UE and go to step 1.

7. Once the UE sends valid ACK/NACK for the PCell on BWP-2, T2 starts. During T2, the SS shall not transmit DCI format for PDSCH reception on PCell.

8. T3 starts from the first slot #j of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires and the SS restarts to send DCI format for PDSCH reception on PCell. Then, the UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part, BWP-1 on PCell:

a) If the UE starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of the DL slot (*j+*TBWPswitchDelay+k1); and

b) During the BWP switch delay interval checked in a), if the number of consecutive missing ACK/NACK for SCell is no more than 1 (based on Table 11.4.5.2.0.2-1).

Then, the number of successful subtests is increased by one. Otherwise, count a fail for the test, switch off/on the UE and go to step 1. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

9. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1), then send an *RRCRelease* message to release the PCell, then the UE is switched OFF/ON, then proceed with step 1.

10. Repeat steps 5-9 until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

If all subtests pass, the test passes. If one subtest fails, the test fails.

11.4.5.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.4.5.2.1.4.3-1: Common Exception messages for NR SA FR1 DCI-based DL active BWP switch of PCell with non-DRX under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

Table 11.4.5.2.1.4.3-1A: *RRCReconfiguration* (Step3) for NR SA FR1 DCI-based DL active BWP switch of PCell with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1-13 with condition NR | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReconfiguration ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcReconfiguration SEQUENCE { |  |  |  |
| secondaryCellGroup | CellGroupConfig | Table 11.4.5.2.1.4.3-1B |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.2.1.4.3-1B: *CellGroupConfig* (Table 11.4.5.2.1.4.3-1A) forNR SA FR1 DCI-based DL active BWP switch of PCell with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| CellGroupConfig ::= SEQUENCE { |  |  |  |
| cellGroupId | 1 |  |  |
| spCellConfig SEQUENCE { |  |  |  |
| servCellIndex | ServCellIndex of NR PCell |  |  |
| spCellConfigDedicated | ServingCellConfig | Table 11.4.5.2.1.4.3-2 |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.2.1.4.3-2: *ServingCellConfig* (Table 11.4.5.2.1.4.3-1B) for NR SA FR1 DCI-based DL active BWP switch of PCell with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-167 | | | |
| Information Element | Value/remark | Comment | Condition |
| ServingCellConfig ::= SEQUENCE { |  |  |  |
| initialDownlinkBWP SEQUENCE { |  |  |  |
| pdcch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| pdsch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| radioLinkMonitoringConfig CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| downlinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF SEQUENCE { | 2 entries |  |  |
| BWP-Downlink[1] | BWP-Downlink with condition BWP1 | entry 1  Table 11.4.5.2.1.4.3-3 |  |
| BWP-Downlink[2] | BWP-Downlink with condition BWP2 | entry 2  Table 11.4.5.2.1.4.3-3 |  |
| } |  |  |  |
| firstActiveDownlinkBWP-Id | 1 | According to BWP-1 |  |
| bwp-InactivityTimer | ms200 |  |  |
| defaultDownlinkBWP-Id | 1 | According to BWP-1 |  |
| uplinkConfig SEQUENCE { |  |  |  |
| initialUplinkBWP SEQUENCE { |  |  |  |
|  |  |  |  |
| pucch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| pusch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| srs-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| uplinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF SEQUENCE { | 2 entries |  |  |
| BWP-Uplink[1] | BWP-Uplink with condition BWP1 | entry 1  Table 11.4.5.2.1.4.3-4 |  |
| BWP-Uplink[2] | BWP-Uplink with condition BWP2 | entry 2  Table 11.4.5.2.1.4.3-4 |  |
| firstActiveUplinkBWP-Id | 1 | According to BWP-1 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.2.1.4.3-3: *BWP-Downlink* (Table 11.4.5.2.1.4.3-2) for NR SA FR1 DCI-based DL active BWP switch of PCell with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| BWP-Downlink ::= SEQUENCE { |  |  |  |
| bwp-Id | 1 | BWP-1 | BWP1 |
|  | 2 | BWP-2 | BWP2 |
| bwp-Common SEQUENCE { |  |  |  |
| genericParameters | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.1 |  | BWP1 |
|  | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.3 |  | BWP2 |
| pdsch-ConfigCommon CHOICE { |  |  |  |
| setup | PDSCH-ConfigCommon | Table 11.4.5.2.1.4.3-6 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.2.1.4.3-4: *BWP-Uplink* (Table 11.4.5.2.1.4.3-2) for NR SA FR1 DCI-based DL active BWP switch of PCell with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-13 | | | |
| Information Element | Value/remark | Comment | Condition |
| BWP-Uplink ::= SEQUENCE { |  |  |  |
| bwp-Id | 1 | BWP-1 | BWP1 |
|  | 2 | BWP-2 | BWP2 |
| bwp-Common SEQUENCE { |  |  |  |
| genericParameters | RIV defined in TS 38.214 [9] that corresponds to ULBWP.1.1 | BWP-1 | BWP1 |
|  | RIV defined in TS 38.214 [9] that corresponds to ULBWP.1.3 | BWP-2 | BWP2 |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.2.1.4.3-5: *PDSCH-TimeDomainResourceAllocationList* (Table 11.4.5.2.1.4.3-6) for NR SA FR1 DCI-based DL active BWP switch of PCell with non-DRX under CCA

| Derivation Path: TS 38.508-1 [14], Table 4.6.3-103 | | | |
| --- | --- | --- | --- |
| Information Element | Value/remark | Comment | Condition |
| PDSCH-TimeDomainResourceAllocationList ::= SEQUENCE(SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation { | 4 entries |  |  |
| PDSCH-TimeDomainResourceAllocation[1] SEQUENCE { |  | entry 1 |  |
| k0 | Not present |  |  |
| mappingType | typeA |  |  |
| startSymbolAndLength | 53 | Start symbol(S)=2, Length(L)=12 |  |
| } |  |  |  |
| PDSCH-TimeDomainResourceAllocation[2] SEQUENCE { |  | entry 2 |  |
| k0 | Not present |  |  |
| mappingType | typeA |  |  |
| startSymbolAndLength | 72 | S=2, L=6 |  |
| } |  |  |  |
| PDSCH-TimeDomainResourceAllocation[3] SEQUENCE { |  | entry 3 |  |
| k0 | TBWPswitchDelay | Defined in Table 11.4.5.2.0.1-1 | The DCI indicating BWP switch |
| mappingType | typeA |  |  |
| startSymbolAndLength | 53 | Start symbol(S)=2, Length(L)=12 |  |
| } |  |  |  |
| PDSCH-TimeDomainResourceAllocation[4] SEQUENCE { |  | entry 4 |  |
| k0 | 1 |  | First DCI right after DCI-based BWP switch |
| mappingType | typeA |  |  |
| startSymbolAndLength | 53 | Start symbol(S)=2, Length(L)=12 |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.2.1.4.3-6: *PDSCH-ConfigCommon* (Table 11.4.5.2.1.4.3-3) for NR SA FR1 DCI-based DL active BWP switch of PCell with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-101 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDSCH-ConfigCommon ::= SEQUENCE { |  |  |  |
| pdsch-TimeDomainAllocationList | PDSCH-TimeDomainResourceAllocationList | Table 11.4.5.2.1.4.3-5 |  |
| } |  |  |  |

11.4.5.2.1.5 Test requirements

Tables 11.4.5.2.1.4.1-3 and 11.4.5.2.1.5-1 define the primary level settings including test tolerances for NR SA FR1 DCI-based DL active BWP switch with non-DRX under CCA.

Table 11.4.5.2.1.5-1: NR Cell specific test parameters for NR SA FR1 DCI-based DL active BWP switch of PCell with non-DRX under CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | **Unit** | **Cell 1** | **Cell2** |
| Frequency Range | | |  | FR1 | |
| Duplex mode | | Config 1 |  | TDD | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | |
| BWchannel | | Config 1 |  | 40 MHz: NRB,c = 106 | |
| Active BWP ID | | |  | 1, 2 | 0 |
| Initial DL BWP Configuration | | |  | DLBWP.0.2Note4 | |
| Initial UL BWP Configuration | | |  | ULBWP.0.2Note4 | |
| Active DL BWP-0 Configuration | | |  | N.A. | DLBWP.0.2Note4 |
| Active DL BWP-1 Configuration | | |  | DLBWP.1.1Note4 | N.A. |
| Active DL BWP-2 Configuration | | |  | DLBWP.1.3Note4 | N.A. |
| Active UL BWP-0 Configuration | | |  | N.A. | ULBWP.0.2Note4 |
| Active UL BWP-1 Configuration | | |  | ULBWP.1.1Note4 | N.A. |
| Active UL BWP-2 Configuration | | |  | ULBWP.1.3Note4 | N.A. |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 CCA | |
| RMSI CORESET parameters | | Config 1 |  | CR.1.1 CCA | |
| Dedicated CORESET parameters | | Config 1 |  | CCR.1.3 CCA | |
| OCNG Patterns | | |  | OP.1 | |
| SSB Configuration | Semi- static channel access | Config 1 |  | SSB.1 CCA | |
| Dynamic channel access | Config 1 |  | SSB.2 CCA | |
| SMTC Configuration | | Config 1 |  | SMTC.1 | |
| DL CCA probability (PCCA\_DL) | | Config 1 |  | 1 | 1 |
| UL CCA probability (PCCA\_UL) | | Config 1 |  | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | |  | 1x2 Low | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |
| NocNote 2 | | Config 1 | dBm/SCS | -101 | -101 |
| SS-RSRP Note 3 | | Config 1 | dBm/SCS | -84 | -84 |
| Ês/Iot | | Config 1 | dB | 17 | 17 |
| Ês/Noc | | Config 1 | dB | 17 | 17 |
| IoNote3 | | Config 1 | dBm/38.16MHz | -52.86 | -52.86 |
| Propagation Condition | | |  | AWGN | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3 SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [8]. | | | | | |

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot (*i+TBWPswitchDelay*+*k1*).

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot (*j+TBWPswitchDelay*+*k1*).

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [12].

Depending on UE capability *bwp-SwitchingDelay* [13], UE shall finish BWP switch within the time duration *TBWPswitchDelay* defined in 38.133 [6] Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

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

During T1 and T3, the start time of SCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 11.4.5.2.0.2.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

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

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first DL slot that occurs after the beginning of DL slot (*i+ TBWPswitchDelay*+*k1*), (*j+ TBWPswitchDelay*+*k1*), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

##### 11.4.5.2.2 NR SA FR1 DCI-based DL active BWP switch with non-DRX under CCA

Editor's Note:

* Statistical analysis to determine test case verdict is FFS

11.4.5.2.2.1 Test purpose

The purpose of this test is to verify the DL BWP switch delay and interruption requirements on other active serving cell defined in clause 11.4.5.2.0.

11.4.5.2.2.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U, RRM measurements and UL with a shared spectrum NR carrier, BWP adaptation of at least 2BWPs, DCI and timer-based active BWP switching delay Type1 or Type2 on shared channel access.

11.4.5.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 11.4.5.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.11.4.5.2.2.

11.4.5.2.2.4 Test description

The test scenario comprises of one PCell (Cell 1) as given in Table 11.4.5.2.4.1-3. NR Cell-specific parameters are specified in Table 11.4.5.2.2.5-1 below.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1\_1 command for DL BWP switch, sent from the test equipment to the UE, is received at the UE side in Cell1’s slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell1’s DL slot (*i+TBWPswitchDelay*) as defined in clause 11.4.5.2.0 and starts to report valid ACK/NACK for the Cell1 no later than the first UL slot that occurs after the beginning of slot (*i+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on Cell1’s BWP-2 starting from the first DL slot that occurs after the beginning of slot (*i+TBWPswitchDelay*).

During T2, the test equipment won’t transmit DCI format for PDSCH reception on Cell1.

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the subframe immediately after *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell1’s slot (*j+TBWPswitchDelay*) as defined in clause 11.4.5.2.0 and starts to report valid ACK/NACK for the Cell1 at latest on the first UL slot that occurs after the beginning of slot (*j+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on Cell1’s BWP-1 starting from the first DL slot that occurs after the beginning of slot (*j+TBWPswitchDelay*).

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

11.4.5.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.4.5.2.2.4.1-1.

Table 11.4.5.2.2.4.1-1: Supported test configurations for NR SA FR1 DCI-based DL active BWP switch with non-DRX under CCA

|  |  |
| --- | --- |
| Config | Description |
| 11.4.5.2.2-1 | With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations.  Note 2: A UE which fulfils the requirements in test case 11.4.5.2.1 can skip test case 11.4.5.2.2.  Note 3: The UE supporting SA operation with only NR band(s) with shared spectrum access is required to be tested. | |

Configure the test equipment and the DUT according to the parameters in Table 11.4.5.2.2.4.1-2.

Table 11.4.5.2.2.4.1-2: Initial conditions for NR SA FR1 DCI-based DL active BWP switch with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.4.5.2.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | - For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE part. | |  |

1. The general test parameter settings are set up according to Table 11.4.5.2.2.4.1-3.

2. Message contents are defined in clause 11.4.5.2.2.4.3.

3. The test scenario comprises of one NR Cell, PCell (Cell 1), under CCA transmitting SSBs in DBT windows according to DL CCA model. The power levels and settings for Cell 1 is configured according to clause C.1.2 and C.1.3.

4. Before the test starts:

- UE is connected to Cell 1 on radio channel 1.

- UE is configured with 2 different UE-specific downlink bandwidth parts, BWP-1 and BWP-2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1.

- UE is configured with a *bwp-InactivityTimer* timer value for Cell1.

The cell has constant signal levels throughout the test.

Table 11.4.5.2.2.4.1-3: General test parameters for NR SA FR1 DCI-based DL active BWP switch with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| DL CCA model |  | As specified in clause D.7.2.1 |  |
| UL CCA model |  | As specified in clause D.7.2.2 |  |
| *bwp-InactivityTimer* | ms | 200 |  |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |
| T3 | s | 0.2 |  |

11.4.5.2.2.4.2 Test procedure

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 1 and the time duration of T2.

All cells have constant signal levels throughout the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Tables 11.4.5.2.2.4.1-3 and 11.4.5.2.2.5-1. Propagation conditions are set according to Annex C clauses C.2.2.

3. The SS shall transmit an *RRCReconfiguration* message releasing the dedicated configuration of the *initialDownlinkBWP* and the *initialUplinkBWP*. This message also configures 2 different UE-specific bandwidth parts, BWP-1 and BWP-2, which always include the bandwidth of the initial DL BWP and SSB. The SS indicates BWP-1 as the active DL BWP using *firstActiveDownlinkBWP-Id*, according to Table 11.4.5.2.2.4.3-2. UE is configured with a *bwp-InactivityTimer* timer value for PCell.

4. The UE shall transmit an *RRCReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 11.4.5.2.2.5-1.

5. The SS shall send a DCI format 1\_1 command for PCell DL BWP switch.

6. The UE shall receive the DCI format 1\_1 command in PCell's slot # denoted i, then T1 starts and the UE switch its bandwidth part from BWP-1 to BWP-2. If the UE starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of the DL slot (*i+*TBWPswitchDelay+k1), the number of successful subtests is increased by one. Otherwise, count a fail for the test, switch off/on the UE and go to step 1.

7. Once the UE sends valid ACK/NACK for the PCell on BWP-2, T2 starts. During T2, the SS shall not transmit DCI format for PDSCH reception on PCell.

8. T3 starts from the first slot #j of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires and the SS restarts to send DCI format for PDSCH reception on PCell. Then, the UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part, BWP-1 on PCell. If the UE starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of the DL slot (*j+*TBWPswitchDelay+k1), the number of successful subtests is increased by one. Otherwise, count a fail for the test, switch off/on the UE and go to step 1. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1).

9. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1), then send an *RRCRelease* message to release the PCell, then the UE is switched OFF/ON, then proceed with step 1.

10. Repeat steps 5-9 until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

If all subtests pass, the test passes. If one subtest fails, the test fails.

11.4.5.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.4.5.2.2.4.3-1: Common Exception messages for NR SA FR1 DCI-based DL active BWP switch with non-DRX under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

Table 11.4.5.2.2.4.3-1A: *RRCReconfiguration* (Step3) for NR SA FR1 DCI-based DL active BWP switch with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1-13 with condition NR | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReconfiguration ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcReconfiguration SEQUENCE { |  |  |  |
| secondaryCellGroup | CellGroupConfig | Table 11.4.5.2.2.4.3-1B |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.2.2.4.3-1B: *CellGroupConfig* (Table 11.4.5.2.2.4.3-1A) forNR SA FR1 DCI-based DL active BWP switch with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| CellGroupConfig ::= SEQUENCE { |  |  |  |
| cellGroupId | 1 |  |  |
| spCellConfig SEQUENCE { |  |  |  |
| servCellIndex | ServCellIndex of NR PCell |  |  |
| spCellConfigDedicated | ServingCellConfig | Table 11.4.5.2.2.4.3-2 |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.2.2.4.3-2: *ServingCellConfig* (Table 11.4.5.2.2.4.3-1B) for NR SA FR1 DCI-based DL active BWP switch with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-167 | | | |
| Information Element | Value/remark | Comment | Condition |
| ServingCellConfig ::= SEQUENCE { |  |  |  |
| initialDownlinkBWP SEQUENCE { |  |  |  |
| pdcch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| pdsch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| radioLinkMonitoringConfig CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
|  |  |  |  |
| downlinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF SEQUENCE { | 2 entries |  |  |
| BWP-Downlink[1] | BWP-Downlink with condition BWP1 | entry 1  Table 11.4.5.2.2.4.3-3 |  |
| BWP-Downlink[2] | BWP-Downlink with condition BWP2 | entry 2  Table 11.4.5.2.2.4.3-3 |  |
| } |  |  |  |
| firstActiveDownlinkBWP-Id | 1 | According to BWP-1 |  |
| bwp-InactivityTimer | ms200 |  |  |
| defaultDownlinkBWP-Id | 1 | According to BWP-1 |  |
| uplinkConfig SEQUENCE { |  |  |  |
| initialUplinkBWP SEQUENCE { |  |  |  |
|  |  |  |  |
| pucch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| pusch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| srs-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| uplinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF SEQUENCE { | 2 entries |  |  |
| BWP-Uplink[1] | BWP-Uplink with condition BWP1 | entry 1  Table 11.4.5.2.2.4.3-4 |  |
| BWP-Uplink[2] | BWP-Uplink with condition BWP2 | entry 2  Table 11.4.5.2.2.4.3-4 |  |
| firstActiveUplinkBWP-Id | 1 | According to BWP-1 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.2.2.4.3-3: *BWP-Downlink* (Table 11.4.5.2.2.4.3-2) for NR SA FR1 DCI-based DL active BWP switch with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| BWP-Downlink ::= SEQUENCE { |  |  |  |
| bwp-Id | 1 | BWP-1 | BWP1 |
|  | 2 | BWP-2 | BWP2 |
| bwp-Common SEQUENCE { |  |  |  |
| genericParameters | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.1 |  | BWP1 |
|  | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.3 |  | BWP2 |
| pdsch-ConfigCommon CHOICE { |  |  |  |
| setup | PDSCH-ConfigCommon | Table 11.4.5.2.2.4.3-6 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.2.2.4.3-4: *BWP-Uplink* (Table 11.4.5.2.2.4.3-2) for NR SA FR1 DCI-based DL active BWP switch with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-13 | | | |
| Information Element | Value/remark | Comment | Condition |
| BWP-Uplink ::= SEQUENCE { |  |  |  |
| bwp-Id | 1 | BWP-1 | BWP1 |
|  | 2 | BWP-2 | BWP2 |
| bwp-Common SEQUENCE { |  |  |  |
| genericParameters | RIV defined in TS 38.214 [9] that corresponds to ULBWP.1.1 | BWP-1 | BWP1 |
|  | RIV defined in TS 38.214 [9] that corresponds to ULBWP.1.3 | BWP-2 | BWP2 |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.2.2.4.3-5: *PDSCH-TimeDomainResourceAllocationList* (Table 11.4.5.2.2.4.3-6) for NR SA FR1 DCI-based DL active BWP switch with non-DRX under CCA

| Derivation Path: TS 38.508-1 [14], Table 4.6.3-103 | | | |
| --- | --- | --- | --- |
| Information Element | Value/remark | Comment | Condition |
| PDSCH-TimeDomainResourceAllocationList ::= SEQUENCE(SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation { | 4 entries |  |  |
| PDSCH-TimeDomainResourceAllocation[1] SEQUENCE { |  | entry 1 |  |
| k0 | Not present |  |  |
| mappingType | typeA |  |  |
| startSymbolAndLength | 53 | Start symbol(S)=2, Length(L)=12 |  |
| } |  |  |  |
| PDSCH-TimeDomainResourceAllocation[2] SEQUENCE { |  | entry 2 |  |
| k0 | Not present |  |  |
| mappingType | typeA |  |  |
| startSymbolAndLength | 72 | S=2, L=6 |  |
| } |  |  |  |
| PDSCH-TimeDomainResourceAllocation[3] SEQUENCE { |  | entry 3 |  |
| k0 | TBWPswitchDelay | Defined in Table 11.4.5.2.0.1-1 | The DCI indicating BWP switch |
| mappingType | typeA |  |  |
| startSymbolAndLength | 53 | Start symbol(S)=2, Length(L)=12 |  |
| } |  |  |  |
| PDSCH-TimeDomainResourceAllocation[4] SEQUENCE { |  | entry 4 |  |
| k0 | 1 |  | First DCI right after DCI-based BWP switch |
| mappingType | typeA |  |  |
| startSymbolAndLength | 53 | Start symbol(S)=2, Length(L)=12 |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.2.2.4.3-6: *PDSCH-ConfigCommon* (Table 11.4.5.2.2.4.3-3) for NR SA FR1 DCI-based DL active BWP switch with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-101 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDSCH-ConfigCommon ::= SEQUENCE { |  |  |  |
| pdsch-TimeDomainAllocationList | PDSCH-TimeDomainResourceAllocationList | Table 11.4.5.2.2.4.3-5 |  |
| } |  |  |  |

11.4.5.2.2.5 Test requirements

Tables 11.4.5.2.2.4.1-3 and 11.4.5.2.2.5-1 define the primary level settings including test tolerances for NR SA FR1 DCI-based DL active BWP switch with non-DRX under CCA.

Table 11.4.5.2.2.5-1: NR Cell specific test parameters for NR SA FR1 DCI-based DL active BWP switch with non-DRX under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 |
| Frequency Range | | |  | FR1 |
| Duplex mode | | Config 1 |  | TDD |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA |
| BWchannel | | Config 1 |  | 40 MHz: NRB,c = 106 |
| Active BWP ID | | |  | 1, 2 |
| Initial DL BWP Configuration | | Config 1 |  | DLBWP.0.2 Note 4 |
| Active DL BWP-1 Configuration | | Config 1 |  | DLBWP.1.1 Note 4 |
| Active DL BWP-2 Configuration | | Config 1 |  | DLBWP.1.3 Note 4 |
| Initial UL BWP Configuration | | Config 1 |  | ULBWP.0.2 Note 4 |
| Active UL BWP-1 Configuration | | Config 1 |  | ULBWP.1.1 Note 4 |
| Active UL BWP-2 Configuration | | Config 1 |  | ULBWP.1.3 Note 4 |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 CCA |
| RMSI CORESET parameters | | Config 1 |  | CR.1.1 CCA |
| Dedicated CORESET parameters | | Config 1 |  | CCR.1.3 CCA |
| OCNG Patterns | | |  | OP.1 |
| SSB Configuration | Semi- static channel access | Config 1 |  | SSB.1 CCA |
| Dynamic channel access | Config 1 |  | SSB.2 CCA |
| SMTC Configuration | | Config 1 |  | SMTC.1 |
| Correlation Matrix and Antenna Configuration | | |  | 1x2 Low |
| TRS Configuration | | Config 1 |  | TRS.1.2 TDD |
| DL CCA probability (PCCA\_DL) | | Config 1 |  | 1 |
| UL CCA probability (PCCA\_UL) | | Config 1 |  | 1 |
| EPRE ratio of PSS to SSS | | | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) | | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |
| NocNote 2 | | Config 1 | dBm/SCS | -101 |
| SS-RSRP Note 3 | | Config 1 | dBm/SCS | -84 |
| Ês/Iot | | Config 1 | dB | 17 |
| Ês/Noc | | Config 1 | dB | 17 |
| IoNote3 | | Config 1 | dBm/38.16 MHz | -52.86 |
| Propagation Condition | | |  | AWGN |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | |

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot (*i+TBWPswitchDelay*+*k1*).

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot (*j+TBWPswitchDelay*+*k1*).

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration *TBWPswitchDelay* defined in 38.133 [6] Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed Cell1 active BWP switch delay to be counted as correct.

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

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after beginning of DL slot (*i+TBWPswitchDelay*+*k1*), (*j+TBWPswitchDelay*+*k1*), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

#### 11.4.5.3 RRC-based Active BWP Switch

##### 11.4.5.3.0 Minimum conformance requirements

11.4.5.3.0.1 Minimum conformance requirements for RRC-based active BWP switch

Same as section 10.3.5.3.0.1.

##### 11.4.5.3.1 NR SA FR1 RRC-based DL active BWP switch of Cell with non-DRX under CCA

Editor's Note:

* Statistical analysis to determine test case verdict is FFS

11.4.5.3.1.1 Test purpose

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch under CCA defined in clause 11.4.5.3.0.1.

11.4.5.3.1.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U, RRM measurements and UL with a shared spectrum NR carrier, BWP adaptation of at least 2BWPs on shared channel access.

11.4.5.3.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 11.4.5.3.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.11.4.5.3.1.

11.4.5.3.1.4 Test description

One cell is deployed in the test, the NR PCell (Cell 1) under CCA transmitting SSBs in DBT windows according to DL CCA model. The test parameters for the cell is given in Table 11.4.5.3.1.4.1-3 and 11.4.5.3.1.5-1 below.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in PCell’s slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot as defined in clause 11.4.5.3.0.1 and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot on BWP-1 of final condition. The UE shall be continuously scheduled on PCell’s BWP-1 of final condition starting from the first DL slot right after slot .

TRRCprocessingDelay and TBWPswitchDelayRRC are defined in clause 11.4.5.3.0.1.

The test equipment verifies the DL BWP switch time in Cell by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when a valid ACK/NACK is received is received.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

11.4.5.3.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.4.5.3.1.4.1-1.

Table 11.4.5.3.1.4.1-1: Supported test configurations for NR SA FR1 RRC-based DL active BWP switch of Cell with non-DRX under CCA

|  |  |
| --- | --- |
| Config | Description |
| 11.4.5.3.1-1 | With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE supporting SA operation with only NR band(s) with shared spectrum access is required to be tested. | |

Configure the test equipment and the DUT according to the parameters in Table 11.4.5.3.1.4.1-2.

Table 11.4.5.3.1.4.1-2: Initial conditions for NR SA FR1 RRC-based DL active BWP switch of Cell with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.4.5.3.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2 |
| Connection Diagram | TE Part | A.3.1.8.2 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | - For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE part. | |  |

1. The general test parameter settings are set up according to Table 11.4.5.3.1.4.1-3.

2. Message contents are defined in clause 11.4.5.3.1.4.3.

3. The test scenario comprises of one NR Cell, PCell (Cell 1), under CCA transmitting SSBs in DBT windows according to DL CCA model. The power levels and settings for Cell 1 is configured according to clause C.1.2 and C.1.3.

4. Before the test starts:

- UE is connected to Cell 1 on radio channel 1.

- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 of initial condition in Cell 1.

All cells have constant signal levels throughout the test.

Table 11.4.5.3.1.4.1-3: General test parameters for NR SA FR1 RRC-based DL active BWP switch of Cell with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test |
| Active Cell |  | Cell 1 | Cell on RF channel number 1. |
| CP length |  | Normal |  |
| DL CCA model |  | As specified in clause D.7.2.1 |  |
| UL CCA model |  | As specified in clause D.7.2.2 |  |
| DRX |  | OFF |  |
| T1 | s | 0.2 |  |

11.4.5.3.1.4.2 Test procedure

The test consists of 1 time period, with duration of T1. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1) at the start of the test.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE will have ACK/NACK sending.

All cells have constant signal levels throughout the test:

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, DC bearer *MCG*\_*and*\_*SCG*, Connected without release *On* and Test Mode *On* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Tables 11.4.5.3.1.4.1-3 and 11.4.5.3.1.5-1. Propagation conditions are set according to Annex C clauses C.2.2.

3. The SS shall send an *RRCReconfiguration* message releasing the dedicated configuration of the *initialDownlinkBWP* and the *initialUplinkBWP*. This message also configures another UE-specific bandwidth part, BWP-1, and indicates BWP-1 as the active DL BWP using *firstActiveDownlinkBWP-Id*, according to the initial condition of Active BWP-1 in Table 11.4.5.3.1.5-1.

4. The UE shall transmit an *RRCReconfigurationComplete* message. The SS shall enable DL and UL CCA model according to Table 11.4.5.3.1.5-1.

5. The SS shall send an *RRCReconfiguration* message with updated bandwidth part configuration for PCell DL BWP switch, changing the BWP according to the final condition of Active BWP-1 in Table 11.4.5.3.1.5-1. T1 starts.

6. The UE shall receive the *RRCReconfiguration* in PCell's slot # denoted i and reconfigure its bandwidth part with the updated bandwidth part configuration:

7 If the UE starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot i+X+k1 then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one. Where,

- X = 52 for test configuration 11.4.5.3.1-1 and 11.4.5.3.1-2;

8. The SS shall disable the CCA model (both DL and UL, i.e. PCCA\_DL\_i= PCCA\_UL=1), then send an *RRCRelease* message to release the PCell, then the UE is switched OFF/ON, then proceed with step 1.

9. Repeat steps 2-8 until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

11.4.5.3.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.4.5.3.1.4.3-1: Common Exception messages for NR SA FR1 RRC-based DL active BWP switch of Cell with non-DRX under CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.10-1 with Condition SSB.1 CCA and SemiStatic, for semi-static channel access; or Condition SSB.2 CCA and Dynamic, for dynamic channel access |

Table 11.4.5.3.1.4.3-1A: *RRCReconfiguration* (Step 3, Step 5) for NR SA FR1 RRC-based DL active BWP switch of Cell with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.1-13 with condition NR | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReconfiguration ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcReconfiguration SEQUENCE { |  |  |  |
| secondaryCellGroup | CellGroupConfig | Table 11.4.5.3.1.4.3-1B |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.3.1.4.3-1B: *CellGroupConfig* (Table 11.4.5.3.1.4.3-1A) for NR SA FR1 RRC-based DL active BWP switch of Cell with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| CellGroupConfig ::= SEQUENCE { |  |  |  |
| cellGroupId | 1 |  |  |
| spCellConfig SEQUENCE { |  |  |  |
| servCellIndex | ServCellIndex of NR PCell |  |  |
| spCellConfigDedicated | ServingCellConfig | Table 11.4.5.3.1.4.3-1C |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.3.1.4.3-1C: *ServingCellConfig* (Table 11.4.5.3.1.4.3-1B) for NR SA FR1 RRC-based DL active BWP switch of Cell with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-167 | | | |
| Information Element | Value/remark | Comment | Condition |
| ServingCellConfig ::= SEQUENCE { |  |  |  |
| initialDownlinkBWP SEQUENCE { |  |  |  |
| pdcch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| pdsch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| radioLinkMonitoringConfig CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
|  |  |  |  |
| downlinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Downlink { | 1 entry |  |  |
| BWP-Downlink[1] SEQUENCE { | BWP-Downlink | entry 1  Table 11.4.5.3.1.4.3-1D |  |
| } |  |  |  |
| firstActiveDownlinkBWP-Id | 1 | BWP-1 |  |
| defaultDownlinkBWP-Id | 1 | BWP-1 |  |
| uplinkConfig SEQUENCE { |  |  |  |
| initialUplinkBWP SEQUENCE { |  |  |  |
| pucch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| pusch-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| srs-Config CHOICE { |  |  |  |
| release | NULL |  |  |
| } |  |  |  |
| uplinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Uplink { | 1 entry |  |  |
| BWP-Uplink[1] | BWP-Uplink | entry 1  11.4.5.3.1.4.3-1E |  |
| } |  |  |  |
| firstActiveUplinkBWP-Id | 1 | BWP-1 |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.3.1.4.3-1D: *BWP-Downlink* (Table 11.4.5.3.1.4.3-1C) for NR SA FR1 RRC-based DL active BWP switch of Cell with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| BWP-Downlink ::= SEQUENCE { |  |  |  |
| bwp-Id | 1 |  |  |
| bwp-Common SEQUENCE { |  |  |  |
| genericParameters | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.3 |  | Step 3 |
|  | RIV defined in TS 38.214 [9] that corresponds to DLBWP.1.1 |  | Step 5 |
| } |  |  |  |
| } |  |  |  |

Table 11.4.5.3.1.4.3-1E: *BWP-Uplink* (Table 11.4.5.3.1.4.3-1C) for NR SA FR1 RRC-based DL active BWP switch of Cell with non-DRX under CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-13 | | | |
| Information Element | Value/remark | Comment | Condition |
| BWP-Uplink ::= SEQUENCE { |  |  |  |
| bwp-Id | 1 |  |  |
| bwp-Common SEQUENCE { |  |  |  |
| genericParameters | RIV defined in TS 38.214 [9] that corresponds to ULBWP.1.3 |  | Step 3 |
|  | RIV defined in TS 38.214 [9] that corresponds to ULBWP.1.1 |  | Step 5 |
| } |  |  |  |
| } |  |  |  |

11.4.5.3.1.5 Test requirements

Tables 11.4.5.3.1.4.1-3 and 11.4.5.3.1.5-1 define the primary level settings including test tolerances for NR SA FR1 RRC-based DL active BWP switch of Cell with non-DRX under CCA.

Table 11.4.5.3.1.5-1: NR Cell specific test parameters for NR SA FR1 RRC-based DL active BWP switch of Cell with non-DRX under CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Cell 1 |
| Frequency Range | | | |  | FR1 |
| Duplex mode | | | Config 1 |  | TDD |
| TDD configuration | | | Config 1 |  | TDDConf.1.1 CCA |
| BWchannel | | | Config 1 |  | 40 MHz: NRB,c = 106 |
| Active BWP ID | | | |  | 1 |
| Initial DL BWP Configuration | | | Config 1 |  | DLBWP.0.2 |
| Initial UL BWP Configuration | | | Config 1 |  | ULBWP.0.2 |
| Initial Condition | Active DL BWP-1 Configuration | | Config 1 |  | DLBWP.1.3 |
| Active UL BWP-1 Configuration | | Config 1 |  | ULBWP.1.3 |
| Final Condition | Active DL BWP-1 Configuration | | Config 1 |  | DLBWP.1.1 |
| Active UL BWP-1 Configuration | | Config 1 |  | ULBWP.1.1 |
| PDSCH Reference measurement channel | | | Config 1 |  | SR.1.1 CCA |
| RMSI CORESET parameters | | | Config 1 |  | CR.1.1 CCA |
| Dedicated CORESET parameters | | | Config 1 |  | CCR.1.3 CCA |
| OCNG Patterns | | | |  | OP.1 |
| SSB Configuration | | Semi-static channel access | Config 1 |  | SSB.1 CCA |
| Dynamic channel access | Config 1 |  | SSB.2 CCA |
| SMTC Configuration | | | |  | SMTC.1 |
| TRS Configuration | | | Config 1 |  | TRS.1.2 TDD |
| DL CCA probability (PCCA\_DL) | | | Config 1 |  | 1 |
| UL CCA probability (PCCA\_UL) | | | Config 1 |  | 1 |
| Propagation Condition | | | |  | AWGN |
| EPRE ratio of PSS to SSS | | | | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | | | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | | |  |  |
| EPRE ratio of PDSCH to PDSCH | | | |  |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) | | | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | |  |  |
| NocNote 2 | | | Config 1 | dBm/SCS | -101 |
| SS-RSRP Note 3 | | | Config 1 | dBm/SCS | -84 |
| Ês/Iot | | | Config 1 | dB | 17 |
| Ês/Noc | | | Config 1 | dB | 17 |
| IoNote3 | | | Config 1 | dBm/38.16MHz | -52.86 |
| 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [8]. | | | | | |

During T1, the UE shall be ready for the reception of uplink grant for the Cell from the first DL slot that occurs right after the beginning of slot and starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot.

Where,

TRRCprocessingDelay = 10 ms, is the RRC procedure delay in ms as defined in clause 12 in TS 38.331 [13];

TBWPSwitchDelayRRC = 6 ms, is the time used by the UE to perform BWP switch;

NR slot length = 0.5 ms for SCS = 30kHz.

*k1* is the timing between DL data receiving and acknowledgement as specified in [12].

Which gives

16 ms (32 slots), for SCS = 30kHz.

All of the above test requirements shall be fulfilled in order for the observed Cell active BWP switch delay to be counted as correct.

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

## 11.5 Measurement procedure

### 11.5.1 Intra-frequency measurements

#### 11.5.1.0 Minimum Conformance Requirements

11.5.1.0.1 Minimum conformance requitements for intra-frequency measurements without measurement gaps

11.5.1.0.1.1 Intra-frequency cell identification

Same Minimum Conformance Requirements as in clause 10.4.1.0.1.1.

The normative reference for this requirement is TS 38.133 [6] clause 9.2A.5.1.

11.5.1.0.1.2 Measurement period

Same Minimum Conformance Requirements as in clause 10.4.1.0.1.2.

The normative reference for this requirement is TS 38.133 [6] clause 9.2A.5.2.

11.5.1.0.2 Minimum conformance requitements for intra-frequency measurements with measurement gaps

11.5.1.0.2.1 Intra-frequency cell identification

Same Minimum Conformance Requirements as in clause 10.4.1.0.2.1

The normative reference for this requirement is TS 38.133 [6] clause 9.2A.6.1.

11.5.1.0.2.2 Intra-frequency measurement period

Same Minimum Conformance Requirements as in clause 10.4.1.0.2.2

The normative reference for this requirement is TS 38.133 [6] clause 9.2A.6.2.

11.5.1.0.3 Minimum conformance requitements for intra-frequency RSSI and channel occupancy measurements

11.5.1.0.3.1 Intra-frequency RSSI measurements

Same Minimum Conformance Requirements as in clause 10.4.1.0.3.1.

The normative reference for this requirement is TS 38.133 [6] clause 9.2A.7.1.

11.5.1.0.3.2 Intra-frequency channel occupancy measurements

Same Minimum Conformance Requirements as in clause 10.4.1.0.3.2.

The normative reference for this requirement is TS 38.133 [6] clause 9.2A.7.2.

#### 11.5.1.1 SA FR1 Event-triggered reporting tests on PCC without gaps under non-DRX

Editor's Note:

* MU and TT analysis is incomplete
* Message contents is missing
* Test procedure is missing
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Some parameters and/or references are still in brackets

11.5.1.1.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event without gaps in non DRX with CCA. This test will partly verify the intra-frequency cell search requirements.

11.5.1.1.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and intra-frequency measurements on shared channel access.

11.5.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.5.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.11.5.1.1.

11.5.1.1.4 Test description

Two cells are deployed in the test on the same carrier frequency with CCA transmitting SSBs in DBT windows according to DL CCA model: PCell (Cell 1) and a neighbour cell (Cell 2). The test parameters for the two cells are given in Table 11.5.1.1.4.1-1 and 11.5.1.1.4.1-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

The test is conducted for SS-RSRP, SS-RSRQ, and SS-SINR:

- In the first test (Test 1), the UE is configured with SS-RSRP as Event A3 measurement quantity.

- In the second test (Test 2), the UE is configured with SS-RSRQ as Event A3 measurement quantity.

- In the third test (Test 3), the UE is configured with SS-SINR as Event A3 measurement quantity.

11.5.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.5.1.1.4.1-1.

Table 11.5.1.1.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 11.5.1.1-1 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 11.5.1.1.4.1-2.

Table 11.5.1.1.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2a | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | Without LTE part. For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part. | |  |

1. The general test parameter settings are set up according to Table 11.5.1.1.4.1-3.

2. Message contents are defined in clause 11.5.1.1.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 11.5.1.1.4.1-3 General test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Active cell | |  | 1 | Cell 1 |  |
| Neighbour cell | |  | 1 | Cell 2 | Cell to be identified. |
| RF Channel Number | |  | 1 | 1: Cell 1 and Cell 2 |  |
| DL CCA model | |  | 1 | As specified in clause A.3.26.2.1 |  |
| UL CCA model | |  | 1 | As specified in clause A.3.26.2.2 |  |
| SSB configuration | Semi-static channel access Note 1,3 |  | 1 | SSB.1 CCA |  |
|  | Dynamic channel access Note 2,3 |  | 1 | SSB.2 CCA |  |
| SMTC configuration | |  | 1 | SMTC.1 |  |
| A3-Offset | | dB | 1 | -4.5 |  |
| CP length | |  | 1 | Normal |  |
| Hysteresis | | dB | 1 | 0 |  |
| Time To Trigger | | s | 1 | 0 |  |
| Filter coefficient | |  | 1 | 0 | L3 filtering is not used |
| DRX | |  | 1 | OFF | DRX is not used |
| Time offset between serving and neighbour cells | |  | 1 | 3 μs | Synchronous cells |
| T1 | | s | 1 | 5 |  |
| T2 | | s | 1 | 5 |  |
| Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 3: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | |

11.5.1.1.4.2 Test procedure

TBD

11.5.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.5.1.1.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | TBD |

11.5.1.1.5 Test requirements

Table 11.5.1.1.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-RSRP measurements.

Table 11.5.1.1.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
| DL CCA probability for semi-static channel access (PCCA\_DL) |  | 1 | PCCA\_DL=0.9375 | | PCCA\_DL=0.9375 | |
| DL CCA probability for dynamic static channel access (PCCA\_DL\_1) |  | 1 | PCCA\_DL\_1=0.75 | | PCCA\_DL\_1=0.75 | |
| DL CCA probability for dynamic static channel access (PCCA\_DL\_2) |  | 1 | PCCA\_DL\_2=0.75 | | PCCA\_DL\_2=0.75 | |
| UL CCA probability PCCA\_UL |  | 1 | PCCA\_UL=1 | | PCCA\_UL=1 | |
| LCCA\_DL |  | 1 | 7 | | 7 | |
| WCCA\_DL | ms | 1 | 600 | | 600 | |
| PDSCH RMC configuration |  | 1 | SR.1.1 CCA | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 CCA | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 CCA | | N/A | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | |
| TRS Configuration |  | 1 | TRS.1.2 TDD | | N/A | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1 | [-95] | | | |
| Note 2 | dBm/15 kHz | 1 | [-98] | | | |
|  | dB | 1 | [4] | [-1.46] | -Infinity | [-1.46] |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
|  | dB | 1 | [4] | [4] | -Infinity | [4] |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | [-91] | [-91] | -Infinity | [-91] |
| Io | dBm/38.16 MHz | 1 | [-58.50] | [-56.16] | [-58.50] | [-56.16] |
| Propagation Condition |  | 1 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than 840 ms from the beginning of time period T2.

The UE is not required to read the neighbour cell SSB index in this test.

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

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

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 11.5.1.2 SA FR1 Event-triggered reporting tests on PCC without gaps under DRX

Editor's Note:

* MU and TT analysis is incomplete
* Message contents is missing
* Test procedure is missing
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Some parameters and/or references are still in brackets

11.5.1.2.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event without gaps in DRX and with CCA. This test will partly verify the intra-frequency cell search requirements.

11.5.1.2.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U, long DRX and intra-frequency measurements on shared channel access.

11.5.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.5.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.11.5.1.2.

11.5.1.2.4 Test description

Two cells are deployed in the test on the same carrier frequency with CCA transmitting SSBs in DBT windows according to DL CCA model: PCell (Cell 1) and a neighbour cell (Cell 2). The test parameters for the two cells are given in Table 10.5.1.1.4.1-1 and 10.5.1.1.4.1-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

11.5.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.5.1.2.4.1-1.

Table 11.5.1.2.4.1-1: Supported test configuration

|  |  |
| --- | --- |
| Configuration | Description |
| 11.5.1.2-1 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 11.5.1.2.4.1-2.

Table 11.5.1.2.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2a | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | Without LTE part. For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part. | |  |

1. The general test parameter settings are set up according to Table 11.5.1.2.4.1-3.

2. Message contents are defined in clause 11.5.1.2.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 11.5.1.2.4.1-3 General test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | | Comment |
|  | |  |  | Test 1 | Test |  |
| Active cell | |  | 1 | Cell 1 | |  |
| Neighbour cell | |  | 1 | Cell 2 | | Cell to be identified. |
| RF Channel Number | |  | 1 | 1: Cell 1 and Cell 2 | |  |
| DL CCA model | |  | 1 | As specified in clause A.3.26.2.1 | |  |
| UL CCA model | |  | 1 | As specified in clause A.3.26.2.2 | |  |
| SSB configuration | Semi-static channel access Note 1,3 |  | 1 | SSB.1 CCA | |  |
|  | Dynamic channel access Note 2,3 |  | 1 | SSB.2 CCA | |  |
| SMTC configuration | |  | 1 | SMTC.1 | |  |
| A3-Offset | | dB | 1 | -4.5 | |  |
| CP length | |  | 1 | Normal | |  |
| Hysteresis | | dB | 1 | 0 | |  |
| Time To Trigger | | s | 1 | 0 | |  |
| Filter coefficient | |  | 1 | 0 | | L3 filtering is not used |
| DRX | |  | 1 | DRX.1 | DRX.7 |  |
| Time offset between serving and neighbour cells | |  | 1 | 3 μs | | Synchronous cells |
| T1 | | s | 1 | 5 | |  |
| T2 | | s | 1 | 5 | 15 |  |
| Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 3: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | |

11.5.1.2.4.2 Test procedure

TBD

11.5.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.5.1.2.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | TBD |

11.5.1.2.5 Test requirements

Table 11.5.1.2.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-RSRP measurements.

Table 11.5.1.2.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
| DL CCA probability for semi-static channel access (PCCA\_DL) |  | 1 | PCCA\_DL=0.9375 | | PCCA\_DL=0.9375 | |
| DL CCA probability for dynamic static channel access (PCCA\_DL\_1) |  | 1 | PCCA\_DL\_1=0.75 | | PCCA\_DL\_1=0.75 | |
| DL CCA probability for dynamic static channel access (PCCA\_DL\_2) |  | 1 | PCCA\_DL\_2=0.75 | | PCCA\_DL\_2=0.75 | |
| UL CCA probability PCCA\_UL |  | 1 | PCCA\_UL=1 | | PCCA\_UL=1 | |
| LCCA\_DL |  | 1 | Test 1: LCCA\_DL = 5  Test 2: LCCA\_DL = 3 | | Test 1: LCCA\_DL = 5  Test 2: LCCA\_DL = 3 | |
| WCCA\_DL | ms | 1 | Test 1:  WCCA\_DL = 600  Test 2:  WCCA\_DL = 5120 | | Test 1:  WCCA\_DL = 600  Test 2:  WCCA\_DL = 5120 | |
| PDSCH RMC configuration |  | 1 | SR.1.1 CCA | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 CCA | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 CCA | | N/A | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | |
| TRS Configuration |  | 1 | TRS.1.2 TDD | | N/A | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1 | [-95] | | | |
| Note 2 | dBm/15 kHz | 1 | [-98] | | | |
|  | dB | 1 | [4] | [-1.46] | -Infinity | [-1.46] |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
|  | dB | 1 | [4] | [4] | -Infinity | [4] |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | [-91] | [-91] | -Infinity | [-91] |
| Io | dBm/38.16 MHz | 1 | [-58.50] | [-56.16] | [-58.50] | [-56.16] |
| Propagation Condition |  | 1 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

In test 1, the UE shall send one Event A3 triggered measurement report with a measurement reporting delay less than 1200 ms from the beginning of time period T2.

In test 2, the UE shall send one Event A3 triggered measurement report with a measurement reporting delay less than 10240 ms from the beginning of time period T2.

The UE is not required to read the neighbour cell SSB index in this test.

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

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

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 11.5.1.3 SA FR1 Event-triggered reporting tests on PCC with per-UE gaps under non-DRX

Editor's Note:

* MU and TT analysis is incomplete
* Message contents is missing
* Test procedure is missing
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements and parameters are missing in RAN4

11.5.1.3.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event with per-UE gaps in non-DRX and with CCA. This test will partly verify the intra-frequency cell search requirements in clause 11.5.1.0.

11.5.1.3.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and intra-frequency measurements on shared channel access.

11.5.1.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.5.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.11.5.1.3.

11.5.1.3.4 Test description

Supported test configurations are shown in Table 11.5.1.3.4.1-1. Intra-frequency measurements are tested by using the parameters in Table 11.5.1.3.5-1. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

11.5.1.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.5.1.3.4.1-1.

Table 11.5.1.3.4.1-1: Supported test configuration

TBD

Configure the test equipment and the DUT according to the parameters in Table 11.5.1.3.4.1-2.

Table 11.5.1.3.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2a | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | Without LTE part. For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part. | |  |

1. The general test parameter settings are set up according to Table 11.5.1.3.4.1-3.

2. Message contents are defined in clause 11.5.1.3.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 11.5.1.3.4.1-3: General test parameters

TBD

11.5.1.3.4.2 Test procedure

TBD

11.5.1.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.5.1.3.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | TBD |

11.5.1.3.5 Test requirements

Table 11.5.1.3.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-RSRP measurements.

Table 11.5.1.3.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRP measurements

TBD

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD.*

The UE is not required to read the neighbour cell SSB index in this test.

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

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

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

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 11.5.1.4 SA FR1 Event-triggered reporting tests on PCC with per-UE gaps under DRX

Editor's Note:

* MU and TT analysis is incomplete
* Message contents is missing
* Test procedure is missing
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements and parameters are missing in RAN4

11.5.1.4.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event with per-UE gaps in DRX and with CCA. This test will partly verify the intra-frequency cell search requirements.

11.5.1.4.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and intra-frequency measurements on shared channel access.

11.5.1.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.5.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.11.5.1.3.

11.5.1.4.4 Test description

Supported test configurations are shown in Table 11.5.1.4.4.1-1. Intra-frequency measurements are tested by using the parameters in Table 11.5.1.4.5-1. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

11.5.1.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.5.1.4.4.1-1.

Table 11.5.1.4.4.1-1: Supported test configuration

TBD

Configure the test equipment and the DUT according to the parameters in Table 11.5.1.4.4.1-2.

Table 11.5.1.4.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2a | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | Without LTE part. For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part. | |  |

1. The general test parameter settings are set up according to Table 11.5.1.4.4.1-3.

2. Message contents are defined in clause 11.5.1.4.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 11.5.1.4.4.1-3: General test parameters

TBD

11.5.1.4.4.2 Test procedure

TBD

11.5.1.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.5.1.4.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | TBD |

11.5.1.4.5 Test requirements

Table 11.5.1.4.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-RSRP measurements.

Table 11.5.1.4.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRP measurements

TBD

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD.*

The UE is not required to read the neighbour cell SSB index in this test.

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

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

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

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 11.5.1.5 to 11.5.1.8

#### 11.5.1.9 SA FR1 RSSI measurement reporting on PCC

Editor's Note:

* MU and TT analysis is incomplete
* Message contents is missing
* Test procedure is missing
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements and parameters are missing in RAN4

11.5.1.9.1 Test purpose

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the intra-frequency RSSI measurement reporting requirements.

11.5.1.9.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and intra-frequency RSSI measurements on a carrier frequency under CCA.

11.5.1.9.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 11.5.1.0.3.

The normative reference for this requirement is TS 38.133 [6] clause A.11.5.1.9.

11.5.1.9.4 Test description

Supported test configurations are shown in Table 11.5.1.9.4.1-1. Intra-frequency measurements are tested by using the parameters in Table 11.5.1.9.5-1. There is one cell in the test: Cell 1 which is PCell operating on a carrier frequency under CCA.

11.5.1.9.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.5.1.9.4.1-1.

Table 11.5.1.9.4.1-1: Supported test configuration

|  |  |
| --- | --- |
| Configuration | Description |
| 11.5.1.9-1 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Configure the test equipment and the DUT according to the parameters in Table 11.5.1.9.4.1-2.

Table 11.5.1.9.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2a | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | Without LTE part. For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part. | |  |

1. The general test parameter settings are set up according to Table 11.5.1.9.4.1-3.

2. Message contents are defined in clause 11.5.1.9.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 11.5.1.9.4.1-3: General test parameters

TBD

11.5.1.9.4.2 Test procedure

TBD

11.5.1.9.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.5.1.9.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | TBD |

11.5.1.9.5 Test requirements

Table 11.5.1.9.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-RSRP measurements.

Table 11.5.1.9.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRP measurements

TBD

### 11.5.2 Inter-frequency measurements

#### 11.5.2.0 Minimum Conformance Requirements

11.5.2.0.1 Inter-frequency cell identification

Same Minimum Conformance Requirements as in clause 10.4.2.0.1

The normative reference for this requirement is TS 38.133 [6] clause 9.3A.4.

11.5.2.0.2 Inter-frequency measurements

Same Minimum Conformance Requirements as in clause 10.4.2.0.2

The normative reference for this requirement is TS 38.133 [6] clause 9.3A.5.

11.5.2.0.3 Inter-frequency RSSI measurements

Same Minimum Conformance Requirements as in clause 10.4.2.0.3

The normative reference for this requirement is TS 38.133 [6] clause 9.3A.9.

#### 11.5.2.1

#### 11.5.2.2

#### 11.5.2.3 NR SA FR1-FR1 Event triggered reporting tests with CCA without SSB time index detection when DRX is not used

Editor's Note: This test case is incomplete in following aspects:

* MU and TT analysis is incomplete
* Message contents is missing
* Test procedure is missing
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Some parameters and/or references are still in brackets

11.5.2.3.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in non DRX without SSB time index detection with CCA. This test will partly verify the SA inter-frequency NR cell search requirements for NR cell with CCA.

11.5.2.3.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and inter-frequency measurements on shared channel access.

11.5.2.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.5.2.0.1 and 11.5.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.11.5.2.3.

11.5.2.3.4 Test description

Two cells are deployed in the test. NR cell 1 with CCA as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters for the two cells are given in Table 11.5.2.3.4.1-1 and 11.5.2.3.4.1-3 below. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

11.5.2.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.5.2.3.4.1-1.

Table 11.5.2.3.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 11.5.2.3-1 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 11.5.2.3.4.1-2.

Table 11.5.2.3.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2a | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | Without LTE part. For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part. | |  |

1. The general test parameter settings are set up according to Table 11.5.2.3.4.1-3.

2. Message contents are defined in clause 11.5.2.3.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 11.5.2.3.4.1-3: General test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| NR RF Channel Number |  | Config 1 | 1, 2 | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cells |  | Config 1 | NR cell 1 with CCA (PCell) | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1 | NR cell 2 with CCA | | NR cell 2 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1 | As specified in clause A.3.26.2.1 | |  |
| UL CCA model |  | Config 1 | As specified in clause A.3.26.2.2 | |  |
| Gap Pattern Id |  | Config 1 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 9 | 9 |  |
| A3-Offset | dB | Config 1 | -6 | |  |
| Hysteresis | dB | Config 1 | 0 | |  |
| CP length |  | Config 1 | Normal | |  |
| TimeToTrigger | s | Config 1 | 0 | |  |
| Filter coefficient |  | Config 1 | 0 | | L3 filtering is not used |
| DRX |  | Config 1 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1 | 3μs | | Synchronous cells. |
| T1 | s | Config 1 | 5 | |  |
| T2 | s | Config 1 | 1.7 | 1.7 |  |

11.5.2.3.4.2 Test procedure

TBD

11.5.2.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.5.2.3.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | TBD |

11.5.2.3.5 Test requirements

Table 11.5.2.3.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-RSRP measurements.

Table 11.5.2.3.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| NR RF Channel Number | | |  | Config 1 | 1 | | 2 | |
| Duplex mode | | |  | Config 1 | TDD | | | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | | |
| BWchannel | | | MHz | Config 1 | 40: NRB,c = 106 | | | |
| BWP BW | | | MHz | Config 1 | 40: NRB,c = 106 | | | |
| BWP configuration | Initial DL BWP | | Config 1 | Config 1 | DLBWP.0.1 | | NA | |
| Initial UL BWP | | Config 1 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | | Config 1 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | | Config 1 | ULBWP.1.1 | | NA | |
| TRS configuration | | |  | Config 1 | TRS.1.2 TDD | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | | |  | Config 1 | SR.1.1 CCA | |  | |
| CORESET Reference Channel | | |  | Config 1 | CR.1.1 CCA | |  | |
| SSB parameters | | Semi-static channel access Note 5,7 |  | Config 1 | SSB.1 CCA | | SSB.1 CCA | |
|  | | Dynamic channel access Note 6,7 |  | Config 1 | SSB.2 CCA | | SSB.2 CCA | |
| DBT window configuration | | |  | Config 1 | As defined in A.3.28.1 | | As defined in A.3.28.1 | |
| SMTC configuration defined in A.3.11 | | |  | Config 1 | SMTC.1 | | SMTC.4 | |
| DL CCA probability PCCA\_DL | | Semi-static channel access Note 5,7 |  | Config 1 | PCCA\_DL=0.9375 | | PCCA\_DL=0.9375 | |
|  | | Dynamic channel access Note 6,7 |  | Config 1 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | |
| UL CCA probability PCCA\_UL | | Semi-static channel access Note 5,7 |  | Config 1 | PCCA\_UL=1 | | PCCA\_UL=1 | |
|  | | Dynamic channel access Note 6,7 |  | Config 1 | PCCA\_UL=1 | | PCCA\_UL=1 | |
| LCCA\_DL | | |  | Config 1 | 12 | | 12 | |
| WCCA\_DL | | | ms | Config 1 | TPSS/SSS\_sync\_inter\_cca | | TPSS/SSS\_sync\_inter\_cca | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1 | 30 | | | |
| EPRE ratio of PSS to SSS | | |  | Config 1 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1 | -104 | | -104 | |
| Note2 | | | dBm/SCS | Config 1 | -101 | | -101 | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1 | -91 | -91 | -Infinity | -88 |
|  | | | dB | Config 1 | 4 | 4 | -Infinity | 7 |
|  | | | dB | Config 1 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | | dBm/9.36MHz | Config 1 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | | |  | Config 1 | AWGN | | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

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

#### 11.5.2.4 NR SA FR1-FR1 Event triggered reporting tests for FR1 with CCA without SSB time index detection when DRX is used

Editor's Note: This test case is incomplete in following aspects:

* MU and TT analysis is incomplete
* Message contents is missing
* Test procedure is missing
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Some parameters and/or references are still in brackets

11.5.2.4.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in DRX without SSB time index detection with CCA. This test will partly verify the SA inter-frequency NR cell search requirements for NR cell with CCA.

11.5.2.4.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and inter-frequency measurements on shared channel access.

11.5.2.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.5.2.0.1 and 11.5.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.11.5.2.4.

11.5.2.4.4 Test description

Two cells are deployed in the test. NR cell 1 with CCA as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters for the two cells are given in Table 11.5.2.4.4.1-1 and 11.5.2.4.4.1-3 below. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

11.5.2.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.5.2.4.4.1-1.

Table 11.5.2.4.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 11.5.2.4-1 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 11.5.2.4.4.1-2.

Table 11.5.2.4.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2a | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | Without LTE part. For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part. | |  |

1. The general test parameter settings are set up according to Table 11.5.2.4.4.1-3.

2. Message contents are defined in clause 11.5.2.4.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 11.5.2.4.4.1-3: General test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| Test 1 | Test 2 | Test 3 | Test 4 |
| NR RF Channel Number |  | Config 1 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cells |  | Config 1 | NR cell 1 with CCA (PCell) | | | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1 | NR cell 2 with CCA | | | | NR cell 2 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1 | As specified in TS 38.133 [6] clause A.3.26.2.1 | | | |  |
| UL CCA model |  | Config 1 | As specified in TS 38.133 [6] clause A.3.26.2.2 | | | |  |
| Gap Pattern Id |  | Config 1 | 0 | | 4 | | As specified in TS 38.133 [6] clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1 | -6 | | | |  |
| Hysteresis | dB | Config 1 | 0 | | | |  |
| CP length |  | Config 1 | Normal | | | |  |
| TimeToTrigger | s | Config 1 | 0 | | | |  |
| Filter coefficient |  | Config 1 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1 | DRX.1 | DRX.2 | DRX.1 | DRX.2 | As specified in clause TS 38.133 [6] A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1 | 3s | | | | Synchronous cells. |
| T1 | s | Config 1 | 5 | | | |  |
| T2 | s | Config 1 | 2.5 | 17 | 2.5 | 17 |  |

Table 11.5.2.4.4.1-4: DRX-Configuration

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
| Value | Value |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [13] |
| drx-InactivityTimer | ms1 | ms1 |
| drx-RetransmissionTimerDL | sl1 | sl1 |
| drx-RetransmissionTimerUL | sl1 | sl1 |
| drx-LongCycleStartOffset | ms40 | Ms640 |
| shortDRX | disable | disable |  |

Table 11.5.2.4.4.1-5: *TimeAlignmentTimer* -Configuration

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [13] |

11.5.2.4.4.2 Test procedure

TBD

11.5.2.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.5.2.4.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | TBD |

11.5.2.4.5 Test requirements

Table 11.5.2.4.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-RSRP measurements.

Table 11.5.2.4.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| NR RF Channel Number | | |  | Config 1 | 1 | | | | 2 | | | |
| Duplex mode | | |  | Config 1 | TDD | | | | | | | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | | | | | | |
| BWchannel | | | MHz | Config 1 | 40: NRB,c = 106 | | | | | | | |
| BWP BW | | | MHz | Config 1 | 40: NRB,c = 106 | | | | | | | |
| BWP configuration | Initial DL BWP | | Config 1 | Config 1 | DLBWP.0.1 | | | | NA | | | |
| Initial UL BWP | | Config 1 | ULBWP.0.1 | | | | NA | | | |
| Dedicated DL BWP | | Config 1 | DLBWP.1.1 | | | | NA | | | |
| Dedicated UL BWP | | Config 1 | ULBWP.1.1 | | | | NA | | | |
| TRS configuration | | |  | Config 1 | TRS.1.2 TDD | | | | NA | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1 | OP.1 | | | | OP.1 | | | |
| PDSCH Reference measurement channel | | |  | Config 1 | SR.1.1 CCA | | | |  | | | |
| CORESET Reference Channel | | |  | Config 1 | CR.1.1 CCA | | | |  | | | |
| SSB parameters | | Semi-static channel access Note 5,7 |  | Config 1 | SSB.1 CCA | | | | SSB.1 CCA | | | |
|  | | Dynamic channel access Note 6,7 |  | Config 1 | SSB.2 CCA | | | | SSB.2 CCA | | | |
| DBT window configuration | | |  | Config 1 | As defined in A.3.28.1 | | | | As defined in A.3.28.1 | | | |
| SMTC configuration defined in A.3.11 | | |  | Config 1 | SMTC.1 | | | | SMTC.4 | | | |
| DL CCA probability PCCA\_DL | | Semi-static channel access Note 5,7 |  | Config 1 | PCCA\_DL=0.9375 | | | | PCCA\_DL=0.9375 | | | |
|  | | Dynamic channel access Note 6,7 |  | Config 1 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | |
| UL CCA probability PCCA\_UL | | Semi-static channel access Note 5,7 |  | Config 1 | PCCA\_UL=1 | | | | PCCA\_UL=1 | | | |
|  | | Dynamic channel access Note 6,7 |  | Config 1 | PCCA\_UL=1 | | | | PCCA\_UL=1 | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1 | 30 | | | | | | | |
| EPRE ratio of PSS to SSS | | |  | Config 1 | 0 | | | | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1 | -104 | | | | -104 | | | |
| Note2 | | | dBm/SCS | Config 1 | -101 | | | | -101 | | | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1 | -91 | | -91 | | -Infinity | | -88 | |
|  | | | dB | Config 1 | 4 | | 4 | | -Infinity | | 7 | |
|  | | | dB | Config 1 | 4 | | 4 | | -Infinity | | 7 | |
| IoNote3 | | | dBm/9.36MHz | Config 1 | -58.49 | | -58.49 | | -63.94 | | -56.15 | |
| Propagation Condition | | |  | Config 1 | AWGN | | | | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

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

#### 11.5.2.5 NR SA FR1-FR1 Event triggered reporting tests for FR1 with CCA with SSB time index detection when DRX is not used

Editor's Note: This test case is incomplete in following aspects:

* MU and TT analysis is incomplete
* Message contents is missing
* Test procedure is missing
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Some parameters and/or references are still in brackets

11.5.2.5.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in non-DRX with SSB time index detection with CCA. This test will partly verify the SA inter-frequency NR cell search requirements for NR cell with CCA.

11.5.2.5.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and inter-frequency measurements on shared channel access.

11.5.2.5.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.5.2.0.1 and 11.5.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.11.5.2.5.

11.5.2.5.4 Test description

Two cells are deployed in the test. NR cell 1 with CCA as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters for the two cells are given in Table 11.5.2.5.4.1-1 and 11.5.2.5.4.1-3 below. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

11.5.2.5.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.5.2.5.4.1-1.

Table 11.5.2.5.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 11.5.2.5-1 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 11.5.2.5.4.1-2.

Table 11.5.2.5.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2a | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | Without LTE part. For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part. | |  |

1. The general test parameter settings are set up according to Table 11.5.2.5.4.1-3.

2. Message contents are defined in clause 11.5.2.5.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 11.5.2.5.4.1-3: General test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| NR RF Channel Number |  | Config 1 | 1, 2 | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cells |  | Config 1 | NR cell 1 with CCA (PCell) | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1 | NR cell 2 with CCA | | NR cell 2 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1 | As specified in clause A.3.26.2.1 | |  |
| UL CCA model |  | Config 1 | As specified in clause A.3.26.2.2 | |  |
| Gap Pattern Id |  | Config 1 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 9 | 9 |  |
| A3-Offset | dB | Config 1 | -6 | |  |
| Hysteresis | dB | Config 1 | 0 | |  |
| CP length |  | Config 1 | Normal | |  |
| TimeToTrigger | s | Config 1 | 0 | |  |
| Filter coefficient |  | Config 1 | 0 | | L3 filtering is not used |
| DRX |  | Config 1 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1 | 3ms | | Synchronous cells. |
| T1 | s | Config 1 | 5 | |  |
| T2 | s | Config 1 | 2 | 2 |  |

11.5.2.5.4.2 Test procedure

TBD

11.5.2.5.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.5.2.5.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | TBD |

11.5.2.5.5 Test requirements

Table 11.5.2.5.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-RSRP measurements.

Table 11.5.2.5.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| NR RF Channel Number | | |  | Config 1 | 1 | | 2 | |
| Duplex mode | | |  | Config 1 | TDD | | | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | | |
| BWchannel | | | MHz | Config 1 | 40: NRB,c = 106 | | | |
| BWP BW | | | MHz | Config 1 | 40: NRB,c = 106 | | | |
| BWP configuration | Initial DL BWP | | Config 1 | Config 1 | DLBWP.0.1 | | NA | |
| Initial UL BWP | | Config 1 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | | Config 1 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | | Config 1 | ULBWP.1.1 | | NA | |
| TRS configuration | | |  | Config 1 | TRS.1.2 TDD | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | | |  | Config 1 | SR.1.1 CCA | |  | |
| CORESET Reference Channel | | |  | Config 1 | CR.1.1 CCA | |  | |
| SSB parameters | | Semi-static channel access Note 5,7 |  | Config 1 | SSB.1 CCA | | SSB.1 CCA | |
|  | |  |
|  | | Semi-static channel access Note 5,7 |  | Config 1 | SSB.2 CCA | | SSB.2 CCA | |
|  | |  |
| DBT window configuration | | |  | Config 1 | As defined in A.3.28.1 | | As defined in A.3.28.1 | |
| SMTC configuration defined in A.3.11 | | |  | Config 1 | SMTC.1 | | SMTC.4 | |
| DL CCA probability PCCA\_DL | | Semi-static channel access Note 5,7 |  | Config 1 | PCCA\_DL=0.9375 | | PCCA\_DL=0.9375 | |
|  | | Dynamic channel access Note 6,7 |  | Config 1 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | |
| UL CCA probability PCCA\_UL | | Semi-static channel access Note 5,7 |  | Config 1 | PCCA\_UL=1 | | PCCA\_UL=1 | |
|  | | Dynamic channel access Note 6,7 |  | Config 1 | PCCA\_UL=1 | | PCCA\_UL=1 | |
| LCCA\_DL | | |  | Config 1 | 5 | | 5 | |
| WCCA\_DL | | | ms | Config 1 | TPSS/SSS\_sync\_inter\_cca | | TPSS/SSS\_sync\_inter\_cca | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1 | 30 | | | |
| EPRE ratio of PSS to SSS | | |  | Config 1 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1 | -104 | | -104 | |
| Note2 | | | dBm/SCS | Config 1 | -101 | | -101 | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1 | -91 | -91 | -Infinity | -88 |
|  | | | dB | Config 1 | 4 | 4 | -Infinity | 7 |
|  | | | dB | Config 1 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | | dBm/9.36MHz | Config 1 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | | |  | Config 1 | AWGN | | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

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

#### 11.5.2.6 NR SA FR1-FR1 Event triggered reporting tests for FR1 with CCA with SSB time index detection when DRX is used

Editor's Note: This test case is incomplete in following aspects:

* MU and TT analysis is incomplete
* Message contents is missing
* Test procedure is missing
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Some parameters and/or references are still in brackets

11.5.2.6.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in DRX with SSB time index detection with CCA. This test will partly verify the SA inter-frequency NR cell search requirements for NR cell with CCA.

11.5.2.6.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and inter-frequency measurements on shared channel access.

11.5.2.6.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.5.2.0.1 and 11.5.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.11.5.2.6.

11.5.2.6.4 Test description

Two cells are deployed in the test. NR cell 1 with CCA as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters for the two cells are given in Table 11.5.2.6.4.1-1 and 11.5.2.6.4.1-3 below. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

11.5.2.6.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.5.2.6.4.1-1.

Table 11.5.2.6.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 11.5.2.6-1 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 11.5.2.6.4.1-2.

Table 11.5.2.6.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2a | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | Without LTE part. For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part. | |  |

1. The general test parameter settings are set up according to Table 11.5.2.6.4.1-3.

2. Message contents are defined in clause 11.5.2.6.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 11.5.2.6.4.1-3: General test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| Test 1 | Test 2 | Test 3 | Test 4 |
| NR RF Channel Number |  | Config 1 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cells |  | Config 1 | NR cell 1 with CCA (PCell) | | | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1 | NR cell 2 with CCA | | | | NR cell 2 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1 | As specified in clause A.3.26.2.1 | | | |  |
| UL CCA model |  | Config 1 | As specified in clause A.3.26.2.2 | | | |  |
| Gap Pattern Id |  | Config 1 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1 | -6 | | | |  |
| Hysteresis | dB | Config 1 | 0 | | | |  |
| CP length |  | Config 1 | Normal | | | |  |
| TimeToTrigger | s | Config 1 | 0 | | | |  |
| Filter coefficient |  | Config 1 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1 | DRX.1 | DRX.2 | DRX.1 | DRX.2 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1 | 3ms | | | | Synchronous cells. |
| T1 | s | Config 1 | 5 | | | |  |
| T2 | s | Config 1 | 3 | 20 | 3 | 20 |  |

Table 11.5.2.6.4.1-4: DRX-Configuration

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
| Value | Value |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [2] |
| drx-InactivityTimer | ms1 | ms1 |
| drx-RetransmissionTimerDL | sl1 | sl1 |
| drx-RetransmissionTimerUL | sl1 | sl1 |
| drx-LongCycleStartOffset | ms40 | Ms640 |
| shortDRX | disable | disable |  |

Table 11.5.2.6.4.1-5: *TimeAlignmentTimer* -Configuration

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

11.5.2.6.4.2 Test procedure

TBD

11.5.2.6.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.5.2.6.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | TBD |

11.5.2.6.5 Test requirements

Table 11.5.2.6.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-RSRP measurements.

Table 11.5.2.6.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| NR RF Channel Number | | |  | Config 1 | 1 | | | | 2 | | | |
| Duplex mode | | |  | Config 1 | TDD | | | | | | | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | | | | | | |
| BWchannel | | | MHz | Config 1 | 40: NRB,c = 106 | | | | | | | |
| BWP BW | | | MHz | Config 1 | 40: NRB,c = 106 | | | | | | | |
| BWP configuration | Initial DL BWP | | Config 1 | Config 1 | DLBWP.0.1 | | | | NA | | | |
| Initial UL BWP | | Config 1 | ULBWP.0.1 | | | | NA | | | |
| Dedicated DL BWP | | Config 1 | DLBWP.1.1 | | | | NA | | | |
| Dedicated UL BWP | | Config 1 | ULBWP.1.1 | | | | NA | | | |
| TRS configuration | | |  | Config 1 | TRS.1.2 TDD | | | | NA | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1 | OP.1 | | | | OP.1 | | | |
| PDSCH Reference measurement channel | | |  | Config 1 | SR.1.1 CCA | | | |  | | | |
| CORESET Reference Channel | | |  | Config 1 | CR.1.1 CCA | | | |  | | | |
| SSB parameters | | Semi-static channel access Note 5,7 |  | Config 1 | SSB.1 CCA | | | | SSB.1 CCA | | | |
|  | |  |
|  | | Semi-static channel access Note 5,7 |  | Config 1 | SSB.2 CCA | | | | SSB.2 CCA | | | |
|  | |  |
| DBT window configuration | | |  | Config 1 | As defined in A.3.28.1 | | | | As defined in A.3.28.1 | | | |
| SMTC configuration defined in A.3.11 | | |  | Config 1 | SMTC.1 | | | | SMTC.4 | | | |
| DL CCA probability PCCA\_DL | | Semi-static channel access Note 5,7 |  | Config 1 | PCCA\_DL=0.9375 | | | | PCCA\_DL=0.9375 | | | |
|  | | Dynamic channel access Note 6,7 |  | Config 1 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | |
| UL CCA probability PCCA\_UL | | Semi-static channel access Note 5,7 |  | Config 1 | PCCA\_UL=1 | | | | PCCA\_UL=1 | | | |
|  | | Dynamic channel access Note 6,7 |  | Config 1 | PCCA\_UL=1 | | | | PCCA\_UL=1 | | | |
| LCCA\_DL | | |  | Config 1 | 2 | | | | 2 | | | |
| WCCA\_DL | | | ms | Config 1 | TPSS/SSS\_sync\_inter\_cca | | | | TPSS/SSS\_sync\_inter\_cca | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1 | 30 | | | | | | | |
| EPRE ratio of PSS to SSS | | |  | Config 1 | 0 | | | | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1 | -104 | | | | -104 | | | |
| Note2 | | | dBm/SCS | Config 1 | -101 | | | | -101 | | | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1 | -91 | | -91 | | -Infinity | | -88 | |
|  | | | dB | Config 1 | 4 | | 4 | | -Infinity | | 7 | |
|  | | | dB | Config 1 | 4 | | 4 | | -Infinity | | 7 | |
| IoNote3 | | | dBm/9.36MHz | Config 1 | -58.49 | | -58.49 | | -63.94 | | -56.15 | |
| Propagation Condition | | |  | Config 1 | AWGN | | | | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%. In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

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

#### 11.5.2.7 NR SA FR1-FR1 Event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

Editor's Note: This test case is incomplete in following aspects:

* MU and TT analysis is incomplete
* Message contents is missing
* Test procedure is missing
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Some parameters and/or references are still in brackets

11.5.2.7.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in non-DRX without SSB time index detection with CCA. This test will partly verify the SA inter-frequency NR cell search requirements for NR cell with CCA.

11.5.2.7.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and inter-frequency measurements on shared channel access.

11.5.2.7.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.5.2.0.1 and 11.5.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.11.5.2.7.

11.5.2.7.4 Test description

Two cells are deployed in the test. NR cell 1 with CCA as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters for the two cells are given in Table 11.5.2.7.4.1-1 and 11.5.2.7.4.1-3 below. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

11.5.2.7.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.5.2.7.4.1-1.

Table 11.5.2.7.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 11.5.2.7-1 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 11.5.2.7-2 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 11.5.2.7-3 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 11.5.2.7.4.1-2.

Table 11.5.2.7.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2a | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | WithoutLTE part. For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part. | |  |

1. The general test parameter settings are set up according to Table 11.5.2.7.4.1-3.

2. Message contents are defined in clause 11.5.2.7.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 11.5.2.7.4.1-3: General test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | | Two FR1 NR carrier frequencies are used. NR channel 1 is with CCA. |
| Active cell |  | Config 1,2,3 | NR cell 1 (PCell) | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3 | As specified in clause A.3.26.2.1 | |  |
| UL CCA model |  | Config 1,2,3 | As specified in clause A.3.26.2.2 | |  |
| Gap Pattern Id |  | Config 1,2,3 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2,3 | -6 | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | |  |
| CP length |  | Config 1,2,3 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3 | 0 | |  |
| Filter coefficient |  | Config 1,2,3 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 1,2,3 | 3ms | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | |  |
| T2 | s | Config 1,2,3 | 1.7 | 1.7 |  |

11.5.2.7.4.2 Test procedure

TBD

11.5.2.7.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.5.2.7.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | TBD |

11.5.2.7.5 Test requirements

Table 11.5.2.7.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-RSRP measurements.

Table 11.5.2.7.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| NR RF Channel Number | | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | | |  | Config 1 | TDD | | FDD | |
|  | Config 2,3 | TDD | | TDD | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | Not Applicable | |
|  | Config 2 | TDDConf.1.1 CCA | | TDDConf.1.1 | |
|  | Config 3 | TDDConf.1.1 CCA | | TDDConf.2.1 | |
| BWchannel | | | MHz | Config 1,2 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP BW | | | MHz | Config 1,2 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP configuration | Initial DL BWP | |  | Config 1,2,3 | DLBWP.0.1 | | NA | |
| Initial UL BWP | |  | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | |  | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | |  | ULBWP.1.1 | | NA | |
| TRS configuration | | |  | Config 1,2,3 | TRS.1.2 TDD | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1,2,3 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | | |  | Config 1,2,3 | SR.1.1 CCA | |  | |
| CORESET Reference Channel | | |  | Config 1,2,3 | CR.1.1 CCA | |  | |
| SSB parameters | | Semi-static channel access Note 5,7 |  | Config 1,2 | SSB.1 CCA | | SSB.1 FR1 | |
|  | |  | Config 3 | SSB.1 CCA | | SSB.2 FR1 | |
|  | | Semi-static channel access Note 5,7 |  | Config 1,2 | SSB.2 CCA | | SSB.1 FR1 | |
|  | |  | Config 3 | SSB.2 CCA | | SSB.2 FR1 | |
| DBT window configuration | | |  | Config 1,2,3 | As defined in A.3.28.1 | | Not applicable | |
| SMTC configuration defined in A.3.11 | | |  | Config 1,2,3 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1,2 | 30 | | 15 | |
| Config 3 | 30 | | 30 | |
| DL CCA probability PCCA\_DL | | Semi-static channel access Note 5,7 |  | Config 1,2,3 | PCCA\_DL=0.9375 | | NA | |
|  | | Dynamic channel access Note 6,7 |  | Config 1,2,3 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | NA | |
| UL CCA probability PCCA\_UL | | Semi-static channel access Note 5,7 |  | Config 1,2,3 | PCCA\_UL=1 | | NA | |
|  | | Dynamic channel access Note 6,7 |  | Config 1,2,3 | PCCA\_UL=1 | | NA | |
| LCCA\_DL | | |  | Config 1,2,3 | 12 | | 12 | |
| WCCA\_DL | | | ms | Config 1,2,3 | TPSS/SSS\_sync\_inter\_cca | | TPSS/SSS\_sync\_inter\_cca | |
| EPRE ratio of PSS to SSS | | |  | Config 1,2,3 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1,2,3 | -104 | | -98 | |
| Note2 | | | dBm/SCS | Config 1,2 | -101 | | -98 | |
| Config 3 | -101 | | -95 | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1,2 | -91 | -91 | -Infinity | -91 |
| Config 3 | -91 | -91 | -Infinity | -88 |
|  | | | dB | Config 1,2,3 | 4 | 4 | -Infinity | 7 |
|  | | | dB | Config 1,2,3 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | | dBm/9.36MHz | Config 1,2 | -58.49 | -58.49 | -70.05 | -62.26 |
| dBm/38.16MHz | Config 3 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | | |  | Config 1,2,3 | AWGN | | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

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

#### 11.5.2.8 NR SA FR1-FR1 Event triggered reporting tests for FR1 without SSB time index detection when DRX is used

Editor's Note: This test case is incomplete in following aspects:

* MU and TT analysis is incomplete
* Message contents is missing
* Test procedure is missing
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Some parameters and/or references are still in brackets

11.5.2.8.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in DRX without SSB time index detection with CCA. This test will partly verify the SA inter-frequency NR cell search requirements.

11.5.2.8.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and inter-frequency measurements on shared channel access.

11.5.2.8.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.5.2.0.1 and 11.5.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.11.5.2.8.

11.5.2.8.4 Test description

Two cells are deployed in the test. NR cell 1 with CCA as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters for the two cells are given in Table 11.5.2.8.4.1-1 and 11.5.2.8.4.1-3 below. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

11.5.2.8.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.5.2.8.4.1-1.

Table 11.5.2.8.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 11.5.2.8-1 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 11.5.2.8-2 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 11.5.2.8-3 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 11.5.2.8.4.1-2.

Table 11.5.2.8.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2a | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | Without LTE part. For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part. | |  |

1. The general test parameter settings are set up according to Table 11.5.2.8.4.1-3.

2. Message contents are defined in clause 11.5.2.8.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 11.5.2.8.4.1-3: General test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| Test 1 | Test 2 | Test 3 | Test 4 |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. NR channel 1 is with CCA. |
| Active cell |  | Config 1,2,3 | NR cell 1 (PCell) | | | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3 | As specified in clause A.3.26.2.1 | | | |  |
| UL CCA model |  | Config 1,2,3 | As specified in clause A.3.26.2.2 | | | |  |
| Gap Pattern Id |  | Config 1,2,3 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2,3 | -6 | | | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | | | |  |
| CP length |  | Config 1,2,3 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3 | DRX.1 | DRX.2 | DRX.1 | DRX.2 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 1,2,3 | 3ms | | | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | | | |  |
| T2 | s | Config 1,2,3 | 2.5 | 17 | 2.5 | 17 |  |

Table 11.5.2.8.4.1-4: DRX-Configuration

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
| Value | Value |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [2] |
| drx-InactivityTimer | ms1 | ms1 |
| drx-RetransmissionTimerDL | sl1 | sl1 |
| drx-RetransmissionTimerUL | sl1 | sl1 |
| drx-LongCycleStartOffset | ms40 | Ms640 |
| shortDRX | disable | disable |  |

Table 11.5.2.8.4.1-5: *TimeAlignmentTimer* -Configuration

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

11.5.2.8.4.2 Test procedure

TBD

11.5.2.8.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.5.2.8.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | TBD |

11.5.2.8.5 Test requirements

Table 11.5.2.8.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-RSRP measurements.

Table 11.5.2.8.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| NR RF Channel Number | | |  | Config 1,2,3 | 1 | | | | 2 | | | |
| Duplex mode | | |  | Config 1 | TDD | | | | FDD | | | |
|  | Config 2,3 | TDD | | | | TDD | | | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | | | Not Applicable | | | |
|  | Config 2 | TDDConf.1.1 CCA | | | | TDDConf.1.1 | | | |
|  | Config 3 | TDDConf.1.1 CCA | | | | TDDConf.2.1 | | | |
| BWchannel | | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| BWP BW | | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| BWP configuration | Initial DL BWP | |  | Config 1,2,3 | DLBWP.0.1 | | | | NA | | | |
| Initial UL BWP | |  | ULBWP.0.1 | | | | NA | | | |
| Dedicated DL BWP | |  | DLBWP.1.1 | | | | NA | | | |
| Dedicated UL BWP | |  | ULBWP.1.1 | | | | NA | | | |
| TRS configuration | | |  | Config 1,2,3 | TRS.1.2 TDD | | | | NA | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1,2,3 | OP.1 | | | | OP.1 | | | |
| PDSCH Reference measurement channel | | |  | Config 1,2,3 | SR.1.1 CCA | | | |  | | | |
| CORESET Reference Channel | | |  | Config 1,2,3 | CR.1.1 CCA | | | |  | | | |
| SSB parameters | | Semi-static channel access Note 5,7 |  | Config 1,2 | SSB.1 CCA | | | | SSB.1 FR1 | | | |
|  | |  | Config 3 | SSB.1 CCA | | | | SSB.2 FR1 | | | |
|  | | Semi-static channel access Note 5,7 |  | Config 1,2 | SSB.2 CCA | | | | SSB.1 FR1 | | | |
|  | |  | Config 3 | SSB.2 CCA | | | | SSB.2 FR1 | | | |
| DBT window configuration | | |  | Config 1,2,3 | As defined in A.3.28.1 | | | | Not applicable | | | |
| SMTC configuration defined in A.3.11 | | |  | Config 1,2,3 | SMTC.1 | | | | SMTC.4 | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1,2 | 30 | | | | 15 | | | |
| Config 3 | 30 | | | | 30 | | | |
| DL CCA probability PCCA\_DL | | Semi-static channel access Note 5,7 |  | Config 1,2,3 | PCCA\_DL=0.9375 | | | | NA | | | |
|  | | Dynamic channel access Note 6,7 |  | Config 1,2,3 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | NA | | | |
| UL CCA probability PCCA\_UL | | Semi-static channel access Note 5,7 |  | Config 1,2,3 | PCCA\_UL=1 | | | | NA | | | |
|  | | Dynamic channel access Note 6,7 |  | Config 1,2,3 | PCCA\_UL=1 | | | | NA | | | |
| LCCA\_DL | | |  | Config 1,2,3 | 5 | | | | 5 | | | |
| WCCA\_DL | | | ms | Config 1,2,3 | TPSS/SSS\_sync\_inter\_cca | | | | TPSS/SSS\_sync\_inter\_cca | | | |
| EPRE ratio of PSS to SSS | | |  | Config 1,2,3 | 0 | | | | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1,2,3 | -104 | | | | -98 | | | |
| Note2 | | | dBm/SCS | Config 1,2 | -101 | | | | -98 | | | |
| Config 3 | -101 | | | | -95 | | | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1,2 | -91 | | -91 | | -Infinity | | -91 | |
| Config 3 | -91 | | -91 | | -Infinity | | -88 | |
|  | | | dB | Config 1,2,3 | 4 | | 4 | | -Infinity | | 7 | |
|  | | | dB | Config 1,2,3 | 4 | | 4 | | -Infinity | | 7 | |
| IoNote3 | | | dBm/9.36MHz | Config 1,2 | -58.49 | | -58.49 | | -70.05 | | -62.26 | |
| dBm/38.16MHz | Config 3 | -58.49 | | -58.49 | | -63.94 | | -56.15 | |
| Propagation Condition | | |  | Config 1,2,3 | AWGN | | | | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

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

#### 11.5.2.9 NR SA FR1-FR1 Event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

Editor's Note: This test case is incomplete in following aspects:

* MU and TT analysis is incomplete
* Message contents is missing
* Test procedure is missing
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Some parameters and/or references are still in brackets

11.5.2.9.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in non-DRX with SSB time index detection with CCA. This test will partly verify the SA inter-frequency NR cell search requirements.

11.5.2.9.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and inter-frequency measurements on shared channel access.

11.5.2.9.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.5.2.0.1 and 11.5.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.11.5.2.9.

11.5.2.9.4 Test description

Two cells are deployed in the test. NR cell 1 with CCA as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters for the two cells are given in Table 11.5.2.9.4.1-1 and 11.5.2.9.4.1-3 below. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

11.5.2.9.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.5.2.9.4.1-1.

Table 11.5.2.9.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 11.5.2.9-1 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 11.5.2.9-2 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 11.5.2.9-3 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 11.5.2.9.4.1-2.

Table 11.5.2.9.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2a | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | Without LTE part. For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part. | |  |

1. The general test parameter settings are set up according to Table 11.5.2.9.4.1-3.

2. Message contents are defined in clause 11.5.2.9.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 11.5.2.9.4.1-3: General test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | | Two FR1 NR carrier frequencies are used. NR channel 1 is with CCA. |
| Active cell |  | Config 1,2,3 | NR cell 1 (PCell) | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3 | As specified in clause A.3.26.2.1 | |  |
| UL CCA model |  | Config 1,2,3 | As specified in clause A.3.26.2.2 | |  |
| Gap Pattern Id |  | Config 1,2,3 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2,3 | -6 | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | |  |
| CP length |  | Config 1,2,3 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3 | 0 | |  |
| Filter coefficient |  | Config 1,2,3 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 1,2,3 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | |  |
| T2 | s | Config 1,2,3 | 2 | 2 |  |

11.5.2.9.4.2 Test procedure

TBD

11.5.2.9.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.5.2.9.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | TBD |

11.5.2.9.5 Test requirements

Table 11.5.2.9.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-RSRP measurements.

Table 11.5.2.9.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| NR RF Channel Number | | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | | |  | Config 1 | TDD | | FDD | |
|  | Config 2,3 | TDD | | TDD | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | Not Applicable | |
|  | Config 2 | TDDConf.1.1 CCA | | TDDConf.1.1 | |
|  | Config 3 | TDDConf.1.1 CCA | | TDDConf.2.1 | |
| BWchannel | | | MHz | Config 1,2 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP BW | | | MHz | Config 1,2 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP configuration | Initial DL BWP | |  | Config 1,2,3 | DLBWP.0.1 | | NA | |
| Initial UL BWP | |  | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | |  | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | |  | ULBWP.1.1 | | NA | |
| TRS configuration | | |  | Config 1,2,3 | TRS.1.2 TDD | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1,2,3 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | | |  | Config 1,2,3 | SR.1.1 CCA | |  | |
| CORESET Reference Channel | | |  | Config 1,2,3 | CR.1.1 CCA | |  | |
| SSB parameters | | Semi-static channel access Note 5,7 |  | Config 1,2 | SSB.1 CCA | | SSB.1 FR1 | |
|  | |  | Config 3 | SSB.1 CCA | | SSB.2 FR1 | |
|  | | Semi-static channel access Note 5,7 |  | Config 1,2 | SSB.2 CCA | | SSB.1 FR1 | |
|  | |  | Config 3 | SSB.2 CCA | | SSB.2 FR1 | |
| DBT window configuration | | |  | Config 1,2,3 | As defined in A.3.28.1 | | Not applicable | |
| SMTC configuration defined in A.3.11 | | |  | Config 1,2,3 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1,2 | 30 | | 15 | |
| Config 3 | 30 | | 30 | |
| DL CCA probability PCCA\_DL | | Semi-static channel access Note 5,7 |  | Config 1,2,3 | PCCA\_DL=0.9375 | | NA | |
|  | | Dynamic channel access Note 6,7 |  | Config 1,2,3 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | NA | |
| UL CCA probability PCCA\_UL | | Semi-static channel access Note 5,7 |  | Config 1,2,3 | PCCA\_UL=1 | | NA | |
|  | | Dynamic channel access Note 6,7 |  | Config 1,2,3 | PCCA\_UL=1 | | NA | |
| LCCA\_DL | | |  | Config 1,2,3 | 5 | | 5 | |
| WCCA\_DL | | | ms | Config 1,2,3 | TPSS/SSS\_sync\_inter\_cca | | TPSS/SSS\_sync\_inter\_cca | |
| EPRE ratio of PSS to SSS | | |  | Config 1,2,3 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1,2,3 | -104 | | -98 | |
| Note2 | | | dBm/SCS | Config 1,2 | -101 | | -98 | |
| Config 3 | -101 | | -95 | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1,2 | -91 | -91 | -Infinity | -91 |
| Config 3 | -91 | -91 | -Infinity | -88 |
|  | | | dB | Config 1,2,3 | 4 | 4 | -Infinity | 7 |
|  | | | dB | Config 1,2,3 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | | dBm/9.36MHz | Config 1,2 | -58.49 | -58.49 | -70.05 | -62.26 |
| dBm/38.16MHz | Config 3 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | | |  | Config 1,2,3 | AWGN | | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

In test 1 and 2 UE is required to report SSB time index.

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

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

#### 11.5.2.10 NR SA FR1-FR1 Event triggered reporting tests for FR1 with SSB time index detection when DRX is used

Editor's Note: This test case is incomplete in following aspects:

* MU and TT analysis is incomplete
* Message contents is missing
* Test procedure is missing
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Some parameters and/or references are still in brackets

11.5.2.10.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in DRX with SSB time index detection with CCA. This test will partly verify the SA inter-frequency NR cell search requirements.

11.5.2.10.2 Test applicability

This test applies to all types of NR UE release 16 and forward, supporting standalone NR-U and inter-frequency measurements on shared channel access.

11.5.2.10.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.5.2.0.1 and 11.5.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.11.5.2.10.

11.5.2.10.4 Test description

Two cells are deployed in the test. NR cell 1 with CCA as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters for the two cells are given in Table 11.5.2.10.4.1-1 and 11.5.2.10.4.1-3 below. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

11.5.2.10.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.5.2.10.4.1-1.

Table 11.5.2.10.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 11.5.2.10-1 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 11.5.2.10-2 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 11.5.2.10-3 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 11.5.2.10.4.1-2.

Table 11.5.2.10.4.1-2: Initial conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.8-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 10.4.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.8.2a | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | Without LTE part. For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part. | |  |

1. The general test parameter settings are set up according to Table 11.5.2.10.4.1-3.

2. Message contents are defined in clause 11.5.2.10.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

Table 11.5.2.10.4.1-3: General test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| Test 1 | Test 2 | Test 3 | Test 4 |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. NR channel 1 is with CCA. |
| Active cell |  | Config 1,2,3 | NR cell 1 (PCell) | | | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3 | As specified in clause A.3.26.2.1 | | | |  |
| UL CCA model |  | Config 1,2,3 | As specified in clause A.3.26.2.2 | | | |  |
| Gap Pattern Id |  | Config 1,2,3 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2,3 | -6 | | | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | | | |  |
| CP length |  | Config 1,2,3 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3 | DRX.1 | DRX.2 | DRX.1 | DRX.2 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 1,2,3 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | | | |  |
| T2 | s | Config 1,2,3 | 3 | 20 | 3 | 20 |  |

Table 11.5.2.10.4.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
| Value | Value |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [2] |
| drx-InactivityTimer | ms1 | ms1 |
| drx-RetransmissionTimerDL | sl1 | sl1 |
| drx-RetransmissionTimerUL | sl1 | sl1 |
| drx-LongCycleStartOffset | ms40 | Ms640 |
| shortDRX | disable | disable |  |

Table 11.5.2.10.4.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

11.5.2.10.4.2 Test procedure

TBD

11.5.2.10.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.5.2.10.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | TBD |

11.5.2.10.5 Test requirements

Table 11.5.2.10.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-RSRP measurements.

Table 11.5.2.10.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRP measurements

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| NR RF Channel Number | | |  | Config 1,2,3 | 1 | | | | 2 | | | |
| Duplex mode | | |  | Config 1 | TDD | | | | FDD | | | |
|  | Config 2,3 | TDD | | | | TDD | | | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | | | Not Applicable | | | |
|  | Config 2 | TDDConf.1.1 CCA | | | | TDDConf.1.1 | | | |
|  | Config 3 | TDDConf.1.1 CCA | | | | TDDConf.2.1 | | | |
| BWchannel | | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| BWP BW | | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| BWP configuration | Initial DL BWP | |  | Config 1,2,3 | DLBWP.0.1 | | | | NA | | | |
| Initial UL BWP | |  | ULBWP.0.1 | | | | NA | | | |
| Dedicated DL BWP | |  | DLBWP.1.1 | | | | NA | | | |
| Dedicated UL BWP | |  | ULBWP.1.1 | | | | NA | | | |
| TRS configuration | | |  | Config 1,2,3 | TRS.1.2 TDD | | | | NA | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1,2,3 | OP.1 | | | | OP.1 | | | |
| PDSCH Reference measurement channel | | |  | Config 1,2,3 | SR.1.1 CCA | | | |  | | | |
| CORESET Reference Channel | | |  | Config 1,2,3 | CR.1.1 CCA | | | |  | | | |
| SSB parameters | | Semi-static channel access Note 5,7 |  | Config 1,2 | SSB.1 CCA | | | | SSB.1 FR1 | | | |
|  | |  | Config 3 | SSB.1 CCA | | | | SSB.2 FR1 | | | |
|  | | Semi-static channel access Note 5,7 |  | Config 1,2 | SSB.2 CCA | | | | SSB.1 FR1 | | | |
|  | |  | Config 3 | SSB.2 CCA | | | | SSB.2 FR1 | | | |
| DBT window configuration | | |  | Config 1,2,3 | As defined in A.3.28.1 | | | | Not applicable | | | |
| SMTC configuration defined in A.3.11 | | |  | Config 1,2,3 | SMTC.1 | | | | SMTC.4 | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1,2 | 30 | | | | 15 | | | |
| Config 3 | 30 | | | | 30 | | | |
| DL CCA probability PCCA\_DL | | Semi-static channel access Note 5,7 |  | Config 1,2,3 | PCCA\_DL=0.9375 | | | | NA | | | |
|  | | Dynamic channel access Note 6,7 |  | Config 1,2,3 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | NA | | | |
| UL CCA probability PCCA\_UL | | Semi-static channel access Note 5,7 |  | Config 1,2,3 | PCCA\_UL=1 | | | | NA | | | |
|  | | Dynamic channel access Note 6,7 |  | Config 1,2,3 | PCCA\_UL=1 | | | | NA | | | |
| LCCA\_DL | | |  | Config 1,2,3 | 2 | | | | 2 | | | |
| WCCA\_DL | | | ms | Config 1,2,3 | TPSS/SSS\_sync\_inter\_cca | | | | TPSS/SSS\_sync\_inter\_cca | | | |
| EPRE ratio of PSS to SSS | | |  | Config 1,2,3 | 0 | | | | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1,2,3 | -104 | | | | -98 | | | |
| Note2 | | | dBm/SCS | Config 1,2 | -101 | | | | -98 | | | |
| Config 3 | -101 | | | | -95 | | | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1,2 | -91 | | -91 | | -Infinity | | -91 | |
| Config 3 | -91 | | -91 | | -Infinity | | -88 | |
|  | | | dB | Config 1,2,3 | 4 | | 4 | | -Infinity | | 7 | |
|  | | | dB | Config 1,2,3 | 4 | | 4 | | -Infinity | | 7 | |
| IoNote3 | | | dBm/9.36MHz | Config 1,2 | -58.49 | | -58.49 | | -70.05 | | -62.26 | |
| dBm/38.16MHz | Config 3 | -58.49 | | -58.49 | | -63.94 | | -56.15 | |
| Propagation Condition | | |  | Config 1,2,3 | AWGN | | | | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration. | | | | | | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

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

## 11.6 Measurement Performance

### 11.6.1 SS-RSRP

#### 11.6.1.0 Minimum Conformance Requirements

##### 11.6.1.0.1 Intra-frequency absolute SS-RSRP measurement accuracy requirements under CCA

Same as in clause 10.5.1.0.1.

##### 11.6.1.0.2 Intra-frequency relative SS-RSRP measurement accuracy requirements under CCA

Same as in clause 10.5.1.0.2.

##### 11.6.1.0.3 Inter-frequency absolute SS-RSRP measurement accuracy requirements under CCA

Same as in clause 10.5.1.0.3.

##### 11.6.1.0.4 Inter-frequency relative SS-RSRP measurement accuracy requirements under CCA

Same as in clause 10.5.1.0.4.

#### 11.6.1.1 NR SA FR1 intra-frequency SS-RSRP measurement accuracy on a carrier frequency with CCA

Editor's Note:

* MU and TT analysis is incomplete
* Message contents may need to be updated
* Call setup and test procedure may need to be updated
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements are FFS
* Some parameters and/or references are still in brackets

11.6.1.1.1 Test purpose

The purpose of this test is to verify that the SS-RSRP measurement accuracy on the carrier frequency with CCA is within the specified limits. This test will verify the requirements in clauses 11.6.1.0.1 and 11.6.1.0.2 for intra-frequency measurements under CCA.

11.6.1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting standalone NR-U and [supporting intra-frequency measurements on shared channel access].

11.6.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.6.1.0.1 and 11.6.1.0.2 for absolute and relative accuracy, correspondingly.

The normative reference for this requirement is TS 38.133 [6] clause A.11.6.1.1.

11.6.1.1.4 Test description

Supported test configurations are shown in Table 11.6.1.1.4.1-1. Both absolute and relative accuracies of SS-RSRP intra-frequency measurements are tested by using the parameters in Table 11.6.1.1.5-1. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

11.6.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.6.1.1.4.1-1.

Table 11.6.1.1.4.1-1: Supported test configurations for NR SA FR1 intra-frequency SS-RSRP measurement accuracy on a carrier frequency with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 11.6.1.1-1 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 11.6.1.1.4.1-2.

Table 11.6.1.1.4.1-2: Initial conditions for NR SA FR1 intra-frequency SS-RSRP measurement accuracy on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.6.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | LTE link is not used in this test | |  |

1. The general test parameter settings are set up according to Table 11.6.1.1.5-1.

2. Message contents are defined in clause 11.6.1.1.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test.

11.6.1.1.4.2 Test procedure

In this set of test cases all cells are on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5.

2. Set the parameters according to Table 11.6.1.1.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message on Cell 1 configuring the UE to perform [intra-frequency measurements in DBT windows] as specified in section 11.6.1.1.4.3.

4. The UE shall transmit an *RRCReconfiguration* message to acknowledge the configuration.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 5, the SS shall check the SS-RSRP reported values in the periodic *MeasurementReport*. The SS-RSRP value of Cell 2 reported by the UE is compared to the expected SS-RSRP. If the value is outside the limits in Table 11.6.1.1.5-2 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 11.6.1.1.5-1.

11.6.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.6.1.1.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRP measurement accuracy on a carrier frequency with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-5  Table H.3.1-7  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 11.6.1.1.4.3-2: *ReportConfigNR* for NR SA FR1 intra-frequency SS-RSRP measurement accuracy on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrq | false |  |  |
| sinr | false |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

11.6.1.1.5 Test requirements

Table 11.6.1.1.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-RSRP measurement accuracy on a carrier frequency with CCA. Table 11.6.1.1.5-2 and Table 11.6.1.1.5-3 define the absolute and relative accuracy requirements, correspondingly.

Table 11.6.1.1.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRP measurement accuracy on a carrier frequency with CCA

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | | Test 3 | |
|  | | |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Cell ID | | |  | 489 | 0 | 489 | 0 | 489 | 0 |
| SSB ARFCN | | |  | freq1 | | freq1 | | freq1 | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | | | |
| BWchannel | | Config 1 | MHz | 40: NRB,c = 106 | | | | | |
| BWP BW | | Config 1 |  | 40: NRB,c = 106 | | | | | |
| DL CCA model | | |  | As specified in clause D.7.2.1 | | | | | |
| UL CCA model | | |  | As specified in clause D.7.2.2 | | | | | |
| PCCA\_DL for dynamic channel access Note 7,9 | | |  | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | | |
| PCCA\_DL for semi-static channel access Note 8,9 | | |  | PCCA\_DL=0.9375 | | | | | |
| PCCA\_UL | | |  | 1 | | | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | | | |
| Downlink dedicated BWP configuration | | |  | DLBWP.1.1 | | | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | | | |
| Uplink dedicated BWP configuration | | |  | ULBWP.1.1 | | | | | |
| TRS configuration | | Config 1 |  | TRS.1.2 TDD | NA | TRS.1.2 TDD | NA | TRS.1.2 TDD | NA |
| DRX Cycle | | | ms | Not Applicable | | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 CCA | - | SR.1.1 CCA | - | SR.1.1 CCA | - |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA | - | CR.1.1 CCA | - | CR.1.1 CCA | - |
| Control channel RMC | | Config 1 |  | CR.1.1 CCA | - | CR.1.1 CCA | - | CR.1.1 CCA | - |
| SSB configuration for semi-static channel access | | Config 1 |  | SSB.1 CCA | SSB.1 CCA | SSB.1 CCA | SSB.1 CCA | SSB.1 CCA | SSB.1 CCA |
| SSB configuration for dynamic channel access | | Config 1 |  | SSB.2 CCA | SSB.2 CCA | SSB.2 CCA | SSB.2 CCA | SSB.2 CCA | SSB.2 CCA |
| DBT window configuration | | Config 1,2,3 |  | DBT.1 | DBT.1 | DBT.1 | DBT.1 | DBT.1 | DBT.1 |
| Time offset with Cell 1 | | Config 1 | μs | - | 3 | - | 3 | - | 3 |
| SMTC configuration | | Config 1 |  | SMTC.1 | | | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |  |  |  |
| Note2 | Config 1 | NR\_CCA\_FR1\_I |  | Not applicableNote 5 | | -94+TT | | -110+TT | |
| NR\_CCA\_FR1\_J | -109.5+TT | |
| Note2 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | Not applicableNote 5 | | -91+TT | | -107.0+TT | |
| NR\_CCA\_FR1\_J | -106.5+TT | |
| Note6 | | | dB | 2.46+TT | -5.97+TT | 2.46+TT | -5.97+TT | -2.01+TT | -3.54+TT |
| Note6 | | | dB | 6+TT | 1+TT | 6+TT | 1+TT | 1+TT | 0+TT |
| SS-RSRPNote3,6 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | Not applicableNote 5 | Not applicableNote 5 | -85+TT | -90+TT | -106.00+TT | -107.00+TT |
| NR\_CCA\_FR1\_J | -105.50+TT | -106.50+TT |
| IoNote3 | Config 1 | NR\_CCA\_FR1\_I | dBm/  38.16MHz | Not applicableNote 5- | | -51.99+TT | | -70.82+TT | |
| NR\_CCA\_FR1\_J | -70.32+TT | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: Subtest 1 is not used when testing with 30kHz SSB SCS.  NOTE 6: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.  NOTE 7: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 8: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 9: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | | |

Table 11.6.1.1.5-2: Absolute accuracy requirements for the reported values for NR SA FR1 intra-frequency SS-RSRP measurement accuracy on a carrier frequency with CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2  All bands | Test 3 | |
| Lowest SS-RSRP reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-RSRP reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in [clause 3A.4, Table 3A.4.1-2] | | | | |

Table 11.6.1.1.5-3: Relative accuracy requirements for the reported values for NR SA FR1 intra-frequency SS-RSRP measurement accuracy on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
|  | Test 1 | Test 2 | Test 3 |
|  | All bands | All bands | All bands |
| Normal Conditions | | | |
| Lowest reported value (Cell 3) | RSRP\_x – FFS | RSRP\_x – FFS | RSRP\_x – FFS |
| Highest reported value (Cell 3) | RSRP\_x – FFS | RSRP\_x + FFS | RSRP\_x + FFS |
| Extreme Conditions | | | |
| Lowest reported value (Cell 3) | RSRP\_x – FFS | RSRP\_x – FFS | RSRP\_x – FFS |
| Highest reported value (Cell 3) | RSRP\_x – FFS | RSRP\_x + FFS | RSRP\_x + FFS |
| RSRP\_x is the reported value of Cell 1 | | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 11.6.1.2 NR SA FR1 intra-frequency measurement accuracy on SCC on a carrier frequency with CCA

Editor's Note:

* MU and TT analysis is incomplete
* Message contents may need to be updated
* Call setup and test procedure may need to be updated
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements are FFS
* Some parameters and/or references are still in brackets

11.6.1.2.1 Test purpose

The purpose of this test is to verify that the SS-RSRP measurement accuracy on the carrier frequency with CCA is within the specified limits. This test will verify the requirements in clauses 11.6.1.0.1 and 11.6.1.0.2 for intra-frequency measurements under CCA.

11.6.1.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting standalone 2DL CA NR-U and [supporting intra-frequency measurements on shared channel access].

11.6.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.6.1.0.1 and 11.6.1.0.2 for absolute and relative accuracy, correspondingly.

The normative reference for this requirement is TS 38.133 [6] clause A.11.6.1.2.

11.6.1.2.4 Test description

Supported test configurations are shown in Table 11.6.1.2.4.1-1. Both absolute and relative accuracies of SS-RSRP intra-frequency measurements are tested by using the parameters in Table 11.6.1.2.5-1. In all test cases, Cell 1 is the PCell, Cell 2 is the SCell, and Cell 3 is the target cell.

11.6.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.6.1.2.4.1-1.

Table 11.6.1.2.4.1-1: Supported test configurations for NR SA FR1 intra-frequency measurement accuracy on SCC on a carrier frequency with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 11.6.1.2-1 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 11.6.1.2.4.1-2.

Table 11.6.1.2.4.1-2: Initial conditions for NR SA FR1 intra-frequency measurement accuracy on SCC on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.6.1.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | LTE link is not used in this test | |  |

1. The general test parameter settings are set up according to Table 11.6.1.2.5-1.

2. Message contents are defined in clause 11.6.1.2.4.3.

3. Cell 1 is the NR PCell, Cell 2 is the NR SCell, Cell 3 is the NR target cell, all of which have power levels set according to clauses C.1.2 and C.1.3 for this test.

11.6.1.2.4.2 Test procedure

Three cells are deployed in the test, which are FR1 PCell (Cell 1) on the carrier frequency with CCA, and two cells on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model: SCell (Cell 2) and a neighbour cell (Cell 3).

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5. Both Cell 1 (PCell) and Cell 2 (SCell) are configured on the UE.

2. Set the parameters according to Table 11.6.1.2.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message on Cell 1 configuring the UE to perform [intra-frequency measurements in SCC DBT windows] as specified in section 11.6.1.2.4.3.

4. The UE shall transmit an *RRCReconfiguration* message to acknowledge the configuration.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 5, the SS shall check the SS-RSRP reported values in the periodic *MeasurementReport*. The SS-RSRP value of Cell 3 reported by the UE is compared to the expected SS-RSRP. If the value is outside the limits in Table 11.6.1.2.5-2 or the UE fails to report the measurement value for Cell 3, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 11.6.1.2.5-1.

11.6.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.6.1.2.4.3-1: Common Exception messages for NR SA FR1 intra-frequency measurement accuracy on SCC on a carrier frequency with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-5  Table H.3.1-7  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 11.6.1.2.4.3-2: *ReportConfigNR* for NR SA FR1 intra-frequency measurement accuracy on SCC on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrq | false |  |  |
| sinr | false |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

11.6.1.2.5 Test requirements

Table 11.6.1.2.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency measurement accuracy on SCC on a carrier frequency with CCA. Table 11.6.1.2.5-2 and Table 11.6.1.2.5-3 define the absolute and relative accuracy requirements, correspondingly.

Table 11.6.1.2.5-1: Cell specific test parameters for NR SA FR1 intra-frequency measurement accuracy on SCC on a carrier frequency with CCA

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | | Test 3 | |
|  | | |  | Cell 2 | Cell 3 | Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| Cell ID | | |  | 489 | 0 | 489 | 0 | 489 | 0 |
| SSB ARFCN | | |  | freq1 | | freq1 | | freq1 | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | | | |
| BWchannel | | Config 1 | MHz | 40: NRB,c = 106 | | | | | |
| BWP BW | | Config 1 |  | 40: NRB,c = 106 | | | | | |
| DL CCA model | | |  | As specified in clause D.7.2.1 | | | | | |
| UL CCA model | | |  | As specified in clause D.7.2.2 | | | | | |
| PCCA\_DL for dynamic channel access Note 7,9 | | |  | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | | |
| PCCA\_DL for semi-static channel access Note 8,9 | | |  | PCCA\_DL=0.9375 | | | | | |
| PCCA\_UL | | |  | 1 | | | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | | | |
| Downlink dedicated BWP configuration | | |  | DLBWP.1.1 | | | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | | | |
| Uplink dedicated BWP configuration | | |  | ULBWP.1.1 | | | | | |
| TRS configuration | | Config 1 |  | TRS.1.2 TDD | NA | TRS.1.2 TDD | NA | TRS.1.2 TDD | NA |
| DRX Cycle | | | ms | Not Applicable | | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 CCA | - | SR.1.1 CCA | - | SR.1.1 CCA | - |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA | - | CR.1.1 CCA | - | CR.1.1 CCA | - |
| Control channel RMC | | Config 1 |  | CR.1.1 CCA | - | CR.1.1 CCA | - | CR.1.1 CCA | - |
| SSB configuration for semi-static channel access | | Config 1 |  | SSB.1 CCA | SSB.1 CCA | SSB.1 CCA | SSB.1 CCA | SSB.1 CCA | SSB.1 CCA |
| SSB configuration for dynamic channel access | | Config 1 |  | SSB.2 CCA | SSB.2 CCA | SSB.2 CCA | SSB.2 CCA | SSB.2 CCA | SSB.2 CCA |
| DBT window configuration | | Config 1,2,3 |  | DBT.1 | DBT.1 | DBT.1 | DBT.1 | DBT.1 | DBT.1 |
| Time offset with Cell 1 | | Config 1 | μs | - | 3 | - | 3 | - | 3 |
| SMTC configuration | | Config 1 |  | SMTC.1 | | | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |  |  |  |
| Note2 | Config 1 | NR\_CCA\_FR1\_I |  | Not applicableNote 5 | | -94+TT | | -110+TT | |
| NR\_CCA\_FR1\_J | -109.5+TT | |
| Note2 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | Not applicableNote 5 | | -91+TT | | -107.0+TT | |
| NR\_CCA\_FR1\_J | -106.5+TT | |
| Note6 | | | dB | 2.46+TT | -5.97+TT | 2.46+TT | -5.97+TT | -2.01+TT | -3.54+TT |
| Note6 | | | dB | 6+TT | 1+TT | 6+TT | 1+TT | 1+TT | 0+TT |
| SS-RSRPNote3 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | Not applicableNote 5 | Not applicableNote 5 | -85+TT | -90+TT | -106.00+TT | -107.00+TT |
| NR\_CCA\_FR1\_J | -105.50+TT | -106.50+TT |
| IoNote3 | Config 1 | NR\_CCA\_FR1\_I | dBm/  38.16MHz | Not applicableNote 5- | | -51.99+TT | | -70.82+TT | |
| NR\_CCA\_FR1\_J | -70.32+TT | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: Subtest 1 is not used when testing with 30kHz SSB SCS.  NOTE 6: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.  NOTE 7: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 8: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 9: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | | |

Table 11.6.1.2.5-2: Absolute accuracy requirements for the reported values for NR SA FR1 intra-frequency measurement accuracy on SCC on a carrier frequency with CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2  All bands | Test 3 | |
| Lowest SS-RSRP reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-RSRP reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in [clause 3A.4, Table 3A.4.1-2] | | | | |

Table 11.6.1.2.5-3: Relative accuracy requirements for the reported values for NR SA FR1 intra-frequency measurement accuracy on SCC on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
|  | Test 1 | Test 2 | Test 3 |
|  | All bands | All bands | All bands |
| Normal Conditions | | | |
| Lowest reported value (Cell 3) | RSRP\_x – FFS | RSRP\_x – FFS | RSRP\_x – FFS |
| Highest reported value (Cell 3) | RSRP\_x – FFS | RSRP\_x + FFS | RSRP\_x + FFS |
| Extreme Conditions | | | |
| Lowest reported value (Cell 3) | RSRP\_x – FFS | RSRP\_x – FFS | RSRP\_x – FFS |
| Highest reported value (Cell 3) | RSRP\_x – FFS | RSRP\_x + FFS | RSRP\_x + FFS |
| RSRP\_x is the reported value of Cell 2 | | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

### 11.6.2 SS-RSRQ

#### 11.6.2.0 Minimum Conformance Requirements

##### 11.6.2.0.1 Intra-frequency absolute SS-RSRQ measurement accuracy requirements under CCA

Same as in clause 10.5.2.0.1.

##### 11.6.2.0.2 Intra-frequency relative SS-RSRQ measurement accuracy requirements under CCA

Same as in clause 10.5.2.0.2.

##### 11.6.2.0.3 Inter-frequency absolute SS-RSRQ measurement accuracy requirements under CCA

Same as in clause 10.5.2.0.3.

##### 11.6.2.0.4 Inter-frequency relative SS-RSRQ measurement accuracy requirements under CCA

Same as in clause 10.5.2.0.4.

#### 11.6.2.1 NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

Editor’s note: This test case is incomplete in following aspects:

* MU and TT analysis is incomplete.
* Message contents may need to be updated.
* Call setup and test procedure may need to be updated.
* Applicability needs to be updated.
* Statistical analysis to determine test case verdict is FFS.
* Test requirements are FFS.
* Some parameters and/or references are still in brackets.

11.6.2.1.1 Test purpose

The purpose of this test is to verify that the SS-RSRQ measurement accuracy on the carrier frequency with CCA is within the specified limits.

11.6.2.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting standalone NR-U and [supporting intra-frequency measurements on shared channel access].

11.6.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.6.2.0.1 and 11.6.2.0.2 for absolute and relative accuracy under CCA, correspondingly.

The normative reference for this requirement is TS 38.133 [6] clause A.11.6.2.1.

11.6.2.1.4 Test description

Supported test configurations are shown in Table 11.6.2.1.4.1-1. Both absolute and relative accuracies of SS-RSRQ intra-frequency measurements are tested by using the parameters in Table 11.6.2.1.5-1. In all test cases, Cell 1 is the PCell with CCA and Cell 2 is the target cell with CCA.

11.6.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.6.2.1.4.1-1.

Table 11.6.2.1.4.1-1: Supported test configurations for NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 11.6.2.1-1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 11.6.2.1.4.1-2.

Table 11.6.2.1.4.1-2: Initial conditions for NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.6.2.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | LTE link is not used in this test | |  |

1. The general test parameter settings are set up according to Table 11.6.2.1.5-1.

2. Message contents are defined in clause 11.6.2.1.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test. All cells are on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model.

11.6.2.1.4.2 Test procedure

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1).

2. Set the parameters according to Table 11.6.2.1.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message on Cell 1 configuring the UE to perform [intra-frequency measurements in DBT windows] as specified in section 11.6.2.1.4.3.

4. The UE shall transmit an *RRCReconfiguration* message to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 11.6.2.1.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 3, the SS shall check the SS-RSRQ reported values in the periodic *MeasurementReport*. The SS-RSRQ value of Cell 2 reported by the UE is compared to the expected SS-RSRQ. If the value is outside the limits in Table 11.6.2.1.5-2 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 11.6.2.1.5-1.

11.6.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.6.2.1.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-5  Table H.3.1-7  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 11.6.2.1.4.3-2: *ReportConfigNR* for NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrp | false |  |  |
| sinr | false |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

11.6.2.1.5 Test requirements

Table 11.6.2.1.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA. Table 11.6.2.1.5-2 and Table 11.6.2.1.5-3 define the absolute and relative accuracy requirements, correspondingly.

Table 11.6.2.1.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | | Test 3 | |
|  | | |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN | | |  | freq1 | | freq1 | | freq1 | |
| DL CCA model | | Config 1 |  | As specified in clause D.7.2.1 | | | | | |
| UL CCA model | | Config 1 |  | As specified in clause D.7.2.2 | | | | | |
| UL CCA probability | | PCCA\_UL |  | 1.0 | - | 1.0 | - | 1.0 | - |
| DL CCA probability for semi-static channel access Note 7, 8 | | PCCA\_DL |  | 0.9375 | - | 0.9375 | - | 0.9375 | - |
| DL CCA probability for  dynamic channel access Note 8, 9 | | PCCA\_DL\_1 |  | 0.75 | - | 0.75 | - | 0.75 | - |
|  | | PCCA\_DL\_2 |  | 0.75 | - | 0.75 | - | 0.75 | - |
| Duplex mode | | Config 1 |  | TDD | | | | | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | | | |
| BWchannel | | Config 1 | MHz | 40: NRB,c = 106 | | | | | |
| Gap Pattern ID | |  |  | 0 | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR1.1 CCA |  | SR1.1 CCA |  | SR1.1 CCA |  |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA |  | CR.1.1 CCA |  | CR.1.1 CCA |  |
| Control Channel RMC | | Config 1 |  | CCR.1.1 CCA |  | CCR.1.1 CCA |  | CCR.1.1 CCA |  |
| TRS Configuration | | Config 1 |  | TRS.1.2 TDD |  | TRS.1.2 TDD |  | TRS.1.2 TDD |  |
| OCNG Patterns | | |  | OP. 1 | | | | | |
| SS-RSSI-Measurement | | |  | Not Applicable | | | | | |
| Time offset with Cell 1 | | Config 1 | μs | - | 3 | - | 3 | - | 3 |
| DBT Window configuration | | Config 1 |  | DBT.1 | | | | | |
| SSB configuration | | Config 1 |  | SSB.1 CCA for semi-static channel access  SSB.2 CCA for dynamic channel access | | | | | |
| SMTC configuration | | Config 1 |  | SMTC.1 | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |  |  |  |
| Note2 |  | NR\_CCA\_FR1\_I | dBm/15kHz | -91+TT | | - | | -110+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | |  | | -109.5+TT | |
| Note2 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | -88+TT | | - | | -107+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | |  | | -106.5+TT | |
|  | | | dB | -1.76+TT | | -4.7+TT | | -5.46+TT | -5.46+TT |
|  | | | dB | 3+TT | 3+TT | -2.9+TT | -2.9+TT | -4+TT | -4+TT |
| SS-RSRPNote3 | Config 1 | NR\_CCA\_FR1\_I |  | -85+TT | -85+TT | - | - | -111+TT | -111+TT |
|  |  | NR\_CCA\_FR1\_J |  |  |  |  |  | -110.5+TT | -110.5+TT |
| SS-RSRQ Note3 | | NR\_CCA\_FR1\_I | dB | -14.77+TT | -14.77+TT | -16.76+TT | -16.76+TT | -17.34+TT | -17.34+TT |
|  | | NR\_CCA\_FR1\_J |  |  |  |  |  |  |  |
| IoNote3 | Config 1 | NR\_CCA\_FR1\_I | dBm/  38.16MHz | -50 | | - | | -73.4 | |
|  |  | NR\_CCA\_FR1\_J |  |  | |  | | -72.9 | |
| 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: SS-RSRQ, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3.5.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configuration  Note 7: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 8: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 9: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | | |

Table 11.6.2.1.5-2: Absolute accuracy requirements for the reported values for NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2  All bands | Test 3 | |
| Lowest SS-RSRQ reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-RSRQ reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in [clause 3A.4, Table 3A.4.1-2] | | | | |

Table 11.6.2.1.5-3: Relative accuracy requirements for the reported values for NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
|  | Test 1 | Test 2 | Test 3 |
|  | All bands | All bands | All bands |
| Normal Conditions | | | |
| Lowest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x – FFS | RSRQ\_x – FFS |
| Highest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x + FFS | RSRQ\_x + FFS |
| Extreme Conditions | | | |
| Lowest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x – FFS | RSRQ\_x – FFS |
| Highest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x + FFS | RSRQ\_x + FFS |
| RSRQ\_x is the reported value of Cell 1 | | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 11.6.2.2 NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

Editor’s note: This test case is incomplete in following aspects:

* MU and TT analysis is incomplete.
* Message contents may need to be updated.
* Call setup and test procedure may need to be updated.
* Applicability needs to be updated.
* Statistical analysis to determine test case verdict is FFS.
* Test requirements are FFS.
* Some parameters and/or references are still in brackets.

11.6.2.2.1 Test purpose

The purpose of this test is to verify that the SS-RSRQ measurement accuracy on the carrier frequency with CCA is within the specified limits.

11.6.2.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting standalone NR-U and [supporting inter-frequency measurements on shared channel access].

11.6.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.6.2.0.3 and 11.6.2.0.4 for absolute and relative accuracy under CCA, correspondingly.

The normative reference for this requirement is TS 38.133 [6] clause A.11.6.2.2.

11.6.2.2.4 Test description

Supported test configurations are shown in Table 11.6.2.2.4.1-1. Both absolute and relative accuracies of SS-RSRQ inter-frequency measurements are tested by using the parameters in Table 11.6.2.2.5-1. In all test cases, Cell 1 is the PCell with CCA and Cell 2 is target cell with CCA. The inter-frequency measurements are supported by a measurement gap.

11.6.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.6.2.2.4.1-1.

Table 11.6.2.2.4.1-1: Supported test configurations for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 11.6.2.2-1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 11.6.2.2.4.1-2.

Table 11.6.2.2.4.1-2: Initial conditions for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.6.2.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | LTE link is not used in this test | |  |

1. The general test parameter settings are set up according to Table 11.6.2.2.5-1.

2. Message contents are defined in clause 11.6.2.2.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test. The two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies, with CCA and transmit SSBs in DBT windows according to DL CCA model.

11.6.2.2.4.2 Test procedure

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1.

2. Set the parameters according to Table 11.6.2.2.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message on Cell 1 configuring the UE to perform [inter-frequency measurements in DBT windows] as specified in section 11.6.2.2.4.3.

4. The UE shall transmit an *RRCReconfiguration* message to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 11.6.2.2.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 3, the SS shall check the SS-RSRQ reported values in the periodic *MeasurementReport*. The SS-RSRQ value of Cell 2 reported by the UE is compared to the expected SS-RSRQ. If the value is outside the limits in Table 11.6.2.2.5-2 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 11.6.2.2.5-1.

11.6.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.6.2.2.4.3-1: Common Exception messages for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-5  Table H.3.1-7  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 11.6.2.2.4.3-2: *ReportConfigNR* for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrp | false |  |  |
| sinr | false |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

11.6.2.2.5 Test requirements

Table 11.6.2.2.5-1 defines the primary level settings including test tolerances for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA. Table 11.6.2.2.5-2 and Table 11.6.2.2.5-3 define the absolute and relative accuracy requirements, correspondingly.

Table 11.6.2.2.5-1: Cell specific test parameters for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | | Test 3 | |
|  | | |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN | | |  | freq1 | freq2 | freq1 | freq2 | freq1 | freq2 |
| DL CCA model | | Config 1 |  | As specified in clause D.7.2.1 | | | | | |
| UL CCA model | | Config 1 |  | As specified in clause D.7.2.2 | | | | | |
| UL CCA probability | | PCCA\_UL |  | 1.0 | - | 1.0 | - | 1.0 | - |
| DL CCA probability for semi-static channel access Note 7, 8 | | PCCA\_DL |  | 0.9375 | - | 0.9375 | - | 0.9375 | - |
| DL CCA probability for  dynamic channel access Note 8, 9 | | PCCA\_DL\_1 |  | 0.75 | - | 0.75 | - | 0.75 | - |
|  | | PCCA\_DL\_2 |  | 0.75 | - | 0.75 | - | 0.75 | - |
| Duplex mode | | Config 1 |  | TDD | | | | | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | | | |
| BWchannel | | Config 1 | MHz | 40: NRB,c = 106 | | | | | |
| Gap pattern ID | | Config 1 |  | 0 | | | | | |
| BWP BW | | Config 1 |  | 40: NRB,c = 106 | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 CCA |  | SR.1.1 CCA |  | SR.1.1 CCA |  |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA |  | CR.1.1 CCA |  | CR.1.1 CCA |  |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.1.1 CCA |  | CCR.1.1 CCA |  | CCR.1.1 CCA |  |
| TRS Configuration | | Config 1 |  | TRS.1.2 TDD |  | TRS.1.2 TDD |  | TRS.1.2 TDD |  |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | | |
| Time offset with Cell 1 | | Config 1 | μs | - | 3 | - | 3 | - | 3 |
| DBT Window configuration | | Config 1 |  | DBT.1 | | | | | |
| SSB configuration | | Config 1 |  | SSB.1 CCA for semi-static channel access  SSB.2 CCA for dynamic channel access | | | | | |
| SMTC configuration | | Config 1 |  | SMTC.1 | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |  |  |  |
| Note2 |  | NR\_CCA\_FR1\_I | dBm/15kHz | -86.27+TT | | -113+TT | | -112+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | |  | | -111.5+TT | |
| Note2 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | -83.27+TT | | -110+TT | | -109+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | |  | | -108.5+TT | |
|  | | | dB | -1.75+TT | | -1.75+TT | | 3+TT | -1.75+TT |
|  | | | dB | -1.75+TT | | -1.75+TT | | 3+TT | -1.75+TT |
| SS-RSRPNote3 | Config 1 | NR\_CCA\_FR1\_I |  | -85.02+TT | -85.02+TT | -111.75+TT | -111.75+TT | -106+TT | -110.75+TT |
|  |  | NR\_CCA\_FR1\_J |  |  |  |  |  | -105.5+TT | -110-.25+TT |
| SS-RSRQNote3 | | NR\_CCA\_FR1\_I | dB | -14.77+TT | -14.77+TT | -40.59+TT | -40.59+TT | 12.56+TT | 14.76+TT |
|  | | NR\_CCA\_FR1\_J |  |  |  |  |  |  |  |
| IoNote3 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | -50 | | -76.73 | | -73.19 | -75.73 |
|  |  | NR\_CCA\_FR1\_J |  |  | |  | | -72.69 | -75.23 |
| 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: SS-RSRQ, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3.5.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configuration.  Note 7: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 8: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 9: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | | |

Table 11.6.2.2.5-2: Absolute accuracy requirements for the reported values for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2  All bands | Test 3 | |
| Lowest SS-RSRQ reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-RSRQ reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in [clause 3A.4, Table 3A.4.1-2] | | | | |

Table 11.6.2.2.5-3: Relative accuracy requirements for the reported values for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
|  | Test 1 | Test 2 | Test 3 |
|  | All bands | All bands | All bands |
| Normal Conditions | | | |
| Lowest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x – FFS | RSRQ\_x – FFS |
| Highest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x + FFS | RSRQ\_x + FFS |
| Extreme Conditions | | | |
| Lowest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x – FFS | RSRQ\_x – FFS |
| Highest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x + FFS | RSRQ\_x + FFS |
| RSRQ\_x is the reported value of Cell 1 | | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 11.6.2.3 NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on SCC on a carrier frequency with CCA

Editor's Note:

* MU and TT analysis is incomplete
* Message contents may need to be updated
* Call setup and test procedure may need to be updated
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements are FFS
* Some parameters and/or references are still in brackets

11.6.2.3.1 Test purpose

The purpose of this test is to verify that the SS-RSRQ measurement accuracy on the carrier frequency with CCA is within the specified limits.

11.6.2.3.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting standalone 2DL CA NR-U and [supporting intra-frequency measurements on shared channel access].

11.6.2.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.6.2.0.1 and 11.6.2.0.2 for absolute and relative accuracy under CCA, correspondingly.

The normative reference for this requirement is TS 38.133 [6] clause A.11.6.2.3.

11.6.2.3.4 Test description

Supported test configurations are shown in Table 11.6.2.3.4.1-1. Both absolute and relative accuracies of SS-RSRQ intra-frequency measurements are tested by using the parameters in Table 11.6.2.3.5-1. In all test cases, Cell 1 is the PCell with CCA, Cell 2 is the SCell with CCA, and Cell 3 is the target cell with CCA.

11.6.2.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.6.2.3.4.1-1.

Table 11.6.2.3.4.1-1: Supported test configurations for NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on SCC on a carrier frequency with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 11.6.2.3-1 | SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 11.6.2.3.4.1-2.

Table 11.6.2.3.4.1-2: Initial conditions for NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on SCC on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.6.2.3.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | LTE link is not used in this test | |  |

1. The general test parameter settings are set up according to Table 11.6.2.3.5-1.

2. Message contents are defined in clause 11.6.2.3.4.3.

3. Cell 1 is the PCell with CCA, Cell 2 is the SCell with CCA, and Cell 3 is the target cell with CCA, all of which have power levels set according to clauses C.1.2 and C.1.3 for this test. PCell (Cell 1) is on one carrier frequency with CCA, Cell 2 and Cell 3 are both on a different carrier frequency than Cell 1.

11.6.2.3.4.2 Test procedure

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5. Both Cell 1 (PCell) and Cell 2 (SCell) are configured on the UE. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1).

2. Set the parameters according to Table 11.6.2.3.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message on Cell 1 configuring the UE to perform [intra-frequency measurements in SCC DBT windows] as specified in section 11.6.2.3.4.3.

4. The UE shall transmit an *RRCReconfiguration* message to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 11.6.2.3.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 3, the SS shall check the SS-RSRQ reported values in the periodic *MeasurementReport*. The SS-RSRQ value of Cell 3 reported by the UE is compared to the expected SS-RSRQ. If the value is outside the limits in Table 11.6.2.3.5-2 or the UE fails to report the measurement value for Cell 3, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 11.6.2.3.5-1.

11.6.2.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.6.2.3.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on SCC on a carrier frequency with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-5  Table H.3.1-7  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 11.6.2.3.4.3-2: *ReportConfigNR* for NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on SCC on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrp | false |  |  |
| sinr | false |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

11.6.2.3.5 Test requirements

Table 11.6.2.3.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency measurement accuracy on SCC on a carrier frequency with CCA. Table 11.6.2.3.5-2 and Table 11.6.2.3.5-3 define the absolute and relative accuracy requirements, correspondingly.

Table 11.6.2.3.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on SCC on a carrier frequency with CCA

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | | Test 2 | | | Test 3 | |
|  | | |  | Cell 1 / Cell 2 | | Cell 3 | Cell 1 / Cell 2 | | Cell 3 | Cell 1 / Cell 2 | Cell 3 |
| SSB ARFCN | | |  | freq1 for Cell 1  freq2 for Cell 2 | | freq2 | freq1 for Cell 1  freq2 for Cell 2 | | freq2 | freq1 for Cell 1  freq2 for Cell 2 | freq2 |
| DL CCA model | | Config 1 |  | As specified in clause D.7.2.1 | | | | | | | |
| UL CCA model | | Config 1 |  | As specified in clause D.7.2.2 | | | | | | | |
| UL CCA probability | | PCCA\_UL |  | 1.0 | - | | 1.0 | - | | 1.0 | - |
| DL CCA probability for semi-static channel access Note 7, 8 | | PCCA\_DL |  | 0.9375 | - | | 0.9375 | - | | 0.9375 | - |
| DL CCA probability for  dynamic channel access Note 8, 9 | | PCCA\_DL\_1 |  | 0.75 | - | | 0.75 | - | | 0.75 | - |
|  | | PCCA\_DL\_2 |  | 0.75 | - | | 0.75 | - | | 0.75 | - |
| Duplex mode | | Config 1 |  | TDD | | | | | | | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | | | | | |
| BWchannel | | Config 1 | MHz | 40: NRB,c = 106 | | | | | | | |
| Gap Pattern ID | |  |  | 0 | | | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR1.1 CCA | |  | SR1.1 CCA | |  | SR1.1 CCA |  |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA | |  | CR.1.1 CCA | |  | CR.1.1 CCA |  |
| Control Channel RMC | | Config 1 |  | CCR.1.1 CCA | |  | CCR.1.1 CCA | |  | CCR.1.1 CCA |  |
| TRS Configuration | | Config 1 |  | TRS.1.2 TDD | |  | TRS.1.2 TDD | |  | TRS.1.2 TDD |  |
| OCNG Patterns | | |  | OP. 1 | | | | | | | |
| SS-RSSI-Measurement | | |  | Not Applicable | | | | | | | |
| Time offset with Cell 1 | | Config 1 | μs | 3 (for Cell 2) | 3 | | 3 (for Cell 2) | 3 | | 3 (for Cell 2) | 3 |
| DBT Window configuration | | Config 1 |  | DBT.1 | | | | | | | |
| SSB configuration | | Config 1 |  | SSB.1 CCA for semi-static channel access  SSB.2 CCA for dynamic channel access | | | | | | | |
| SMTC configuration | | Config 1 |  | SMTC.1 | | | | | | | |
| CSI-RS for tracking | | Config 1 |  | TRS.1.2 TDD | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | 0 | 0 | | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  | |  |  | |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  | |  |  | |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  | |  |  | |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  | |  |  | |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  | |  |  | |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  | |  |  | |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  | |  |  | |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  | |  |  | |  |  |  |
| Note2 |  | NR\_CCA\_FR1\_I | dBm/15kHz | -91+TT | | | - | | | -110+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | | |  | | | -109.5+TT | |
| Note2 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | -88+TT | | | - | | | -107+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | | |  | | | -106.5+TT | |
|  | | | dB | -1.76+TT | | | -4.7+TT | | | -5.46+TT | -5.46+TT |
|  | | | dB | 3+TT | | 3+TT | -2.9+TT | | -2.9+TT | -4+TT | -4+TT |
| SS-RSRPNote3 | Config 1 | NR\_CCA\_FR1\_I |  | -85+TT | | -85+TT | - | | - | -111+TT | -111+TT |
|  |  | NR\_CCA\_FR1\_J |  |  | |  |  | |  | -110.5 | -110.5+TT |
| SS-RSRQ Note3 | | NR\_CCA\_FR1\_I | dB | -14.77+TT | | -14.77+TT | -16.76+TT | | -16.76+TT | -17.34+TT+TT | -17.34+TT |
|  | | NR\_CCA\_FR1\_J |  |  | |  |  | |  |  |  |
| IoNote3 | Config 1 | NR\_CCA\_FR1\_I | dBm/  38.16MHz | -50 | | | - | | | -73.4 | |
|  |  | NR\_CCA\_FR1\_J |  |  | | |  | | | -72.9 | |
| 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: SS-RSRQ, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3.5.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configuration.  Note 7: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 8: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 9: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | | | | |

Table 11.6.2.3.5-2: Absolute accuracy requirements for the reported values for NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on SCC on a carrier frequency with CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2  All bands | Test 3 | |
| Lowest SS-RSRQ reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-RSRQ reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in [clause 3A.4, Table 3A.4.1-2] | | | | |

Table 11.6.2.3.5-3: Relative accuracy requirements for the reported values for NR SA FR1 intra-frequency SS-RSRQ measurement accuracy on SCC on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
|  | Test 1 | Test 2 | Test 3 |
|  | All bands | All bands | All bands |
| Normal Conditions | | | |
| Lowest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x – FFS | RSRQ\_x – FFS |
| Highest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x + FFS | RSRQ\_x + FFS |
| Extreme Conditions | | | |
| Lowest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x – FFS | RSRQ\_x – FFS |
| Highest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x + FFS | RSRQ\_x + FFS |
| RSRQ\_x is the reported value of Cell 2 | | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 11.6.2.4 NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA from carrier without CCA

Editor's Note:

* MU and TT analysis is incomplete
* Message contents may need to be updated
* Call setup and test procedure may need to be updated
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements are FFS
* Some parameters and/or references are still in brackets

11.6.2.4.1 Test purpose

The purpose of this test is to verify that the SS-RSRQ measurement accuracy on the carrier frequency with CCA is within the specified limits.

11.6.2.4.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting standalone NR-U and [supporting inter-frequency measurements on shared channel access].

11.6.2.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.6.2.0.3 and 11.6.2.0.4 for absolute and relative accuracy under CCA, correspondingly.

The normative reference for this requirement is TS 38.133 [6] clause A.11.6.2.4.

11.6.2.4.4 Test description

Supported test configurations are shown in Table 11.6.2.4.4.1-1. Both absolute and relative accuracies of SS-RSRQ inter-frequency measurements are tested by using the parameters in Table 11.6.2.4.5-1. In all test cases, Cell 1 is the PCell and Cell 2 is target cell with CCA.

11.6.2.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.6.2.4.4.1-1.

Table 11.6.2.4.4.1-1: Supported test configurations for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA from carrier without CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 11.6.2.4-1 | Without CCA: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 11.6.2.4-2 | Without CCA: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 11.6.2.4-3 | Without CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 11.6.2.4.4.1-2.

Table 11.6.2.4.4.1-2: Initial conditions for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA from carrier without CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.6.2.4.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | LTE link is not used in this test | |  |

1. The general test parameter settings are set up according to Table 11.6.2.4.5-1.

2. Message contents are defined in clause 11.6.2.4.4.3.

3. Cell 1 is the PCell and Cell 2 is target cell with CCA, all of which have power levels set according to clauses C.1.2 and C.1.3 for this test. The two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies, Cell 2 is with CCA and transmit SSBs in DBT windows according to DL CCA model.

11.6.2.4.4.2 Test procedure

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1).

2. Set the parameters according to Table 11.6.2.4.5-1 and Table 11.6.2.4.5-2 appropriate.

3. The SS shall transmit an *RRCReconfiguration* message on Cell 1 configuring the UE to perform [inter-frequency measurements in SCC DBT windows] as specified in section 11.6.2.4.4.3.

4. The UE shall transmit an *RRCReconfiguration* message to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 11.6.2.4.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 3, the SS shall check the SS-RSRQ reported values in the periodic *MeasurementReport*. The SS-RSRQ value of Cell 2 reported by the UE is compared to the expected SS-RSRQ. If the value is outside the limits in Table 11.6.2.4.5-3 or the UE fails to report the measurement value for Cell 3, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 11.6.2.4.5-1.

11.6.2.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.6.2.4.4.3-1: Common Exception messages for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA from carrier without CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-5  Table H.3.1-7  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 11.6.2.4.4.3-2: *ReportConfigNR* for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA from carrier without CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrp | false |  |  |
| sinr | false |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

11.6.2.4.5 Test requirements

Table 11.6.2.4.5-1 defines the primary level settings including test tolerances for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA. Table 11.6.2.4.5-3 and Table 11.6.2.4.5-4 define the absolute and relative accuracy requirements, correspondingly.

Table 11.6.2.4.5-1: Cell specific test parameters for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA from carrier without CCA for target cell

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | **Test 2** | **Test 3** |
|  | | |  | **Cell 2** | **Cell 2** | **Cell 2** |
| SSB ARFCN | | |  | freq2 | freq2 | freq2 |
| DL CCA model | | Config 1, 2, 3 |  | As specified in clause D.7.2.1 | | |
| UL CCA model | | Config 1, 2, 3 |  | As specified in clause D.7.2.2 | | |
| UL CCA probability | | PCCA\_UL |  | 1.0 | | |
| DL CCA probability for semi-static channel access Note 7, 8 | | PCCA\_DL |  | 0.9375 | | |
| DL CCA probability for  dynamic channel access Note 8, 9 | | PCCA\_DL\_1 |  | 0.75 | | |
|  | | PCCA\_DL\_2 |  | 0.75 | | |
| Duplex mode | | Config 1, 2, 3 |  | TDD | | |
| TDD configuration | | Config 1, 2, 3 |  | TDDConf.1.1 CCA | | |
| BWchannel | | Config 1, 2, 3 | MHz | 40: NRB,c = 106 | | |
| Gap pattern ID | | Config 1, 2, 3 |  | 0 | | |
| BWP BW | | Config 1, 2, 3 |  | 40: NRB,c = 106 | | |
| DRX Cycle | | | ms | Not Applicable | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | |
| Time offset with Cell 1 | | Config 1, 2, 3 | μs | 3 | | |
| DBT Window configuration | | Config 1, 2, 3 |  | DBT.1 | | |
| SSB configuration | | Config 1, 2, 3 |  | SSB.1 CCA for semi-static channel access  SSB.2 CCA for dynamic channel access | | |
| SMTC configuration | | Config 1, 2, 3 |  | SMTC.1 | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2, 3 | kHz | 30 kHz | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |
| Note2 |  | NR\_CCA\_FR1\_I | dBm/15kHz | -86.27+TT | -113+TT | -112 |
|  |  | NR\_CCA\_FR1\_J |  |  |  | -111.5 |
| Note2 | Config 1, 2, 3 | NR\_CCA\_FR1\_I | dBm/SCS | -83.27+TT | -110+TT | -109 |
|  |  | NR\_CCA\_FR1\_J |  |  |  | -108.5 |
|  | | | dB | -1.75+TT | -1.75+TT | -1.75+TT |
|  | | | dB | -1.75+TT |  | -1.75+TT |
| SS-RSRPNote3 | Config 1, 2, 3 | NR\_CCA\_FR1\_I |  | -85.02+TT | -111.75+TT | -110.75+TT |
|  |  | NR\_CCA\_FR1\_J |  |  |  | -110-.25+TT |
| SS-RSRQNote3 | | NR\_CCA\_FR1\_I | dB | -14.77+TT | -40.59+TT | 14.76+TT |
|  | | NR\_CCA\_FR1\_J |  |  |  |  |
| IoNote3 | Config 1, 2, 3 | NR\_CCA\_FR1\_I | dBm/SCS | -50 | -76.73 | -75.73 |
|  |  | NR\_CCA\_FR1\_J |  |  |  | -75.23 |
| 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: SS-RSRQ, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3.5.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configuration.  Note 7: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 8: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 9: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | |

Table 11.6.2.4.5-2: Cell specific test parameters for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA from carrier without CCA for NR PCell

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | **Test 2** | **Test 3** |
|  | | |  | **Cell 1** | **Cell 1** | **Cell 1** |
| SSB ARFCN | | |  |  | freq1 |  |
| Duplex mode | | Config 1 |  |  | FDD |  |
|  | | Config 2,3 |  |  | TDD |  |
| TDD configuration | | Config 1 |  |  | Not Applicable |  |
|  | | Config 2 |  |  | TDDConf.1.1 |  |
|  | | Config 3 |  |  | TDDConf.2.1 |  |
| BWchannel | | Config 1 | MHz |  | 10: NRB,c = 52 |  |
|  | | Config 2 |  |  | 10: NRB,c = 52 |  |
|  | | Config 3 |  |  | 40: NRB,c = 106 |  |
| Gap Pattern ID | |  |  |  | 0 |  |
| BWP configuration | | Initial DL BWP |  |  | DLBWP.0.1 |  |
|  | | Dedicated DL BWP |  |  | DLBWP.1.1 |  |
|  | | Initial UL BWP |  |  | ULBWP.0.1 |  |
|  | | Dedicated UL BWP |  |  | ULBWP.1.1 |  |
| DRX Cycle | | | ms |  | Not Applicable |  |
| PDSCH Reference measurement channel | | Config 1 |  |  | SR.1.1 FDD |  |
|  | | Config 2 |  |  | SR.1.1 TDD |  |
|  | | Config 3 |  |  | SR2.1 TDD |  |
| RMSI CORESET Reference Channel | | Config 1 |  |  | CR.1.1 FDD |  |
|  | | Config 2 |  |  | CR.1.1 TDD |  |
|  | | Config 3 |  |  | CR.2.1 TDD |  |
| Control Channel RMC | | Config 1 |  |  | CCR.1.1 FDD |  |
|  | | Config 2 |  |  | CCR.1.1 TDD |  |
|  | | Config 3 |  |  | CCR.2.1 TDD |  |
| TRS Configuration | | Config 1 |  |  | TRS.1.1 FDD |  |
|  | | Config 2 |  |  | TRS.1.1 TDD |  |
|  | | Config 3 |  |  | TRS.1.2 TDD |  |
| OCNG Patterns | | |  |  | OP. 1 |  |
| SS-RSSI-Measurement | | |  |  | Not Applicable |  |
| SMTC configuration | | Config 1 |  |  | SMTC.2 |  |
|  | | Config 2,3 |  |  | SMTC.1 |  |
| SSB configuration | | Config 1,2 |  |  | SSB.1 FR1 |  |
|  | | Config 3 |  |  | SSB.2 FR1 |  |
| CSI-RS for tracking | | Config 1 |  |  | TRS.1.1 FDD |  |
| Config 2 |  | TRS.1.1 TDD |  |
| Config 3 |  | TRS.1.2 TDD |  |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz |  | 15 kHz |  |
|  | | Config 3 |  |  | 30 kHz |  |
| EPRE ratio of PSS to SSS | | | dB |  | 0 |  |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |
| Noc Note2 | Config 1,2 | Depending on  band group NOTE 6 | dBm/15kHz | -85+TT | -101 +TT | -114 + ΔBG\_offset +TT |
|  | Config 3 | Depending on  band group NOTE 6 |  | -91 +TT | - | -114 + ΔBG\_offset +TT |
| Noc Note2 | Config 1,2 | Depending on  band group NOTE 6 | dBm/SCS | -85 +TT | -101 +TT | -114+ ΔBG\_offset +TT |
|  | Config 3 | Depending on  band group NOTE 6 |  | -88 +TT | - | -111+ ΔBG\_offset +TT |
|  | | | dB | -1.76 +TT | -4.7 +TT | -5.46 |
|  | | | dB | 3 +TT | -2.9 +TT | -4 |
| SS-RSRPNote3 | Config 1,2 | Depending on  band group NOTE 6 | dBm/SCS | -82 +TT | -103.9 +TT | -118 + ΔBG\_offset +TT |
|  | Config 3 | Depending on  band group NOTE 6 |  | -85 +TT | - | -115 + ΔBG\_offset +TT |
| SS-RSRQ Note3 | | Depending on  band group NOTE 6 | dB | -14.77 +TT | -16.76 +TT | -17.34 + ΔBG\_offset +TT |
| IoNote3 | Config 1,2 | Depending on  band group NOTE 6 | dBm/  9.36MHz | -50 | -70 | -83.5 + ΔBG\_offset +TT |
|  | Config 3 | Depending on  band group NOTE 6 | dBm/  38.16MHz | -50 | - | -77.4 + ΔBG\_offset +TT |
| 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: SS-RSRQ, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3.5.2.  Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.  Note 7: ΔBG\_offset is defined in clause 3A.4, Table 3A.4.1-2 | | | | | | |

Table 11.6.2.4.5-3: Absolute accuracy requirements for the reported values for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA from carrier without CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2  All bands | Test 3 | |
| Lowest SS-RSRQ reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-RSRQ reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in [clause 3A.4, Table 3A.4.1-2] | | | | |

Table 11.6.2.4.5-4: Relative accuracy requirements for the reported values for NR SA FR1 inter-frequency SS-RSRQ measurement accuracy on a carrier frequency with CCA from carrier without CCA

|  |  |  |  |
| --- | --- | --- | --- |
|  | Test 1 | Test 2 | Test 3 |
|  | All bands | All bands | All bands |
| Normal Conditions | | | |
| Lowest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x – FFS | RSRQ\_x – FFS |
| Highest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x + FFS | RSRQ\_x + FFS |
| Extreme Conditions | | | |
| Lowest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x – FFS | RSRQ\_x – FFS |
| Highest reported value (Cell 3) | RSRQ\_x – FFS | RSRQ\_x + FFS | RSRQ\_x + FFS |
| RSRQ\_x is the reported value of Cell 2 | | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

### 11.6.3 SS-SINR

#### 11.6.3.0 Minimum Conformance Requirements

##### 11.6.3.0.1 Intra-frequency absolute SS-SINR measurement accuracy requirements under CCA

Same as in clause 10.5.3.0.1.

##### 11.6.3.0.2 Void

##### 11.6.3.0.3 Inter-frequency absolute SS-SINR measurement accuracy requirements under CCA

Same as in clause 10.5.3.0.3.

##### 11.6.3.0.4 Inter-frequency relative SS-SINR measurement accuracy requirements under CCA

Same as in clause 10.5.230.4.

#### 11.6.3.1 NR SA FR1 Intra-frequency SS-SINR measurement accuracy on a carrier frequency with CCA

Editor’s note: This test case is incomplete in following aspects:

* MU and TT analysis is incomplete.
* Message contents may need to be updated.
* Call setup and test procedure may need to be updated.
* Applicability needs to be updated.
* Statistical analysis to determine test case verdict is FFS.
* Test requirements are FFS.
* Some parameters and/or references are still in brackets.

11.6.3.1.1 Test purpose

The purpose of this test is to verify that the SS-SINR measurement accuracy on the carrier frequency with CCA is within the specified limits.

11.6.3.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting standalone NR-U and [supporting intra-frequency measurements on shared channel access].

11.6.3.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 11.6.3.0.1 for absolute accuracy under CCA.

The normative reference for this requirement is TS 38.133 [6] clause A.11.6.3.1.

11.6.3.1.4 Test description

Supported test configurations are shown in Table 11.6.3.1.4.1-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table 11.6.3.1.5-1. In all test cases, Cell 1 is the PCell with CCA and Cell 2 is the target cell with CCA.

11.6.3.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.6.3.1.4.1-1.

Table 11.6.3.1.4.1-1: Supported test configurations for NR SA FR1 intra-frequency SS-SINR measurement accuracy on a carrier frequency with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 11.6.3.1-1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 11.6.3.1.4.1-2.

Table 11.6.3.1.4.1-2: Initial conditions for NR SA FR1 intra-frequency SS-SINR measurement accuracy on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.6.3.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | LTE link is not used in this test | |  |

1. The general test parameter settings are set up according to Table 11.6.3.1.5-1.

2. Message contents are defined in clause 11.6.3.1.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test. All cells are on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model.

11.6.3.1.4.2 Test procedure

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1).

2. Set the parameters according to Table 11.6.3.1.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message on Cell 1 configuring the UE to perform [intra-frequency measurements in DBT windows] as specified in section 11.6.3.1.4.3.

4. The UE shall transmit an *RRCReconfiguration* message to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 11.6.3.1.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 3, the SS shall check the SS-SINR reported values in the periodic *MeasurementReport*. The SS-SINR value of Cell 2 reported by the UE is compared to the expected SS-SINR. If the value is outside the limits in Table 11.6.3.1.5-2 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 11.6.3.1.5-1.

11.6.3.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.6.3.1.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-SINR measurement accuracy on a carrier frequency with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-5  Table H.3.1-7  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 11.6.3.1.4.3-2: *ReportConfigNR* for NR SA FR1 intra-frequency SS-SINR measurement accuracy on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrq | false |  |  |
| sinr | true |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

11.6.3.1.5 Test requirements

Table 11.6.3.1.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency SS-SINR measurement accuracy on a carrier frequency with CCA. Table 11.6.3.1.5-2 defines the absolute accuracy requirements.

Table 11.6.3.1.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-SINR measurement accuracy on a carrier frequency with CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | |
|  | | |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN | | |  | freq1 | | freq1 | |
| DL CCA model | | Config 1 |  | As specified in clause D.7.2.1 | | | |
| UL CCA model | | Config 1 |  | As specified in clause D.7.2.2 | | | |
| UL CCA probability | | PCCA\_UL |  | 1.0 | - | 1.0 | - |
| DL CCA probability for semi-static channel access Note 7, 8 | | PCCA\_DL |  | 0.9375 | - | 0.9375 | - |
| DL CCA probability for  dynamic channel access Note 8, 9 | | PCCA\_DL\_1 |  | 0.75 | - | 0.75 | - |
|  | | PCCA\_DL\_2 |  | 0.75 | - | 0.75 | - |
| Duplex mode | | Config 1 |  | TDD | | | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | |
| Downlink dedicated BWP configuration | | |  | DLBWP.1.1 | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | |
| Uplink dedicated BWP configuration | | |  | ULBWP.1.1 | | | |
| DRX Cycle configuration | | | ms | Not Applicable | | | |
| TRS configuration | | Config 1 |  | TRS.1.2 TDD |  | TRS.1.2 TDD |  |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 CCA |  | SR.1.1 CCA |  |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA |  | CR.1.1 CCA |  |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.1.1 CCA |  | CCR.1.1 CCA |  |
| OCNG Patterns | | |  | OP.1 | | | |
| SS-RSSI-Measurement | | |  | Not Applicable | | | |
| DBT Window configuration | | Config 1 |  | DBT.1 | | | |
| Time offset with Cell 1 | | Config 1 | s | - | 3 | - | 3 |
| SSB configuration | | Config 1 |  | SSB.1 CCA for semi-static channel access  SSB.2 CCA for dynamic channel access | | | |
| SMTC configuration | | Config 1 |  | SMTC.1 | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |  |
| Note2 | | NR\_CCA\_FR1\_I | dBm/15kHz | -93+TT | | -112+TT | |
|  | | NR\_CCA\_FR1\_J |  |  | | -111.5+TT | |
| Note2 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | -90+TT | | -109+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | | -108.5+TT | |
|  | | | dB | 0 | -3.19 | -5.46 | -5.46 |
|  | | | dB | 4.54 | 2.66 | -4 | -4 |
| SS-RSRPNote3 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | -85.46+TT | -87.34+TT | -113+TT | -113+TT |
|  |  | NR\_CCA\_FR1\_J |  |  |  | -112.5+TT | -112.5+TT |
| SS-SINR Note3 | | NR\_CCA\_FR1\_I | dB | 0 | -3.19 | -5.46 | -5.46 |
|  | | NR\_CCA\_FR1\_J |  |  |  |  |  |
| IoNote3 | Config 1 | NR\_CCA\_FR1\_I | dBm/  38.16MHz | -51.41 | | -75.41 | |
|  |  | NR\_CCA\_FR1\_J |  |  | | -74.91 | |
| 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: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3.5.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configuration.  Note 7: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 8: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 9: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | |

Table 11.6.3.1.5-2: Absolute accuracy requirements for the reported values for NR SA FR1 intra-frequency SS-SINR measurement accuracy on a carrier frequency with CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2  All bands | Test 3 | |
| Lowest SS-SINR reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-SINR reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in [clause 3A.4, Table 3A.4.1-2] | | | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 11.6.3.2 NR SA FR1 Inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA

Editor’s note: This test case is incomplete in following aspects:

* MU and TT analysis is incomplete.
* Message contents may need to be updated.
* Call setup and test procedure may need to be updated.
* Applicability needs to be updated.
* Statistical analysis to determine test case verdict is FFS.
* Test requirements are FFS.
* Some parameters and/or references are still in brackets.

11.6.3.2.1 Test purpose

The purpose of this test is to verify that the SS-SINR measurement accuracy on a carrier frequency with CCA from carrier without CCA is within the specified limits.

11.6.3.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting standalone NR-U and [supporting Inter-frequency measurements on shared channel access].

11.6.3.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 11.6.3.0.3 and 11.6.3.0.4 for absolute and relative accuracy under CCA, correspondingly.

The normative reference for this requirement is TS 38.133 [6] clause A.11.6.3.2.

11.6.3.2.4 Test description

Supported test configurations are shown in Table 11.6.3.2.4.1-1. The absolute accuracy of SS-SINR Inter-frequency measurement is tested by using the parameters in Table 11.6.3.2.5-1. In all test cases, Cell 1 is the PCell with CCA and Cell 2 is the target cell with CCA.

11.6.3.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.6.3.2.4.1-1.

Table 11.6.3.2.4.1-1: Supported test configurations for NR SA FR1 inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 11.6.3.2-1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 11.6.3.2.4.1-2.

Table 11.6.3.2.4.1-2: Initial conditions for NR SA FR1 inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.6.3.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | LTE link is not used in this test | |  |

1. The general test parameter settings are set up according to Table 11.6.3.2.5-1.

2. Message contents are defined in clause 11.6.3.2.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. Cell 2 is the NR neighbour cell also with the power level set according to clauses C.1.2 and C.1.3 for this test. All cells are on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model.

11.6.3.2.4.2 Test procedure

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1).

2. Set the parameters according to Table 11.6.3.2.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message on Cell 1 configuring the UE to perform [Inter-frequency measurements in DBT windows] as specified in section 11.6.3.2.4.3.

4. The UE shall transmit an *RRCReconfiguration* message to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 11.6.3.2.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 3, the SS shall check the SS-SINR reported values in the periodic *MeasurementReport*. The SS-SINR value of Cell 2 reported by the UE is compared to the expected SS-SINR. If the value is outside the limits in Table 11.6.3.2.5-2 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 11.6.3.2.5-1.

11.6.3.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.6.3.2.4.3-1: Common Exception messages for NR SA FR1 inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with condition INTER-FREQ and GAP NEEDED  Table H.3.1-3 with Condition INTER-FREQ MO  Table H.3.1-5  Table H.3.1-7 with condition INTER-FREQ  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 11.6.3.2.4.3-2: *ReportConfigNR* for NR SA FR1 inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrq | false |  |  |
| sinr | true |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

11.6.3.2.5 Test requirements

Table 11.6.3.2.5-1 defines the primary level settings including test tolerances for NR SA FR1 Inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA. Table 11.6.3.2.5-2 defines the absolute accuracy requirements.

Table 11.6.3.2.5-1: Cell specific test parameters for NR SA FR1 inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | | | Test 3 | |
|  | | |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 | | Cell 1 | Cell 2 |
| SSB ARFCN | | |  | freq1 | freq2 | freq1 | freq2 | | freq1 | freq2 |
| DL CCA model | | Config 1 |  | As specified in clause D.7.2.1 | | | | | | |
| UL CCA model | | Config 1 |  | As specified in clause D.7.2.2 | | | | | | |
| UL CCA probability | | PCCA\_UL |  | 1.0 | - | 1.0 | - | 1.0 | | - |
| DL CCA probability for semi-static channel access Note 7, 8 | | PCCA\_DL |  | 0.9375 | - | 0.9375 | - | 0.9375 | | - |
| DL CCA probability for  dynamic channel access Note 8, 9 | | PCCA\_DL\_1 |  | 0.75 | - | 0.75 | - | 0.75 | | - |
|  | | PCCA\_DL\_2 |  | 0.75 | - | 0.75 | - | 0.75 | | - |
| Duplex mode | | Config 1 |  | TDD | | | | | | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | | | | |
| Downlink dedicated BWP configuration | | |  | DLBWP.1.1 | | | | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | | | | |
| Uplink dedicated BWP configuration | | |  | ULBWP.1.1 | | | | | | |
| DRX Cycle configuration | | | ms | Not Applicable | | | | | | |
| Gap pattern ID | | |  | 0 | - | 0 | - | | 0 | - |
| TRS configuration | | Config 1 |  | TRS.1.2 TDD |  | TRS.1.2 TDD |  | | TRS.1.2 TDD |  |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 CCA |  | SR.1.1 CCA |  | | SR.1.1 CCA |  |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA |  | CR.1.1 CCA |  | | CR.1.1 CCA |  |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.1.1 CCA |  | CCR.1.1 CCA |  | | CCR.1.1 CCA |  |
| OCNG Patterns | | |  | OP.1 | | | | | | |
| SS-RSSI-Measurement | | |  | Not Applicable | | | | | | |
| Time offset with Cell 1 | | Config 1 | μs | - | 3 | - | 3 | | - | 3 |
| DBT Window configuration | | Config 1 |  | DBT.1 | | | | | | |
| SSB configuration | | Config 1 |  | SSB.1 CCA for semi-static channel access  SSB.2 CCA for dynamic channel access | | | | | | |
| SMTC configuration | | Config 1 |  | SMTC.1 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 | | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 | | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |  | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |  | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |  | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |  | |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |  | |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |  | |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |  | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |  | |  |  |
| Note2 |  | NR\_CCA\_FR1\_I | dBm/15kHz | -88+TT | | -108.5+TT | | | -115.5+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | |  | | | -115+TT | |
| Note2 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | -85+TT | | -105.5+TT | | | -112.5+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | |  | | | -112+TT | |
|  | | | dB | -1.75 | -1.75 | 20 | 20 | | -4.0 | -4.0 |
|  | | | dB | -1.75 | | 20 | | | -4.0 | |
| SS-RSRP Note3 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | -86.75+TT | | -85.5+TT | | | -116.5+TT | |
|  |  | NR\_CCA\_FR1\_J |  |  | |  | | | -116+TT | |
| SS-SINRNote3 | | NR\_CCA\_FR1\_I | dB | -1.75+TT | | 20+TT | | | -4.0+TT | |
|  | | NR\_CCA\_FR1\_J |  |  | |  | | |  | |
| IoNote3 | Config 1 | NR\_CCA\_FR1\_I | dBm/  38.16MHz | -51.73 | | -54.41 | | | -80 | |
|  |  | NR\_CCA\_FR1\_J |  |  | |  | | | -79.5 | |
| 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: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3.5.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configuration.  Note 7: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 8: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 9: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | | | |

Table 11.6.3.2.5-2: Absolute accuracy requirements for the reported values for NR SA FR1 inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2  All bands | Test 3 | |
| Lowest SS-SINR reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-SINR reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in [clause 3A.4, Table 3A.4.1-2] | | | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 11.6.3.3 NR SA FR1 Intra-frequency SS-SINR measurement accuracy on SCC on a carrier frequency with CCA

Editor's Note:

* MU and TT analysis is incomplete
* Message contents may need to be updated
* Call setup and test procedure may need to be updated
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements are FFS
* Some parameters and/or references are still in brackets

11.6.3.3.1 Test purpose

The purpose of this test is to verify that the SS-SINR measurement accuracy on the carrier frequency with CCA is within the specified limits.

11.6.3.3.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting standalone 2DL CA NR-U and [supporting intra-frequency measurements on shared channel access].

11.6.3.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 11.6.3.0.1 for absolute accuracy under CCA.

The normative reference for this requirement is TS 38.133 [6] clause A.11.6.3.3.

11.6.3.3.4 Test description

Supported test configurations are shown in Table 11.6.3.3.4.1-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table 11.6.3.3.5-1. In all test cases, Cell 1 is the PCell with CCA, Cell 2 is the Scell with CCA, and Cell 3 is the target cell with CCA.

11.6.3.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.6.3.3.4.1-1.

Table 11.6.3.3.4.1-1: Supported test configurations for NR SA FR1 intra-frequency SS-SINR measurement accuracy on SCC on a carrier frequency with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 11.6.3.3-1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 11.6.3.3.4.1-2.

Table 11.6.3.3.4.1-2: Initial conditions for NR SA FR1 intra-frequency SS-SINR measurement accuracy on SCC on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.6.3.3.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | LTE link is not used in this test | |  |

1. The general test parameter settings are set up according to Table 11.6.3.3.5-1.

2. Message contents are defined in clause 11.6.3.3.4.3.

3. Cell 1 is the PCell with CCA, Cell 2 is the SCell with CCA, and Cell 3 is the target cell with CCA, all of which have power levels set according to clauses C.1.2 and C.1.3 for this test. PCell (Cell 1) is on one carrier frequency with CCA, Cell 2 and Cell 3 are both on a different carrier frequency than Cell 1.

11.6.3.3.4.2 Test procedure

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5. Both Cell 1 (PCell) and Cell 2 (SCell) are configured on the UE. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1).

2. Set the parameters according to Table 11.6.3.3.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message on Cell 1 configuring the UE to perform [intra-frequency measurements in SCC DBT windows] as specified in section 11.6.3.3.4.3.

4. The UE shall transmit an *RRCReconfiguration* message to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 11.6.3.3.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 3, the SS shall check the SS-SINR reported values in the periodic *MeasurementReport*. The SS-SINR value of Cell 3 reported by the UE is compared to the expected SS-SINR. If the value is outside the limits in Table 11.6.3.3.5-2 or the UE fails to report the measurement value for Cell 3, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 11.6.3.3.5-1.

11.6.3.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.6.3.3.4.3-1: Common Exception messages for NR SA FR1 intra-frequency SS-SINR measurement accuracy on SCC on a carrier frequency with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-5  Table H.3.1-7  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 11.6.3.3.4.3-2: *ReportConfigNR* for NR SA FR1 intra-frequency SS-SINR measurement accuracy on SCC on a carrier frequency with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrq | false |  |  |
| sinr | true |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

11.6.3.3.5 Test requirements

Table 11.6.3.3.5-1 defines the primary level settings including test tolerances for NR SA FR1 intra-frequency measurement accuracy on SCC on a carrier frequency with CCA. Table 11.6.3.3.5-2 defines the absolute accuracy requirements, correspondingly.

Table 11.6.3.3.5-1: Cell specific test parameters for NR SA FR1 intra-frequency SS-SINR measurement accuracy on SCC on a carrier frequency with CCA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | | |
|  | | |  | Cell 1 / Cell 2 | Cell 3 | Cell 1 / Cell 2 | | Cell 3 |
| SSB ARFCN | | |  | freq1 for Cell 1  freq2 for Cell 2 | freq2 | freq1 for Cell 1  freq2 for Cell 2 | | freq2 |
| DL CCA model | | Config 1 |  | As specified in clause D.7.2.1 | | | | |
| UL CCA model | | Config 1 |  | As specified in clause D.7.2.2 | | | | |
| UL CCA probability | | PCCA\_UL |  | 1.0 | - | 1.0 | - | |
| DL CCA probability for semi-static channel access Note 7, 8 | | PCCA\_DL |  | 0.9375 | - | 0.9375 | - | |
| DL CCA probability for  dynamic channel access Note 8, 9 | | PCCA\_DL\_1 |  | 0.75 | - | 0.75 | - | |
|  | | PCCA\_DL\_2 |  | 0.75 | - | 0.75 | - | |
| Duplex mode | | Config 1 |  | TDD | | | | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | | |
| Downlink dedicated BWP configuration | | |  | DLBWP.1.1 | | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | | |
| Uplink dedicated BWP configuration | | |  | ULBWP.1.1 | | | | |
| DRX Cycle configuration | | | ms | Not Applicable | | | | |
| TRS configuration | | Config 1 |  | TRS.1.2 TDD |  | TRS.1.2 TDD | |  |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 CCA |  | SR.1.1 CCA | |  |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA |  | CR.1.1 CCA | |  |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.1.1 CCA |  | CCR.1.1 CCA | |  |
| OCNG Patterns | | |  | OP.1 | | | | |
| SS-RSSI-Measurement | | |  | Not Applicable | | | | |
| DBT Window configuration | | Config 1 |  | DBT.1 | | | | |
| Time offset with Cell 1 | | Config 1 | s | 3 (for Cell 2) | 3 | 3 (for Cell 2) | | 3 |
| SSB configuration | | Config 1 |  | SSB.1 CCA for semi-static channel access  SSB.2 CCA for dynamic channel access | | | | |
| SMTC configuration | | Config 1 |  | SMTC.1 | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  | |  |
| Note2 | | NR\_CCA\_FR1\_I | dBm/15kHz | -93+TT | | -112+TT | | |
|  | | NR\_CCA\_FR1\_J |  |  | | -111.5+TT | | |
| Note2 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | -90+TT | | -109+TT | | |
|  |  | NR\_CCA\_FR1\_J |  |  | | -108.5+TT | | |
|  | | | dB | 0 | -3.19 | -5.46 | | -5.46 |
|  | | | dB | 4.54 | 2.66 | -4 | | -4 |
| SS-RSRPNote3 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | -85.46+TT | -87.34+TT | -113+TT | | -113+TT |
|  |  | NR\_CCA\_FR1\_J |  |  |  | -112.5+TT | | -112.5+TT |
| SS-SINR Note3 | | NR\_CCA\_FR1\_I | dB | 0 | -3.19 | -5.46 | | -5.46 |
|  | | NR\_CCA\_FR1\_J |  |  |  |  | |  |
| IoNote3 | Config 1 | NR\_CCA\_FR1\_I | dBm/  38.16MHz | -51.41 | | -75.41 | | |
|  |  | NR\_CCA\_FR1\_J |  |  | | -74.91 | | |
| 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: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3.5.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configuration.  Note 7: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 8: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 9: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | |

Table 11.6.3.3.5-2: Absolute accuracy requirements for the reported values for NR SA FR1 intra-frequency SS-SINR measurement accuracy on SCC on a carrier frequency with CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2  All bands | Test 3 | |
| Lowest SS-SINR reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-SINR reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in [clause 3A.4, Table 3A.4.1-2] | | | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 11.6.3.4 NR SA FR1 Inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA from carrier without CCA

Editor's Note:

* MU and TT analysis is incomplete
* Message contents may need to be updated
* Call setup and test procedure may need to be updated
* Applicability needs to be updated
* Statistical analysis to determine test case verdict is FFS
* Test requirements are FFS
* Some parameters and/or references are still in brackets

11.6.3.4.1 Test purpose

The purpose of this test is to verify that the SS-SINR measurement accuracy on a carrier frequency with CCA from carrier without CCA is within the specified limits.

11.6.3.4.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting standalone NR-U and [supporting inter-frequency measurements on shared channel access].

11.6.3.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 11.6.3.0.3 and 11.6.3.0.4 for absolute and relative accuracy under CCA, correspondingly.

The normative reference for this requirement is TS 38.133 [6] clause A.11.6.3.4.

11.6.3.4.4 Test description

Supported test configurations are shown in Table 11.6.3.4.4.1-1. The absolute accuracy of SS-SINR Inter-frequency measurement is tested by using the parameters in Table 11.6.3.4.5-1. In all test cases, Cell 1 is the PCell with CCA, Cell 2 is the Scell with CCA, and Cell 3 is the target cell with CCA.

11.6.3.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.6.3.4.4.1-1.

Table 11.6.3.4.4.1-1: Supported test configurations for NR SA FR1 inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA from carrier without CCA

|  |  |
| --- | --- |
| Config | Description |
| 11.6.3.4-1 | Without CCA: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 11.6.3.4-2 | Without CCA: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 11.6.3.4-3 | Without CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 11.6.3.4.4.1-2.

Table 11.6.3.4.4.1-2: Initial conditions for NR SA FR1 inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA from carrier without CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.6.3.4.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | LTE link is not used in this test | |  |

1. The general test parameter settings are set up according to Table 11.6.3.4.5-1.

2. Message contents are defined in clause 11.6.3.4.4.3.

3. Cell 1 is the PCell and Cell 2 is target cell with CCA, all of which have power levels set according to clauses C.1.2 and C.1.3 for this test. The two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies, Cell 2 is with CCA and transmit SSBs in DBT windows according to DL CCA model.

11.6.3.4.4.2 Test procedure

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1).

2. Set the parameters according to Table 11.6.3.4.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message on Cell 1 configuring the UE to perform [Inter-frequency measurements in SCC DBT windows] as specified in section 11.6.3.4.4.3.

4. The UE shall transmit an *RRCReconfiguration* message to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 11.6.3.4.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 3, the SS shall check the SS-SINR reported values in the periodic *MeasurementReport*. The SS-SINR value of Cell 3 reported by the UE is compared to the expected SS-SINR. If the value is outside the limits in Table 11.6.3.4.5-2 or the UE fails to report the measurement value for Cell 3, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 11.6.3.4.5-1.

11.6.3.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.6.3.4.4.3-1: Common Exception messages for NR SA FR1 inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA from carrier without CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with condition INTER-FREQ and GAP NEEDED  Table H.3.1-3 with Condition INTER-FREQ MO  Table H.3.1-5  Table H.3.1-7 with condition INTER-FREQ  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 11.6.3.4.4.3-2: *ReportConfigNR* for NR SA FR1 inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA from carrier without CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrq | false |  |  |
| sinr | true |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

11.6.3.4.5 Test requirements

Table 11.6.3.4.5-1 and 11.6.3.4.5-2 define the primary level settings including test tolerances for NR SA FR1 Inter-frequency measurement accuracy on a carrier frequency with CCA. Table 11.6.3.4.5-3 and Table 11.6.3.4.5-4 define the absolute and relative accuracy requirements, correspondingly.

Table 11.6.3.4.5-1: Cell specific test parameters for NR SA FR1 inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA from carrier without CCA for target cell

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | | **Test 1** | **Test 2** | **Test 3** |
|  | | |  | | **Cell 2** | **Cell 2** | **Cell 2** |
| SSB ARFCN | | |  | | freq2 | freq2 | freq2 |
| DL CCA model | | Config 1 |  | | As specified in clause D.7.2.1 | | |
| UL CCA model | | Config 1 |  | | As specified in clause D.7.2.2 | | |
| UL CCA probability | | PCCA\_UL |  | | 1.0 | | |
| DL CCA probability for semi-static channel access Note 7, 8 | | PCCA\_DL |  | | 0.9375 | | |
| DL CCA probability for  dynamic channel access Note 8, 9 | | PCCA\_DL\_1 |  | | 0.75 | | |
|  | | PCCA\_DL\_2 |  | | 0.75 | | |
| Duplex mode | | Config 1 |  | | TDD | | |
| TDD configuration | | Config 1 |  | | TDDConf.1.1 CCA | | |
| Downlink initial BWP configuration | | |  | | DLBWP.0.1 | | |
| Downlink dedicated BWP configuration | | |  | | DLBWP.1.1 | | |
| Uplink initial BWP configuration | | |  | | ULBWP.0.1 | | |
| Uplink dedicated BWP configuration | | |  | | ULBWP.1.1 | | |
| DRX Cycle configuration | | | ms | | Not Applicable | | |
| Gap pattern ID | | |  | | - | | |
| OCNG Patterns | | |  | | OP.1 | | |
| SS-RSSI-Measurement | | |  | | Not Applicable | | |
| Time offset with Cell 1 | | Config 1 | μs | | 3 | | |
| DBT Window configuration | | Config 1 |  | | DBT.1 | | |
| SSB configuration | | Config 1 |  | | SSB.1 CCA for semi-static channel access SSB.2 CCA for dynamic channel access | | |
| SMTC configuration | | Config 1 |  | | SMTC.1 | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | | 30 | | |
| EPRE ratio of PSS to SSS | | | dB | | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  | |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  | |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  | |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  | |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  | |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  | |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  | |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  | |  |  |  |
| Note2 |  | NR\_CCA\_FR1\_I | dBm/15kHz | | -88+TT | -108.5+TT | -115.5+TT |
|  |  | NR\_CCA\_FR1\_J |  | |  |  | -115+TT |
| Note2 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | | -85+TT | -105.5+TT | -112.5+TT |
|  |  | NR\_CCA\_FR1\_J |  | |  |  | -112+TT |
|  | | | dB | | -1.75 | 20 | -4.0 |
|  | | | dB | | -1.75 | 20 | -4.0 |
| SS-RSRP Note3 | Config 1 | NR\_CCA\_FR1\_I | dBm/SCS | | -86.75+TT | -85.5+TT | -116.5+TT |
|  |  | NR\_CCA\_FR1\_J |  | |  |  | -116+TT |
| SS-SINRNote3 | | NR\_CCA\_FR1\_I | dB |  | -1.75+TT | 20+TT | -4.0+TT |
|  | | NR\_CCA\_FR1\_J |  |  |  |  |  |
| IoNote3 | Config 1 | NR\_CCA\_FR1\_I | dBm/  38.16MHz | | -51.73 | -54.41 | -80 |
|  |  | NR\_CCA\_FR1\_J |  | |  |  | -79.5 |
| 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: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3.5.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configuration.  Note 7: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 8: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 9: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | |

Table 11.6.3.4.5-2: Cell specific test parameters for NR SA FR1 inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA from carrier without CCA for NR PCell

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | **Test 2** | **Test 3** |
|  | | |  | **Cell 1** | **Cell 1** | **Cell 1** |
| SSB ARFCN | | |  | freq1 | freq1 | freq1 |
| Duplex mode | | Config 1 |  |  | FDD |  |
|  | | Config 2,3 |  |  | TDD |  |
| TDD configuration | | Config 1 |  |  | Not Applicable |  |
|  | | Config 2 |  |  | TDDConf.1.1 |  |
|  | | Config 3 |  |  | TDDConf.2.1 |  |
| Downlink initial BWP configuration | | |  |  | DLBWP.0.1 |  |
| Downlink dedicated BWP configuration | | |  |  | DLBWP.1.1 |  |
| Uplink initial BWP configuration | | |  |  | ULBWP.0.1 |  |
| Uplink dedicated BWP configuration | | |  |  | ULBWP.1.1 |  |
| DRX Cycle configuration | | | ms |  | Not Applicable |  |
| Gap pattern ID | | |  |  | 0 |  |
| TRS configuration | | Config 1 |  |  | TRS.1.1 FDD |  |
| Config 2 |  |  | TRS.1.1 TDD |  |
| Config 3 |  |  | TRS.1.2 TDD |  |
| PDSCH Reference measurement channel | | Config 1 |  |  | SR.1.1 FDD |  |
|  | | Config 2 |  |  | SR.1.1 TDD |  |
|  | | Config 3 |  |  | SR2.1 TDD |  |
| RMSI CORESET Reference Channel | | Config 1 |  |  | CR.1.1 FDD |  |
|  | | Config 2 |  |  | CR.1.1 TDD |  |
|  | | Config 3 |  |  | CR2.1 TDD |  |
| Dedicated CORESET Reference Channel | | Config 1 |  |  | CCR.1.1 FDD |  |
|  | | Config 2 |  |  | CCR.1.1 TDD |  |
|  | | Config 3 |  |  | CCR2.1 TDD |  |
| OCNG Patterns | | |  |  | OP.1 |  |
| SS-RSSI-Measurement | | |  |  | Not Applicable |  |
| SMTC configuration | | Config 1 |  |  | SMTC pattern 2 |  |
|  | | Config 2,3 |  |  | SMTC pattern 1 |  |
| SSB configuration | | Config 1,2 |  |  | SSB.1 FR1 |  |
|  | | Config 3 |  |  | SSB.2 FR1 |  |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz |  | 15 |  |
|  | | Config 3 |  |  | 30 |  |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |
| Note2 | Config 1,2 | Depending on  band group NOTE 6 | dBm/15kHz | -88+TT | -108.5+TT | -119.5+ ΔBG\_offset +TT |
| Note2 | Config 1,2 | | dBm/SCS | -88+TT | -108.5+TT | Same as Noc for 15kHz |
|  | Config 3 | Depending on  band group NOTE 6 |  | -85+TT | -105.5+TT | -116.5+ ΔBG\_offset +TT |
|  | | | dB | -1.75 | 20 | -4.0 |
|  | | | dB | -1.75 | 20 | -4.0 |
| SS-RSRP Note3 | Config 1,2 | Depending on  band group NOTE 6 | dBm/SCS | -89.75+TT | -88.5+TT | -123.5+ ΔBG\_offset +TT |
|  | Config 3 | Depending on  band group NOTE 6 |  | -86.75+TT | -85.5+TT | -120.5+ ΔBG\_offset +TT |
| SS-SINRNote3 | | Depending on  band group NOTE 6 | dB | -1.75+TT | 20+TT | -4.0+ ΔBG\_offset +TT |
| IoNote3 | Config 1,2 | Depending on  band group NOTE 6 | dBm/  9.36MHz | -57.83 | -60.5 | -90.09+ ΔBG\_offset |
|  | Config 3 | Depending on  band group NOTE 6 | dBm/  38.16MHz | -51.73 | -54.41 | -84+ ΔBG\_offset |
| 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: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3.5.2.  Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.  Note 7: ΔBG\_offset is defined in clause 3A.4, Table 3A.4.1-2 | | | | | | |

Table 11.6.3.4.5-3: Absolute accuracy requirements for the reported values for NR SA FR1 inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA from carrier without CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Normal Conditions | Test 1  All bands | Test 2  All bands | Test 3 | |
| Lowest SS-SINR reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Highest SS-SINR reported value | FFS | FFS | Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Bands FFS | FFS |
| Note 1: NR operating band groups are defined in [clause 3A.4, Table 3A.4.1-2] | | | | |

Table 11.6.2.4.5-4: Relative accuracy requirements for the reported values for NR SA FR1 inter-frequency SS-SINR measurement accuracy on a carrier frequency with CCA from carrier without CCA

|  |  |  |  |
| --- | --- | --- | --- |
|  | Test 1 | Test 2 | Test 3 |
|  | All bands | All bands | All bands |
| Normal Conditions | | | |
| Lowest reported value (Cell 3) | SINR\_x – FFS | SINR\_x – FFS | SINR\_x – FFS |
| Highest reported value (Cell 3) | SINR\_x – FFS | SINR\_x + FFS | SINR\_x + FFS |
| Extreme Conditions | | | |
| Lowest reported value (Cell 3) | SINR\_x – FFS | SINR\_x – FFS | SINR\_x – FFS |
| Highest reported value (Cell 3) | SINR\_x – FFS | SINR\_x + FFS | SINR\_x + FFS |
| SINR\_x is the reported value of Cell 2 | | | |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

### 11.6.4

### 11.6.5 SS-SINR

#### 11.6.5.0 Minimum Conformance Requirements

TBD

#### 11.6.5.1 NR SA FR1 Intra-frequency RSSI measurement accuracy on PCC with CCA

Editor’s note: This test case is incomplete in following aspects:

* MU and TT analysis is incomplete.
* Message contents is incomplete.
* Call setup and test procedure may need to be updated.
* Applicability needs to be updated.
* Statistical analysis to determine test case verdict is FFS.
* Test requirements are FFS.
* Some parameters and/or references are still in brackets.

11.6.5.1.1 Test purpose

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits.

11.6.5.1.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting standalone NR-U and [supporting intra-frequency measurements on shared channel access].

11.6.5.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 11.6.5.0.1 for absolute accuracy under CCA.

The normative reference for this requirement is TS 38.133 [6] clause A.11.6.5.1.

11.6.5.1.4 Test description

Supported test configurations are shown in Table 11.6.5.1.4.1-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table 11.6.5.1.5-1 and Table 11.6.5.1.5-2. In all test cases, Cell 1 is the PCell with CCA. RSSI is measured on channel number 1.

11.6.5.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.6.5.1.4.1-1.

Table 11.6.5.1.4.1-1: Supported test configurations for NR SA FR1 Intra-frequency RSSI measurement accuracy on PCC with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 11.6.5.1-1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 11.6.5.1.4.1-2.

Table 11.6.5.1.4.1-2: Initial conditions for NR SA FR1 Intra-frequency RSSI measurement accuracy on PCC with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.6.5.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | LTE link is not used in this test | |  |

1. The general test parameter settings are set up according to Table 11.6.5.1.5-1.

2. Message contents are defined in clause 11.6.5.1.4.3.

3. Cell 1 is the NR PCell with the power level set according to clauses C.1.2 and C.1.3 for this test. CCA and transmit SSBs in DBT windows according to DL CCA model.

11.6.5.1.4.2 Test procedure

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1).

2. Set the parameters according to Table 11.6.5.1.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message on Cell 1 configuring the UE to perform [intra-frequency measurements in DBT windows] as specified in section 11.6.5.1.4.3.

4. The UE shall transmit an *RRCReconfiguration* message to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 11.6.5.1.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 3, the SS shall check the RSSI reported values in the periodic *MeasurementReport*. The RSSI value of Cell 2 reported by the UE is compared to the expected RSSI. If the value is outside the limits in Table 11.6.5.1.5-3 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 11.6.5.1.5-1.

11.6.5.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.6.5.1.4.3-1: Common Exception messages for NR SA FR1 Intra-frequency RSSI measurement accuracy on PCC with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-5  Table H.3.1-7  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 11.6.5.1.4.3-2: *ReportConfigNR* for NR SA FR1 Intra-frequency RSSI measurement accuracy on PCC with CCA

TBD

11.6.5.1.5 Test requirements

Table 11.6.5.1.5-1 defines the primary level settings including test tolerances for NR SA FR1 Intra-frequency RSSI measurement accuracy on PCC with CCA. Table 11.6.5.1.5-2 defines the RSSI measurement time configuration (RMTC). Table 11.6.5.1.5-3 defines the absolute accuracy requirements.

Table 11.6.5.1.5-1: Cell specific test parameters for NR SA FR1 Intra-frequency RSSI measurement accuracy on PCC with CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 |
| Cell 1 |
| RF Channel Number | | |  | 1 |
| BWchannel | | | MHz | 40 |
| SSB configuration | Semi-static channel access Note 1, 3 | Config 1 |  | SSB.1 CCA |
| Dynamic channel access Note 2, 3 | Config 1 |  | SSB.2 CCA |
| PCCA\_DL | | |  | TBD |
| PCCA\_UL | | |  | TBD |
| DL CCA model | | |  | As specified in clause D.7.2.1 |
| UL CCA model | | |  | As specified in clause D.7.2.2 |
| Measurement bandwidth | | |  | Same as channel access bandwidth |
| Channel access bandwidth | | | MHz | 20 |
| DRX Cycle configuration | | | ms | Not Applicable |
| PDSCH Reference measurement channel | | |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | | |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | | |  | CCR.1.1 CCA |
| OCNG Patterns | | |  | OP.1 |
| EPRE ratio of PSS to SSS | | | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | | | dBm/SCS | -106 |
| in slots corresponding to RSSI measurement time configuration (RMTC) | | | dBm/SCS | -87 |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | | | dB | 2.5 |
| in slots corresponding to RSSI measurement time configuration (RMTC) | | | dB | -Infinity |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) | | | dBm/SCS | -103.5 |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) | | |  | -Infinity |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) | | | dBm/BW | -101.6 |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) | | | dBm/BW | -87 |
| Propagation condition | | | - | AWGN |
| Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 3: For a UE supporting | | | | |

11.6.5.1.5-2: RSSI RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

Table 11.6.5.1.5-3: Absolute accuracy requirements for the reported values for NR SA FR1 Intra-frequency RSSI measurement accuracy on PCC with CCA

TBD

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 11.6.5.2 NR SA FR1 Intra-frequency RSSI measurement accuracy on SCC with CCA

Editor’s note: This test case is incomplete in following aspects:

* MU and TT analysis is incomplete.
* Message contents is incomplete.
* Call setup and test procedure may need to be updated.
* Applicability needs to be updated.
* Statistical analysis to determine test case verdict is FFS.
* Test requirements are FFS.
* Some parameters and/or references are still in brackets.

11.6.5.2.1 Test purpose

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits.

11.6.5.2.2 Test applicability

This test applies to all types of E-UTRA UE release 16 and forward, supporting standalone 2DL CA NR-U and [supporting intra-frequency measurements on shared channel access].

11.6.5.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 11.6.5.0.1 for absolute accuracy under CCA.

The normative reference for this requirement is TS 38.133 [6] clause A.11.6.5.2.

11.6.5.2.4 Test description

Supported test configurations are shown in Table 11.6.5.2.4.1-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table 11.6.5.2.5-1 and Table 11.6.5.2.5-2. Cell 1 which is PCell operating on a carrier frequency under CCA, and Cell 2 which is SCell operating on a carrier frequency under CCA. RSSI is measured on channel number 2.

11.6.5.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 11.6.5.2.4.1-1.

Table 11.6.5.2.4.1-1: Supported test configurations for NR SA FR1 Intra-frequency RSSI measurement accuracy on SCC with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 11.6.5.2-1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 11.6.5.2.4.1-2.

Table 11.6.5.2.4.1-2: Initial conditions for NR SA FR1 Intra-frequency RSSI measurement accuracy on SCC with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC, TL/VL, TL/VH, TH/VL, TH/VH | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.9-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 11.6.5.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part 2Rx | A.3.1.8.2 with n = 2 and φ1 = 5 Hz | As specified in TS 38.508-1 [14] Annex A. |
| TE Part 4Rx | A.3.1.8.5 with n = 2 and φ1,1 = 5 Hz, φ1,2 = 10 Hz, φ1,3 = 15 Hz |
| DUT Part 2Rx | A.3.2.3.4 |
| DUT Part 4Rx | A.3.2.5.2 |
| Exceptions to connection diagram | LTE link is not used in this test | |  |

1. The general test parameter settings are set up according to Table 11.6.5.2.5-1.

2. Message contents are defined in clause 11.6.5.2.4.3.

3. Cell 1 is the NR PCell, Cell 2 is the SCell, all of which have power levels set according to clauses C.1.2 and C.1.3 for this test. All cells are on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model.

11.6.5.2.4.2 Test procedure

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Mode *On*]*,* according to TS 38.508-1 [14] clause 4.5. The CCA model (both DL and UL) is disabled (i.e. PCCA\_DL\_i= PCCA\_UL=1).

2. Set the parameters according to Table 11.6.5.2.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message on Cell 1 configuring the UE to perform [intra-frequency measurements in DBT windows] as specified in section 11.6.5.2.4.3.

4. The UE shall transmit an *RRCReconfiguration* message to acknowledge the configuration. Afterwards, the SS shall enable DL and UL CCA model according to Table 11.6.5.2.5-1.

5. The UE shall transmit periodical *MeasurementReport* messages.

6. After 10s wait from Step 3, the SS shall check the RSSI reported values in the periodic *MeasurementReport*. The RSSI value of Cell 2 reported by the UE is compared to the expected RSSI. If the value is outside the limits in Table 11.6.5.2.5-3 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to [Tables G.TBD in Annex G clause G.TBD] is achieved.

8. Repeat steps 1-7 for each subtest defined in Table 11.6.5.2.5-1.

11.6.5.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 11.6.5.2.4.3-1: Common Exception messages for NR SA FR1 Intra-frequency RSSI measurement accuracy on SCC with CCA

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition INTRA-FREQ MO  Table H.3.1-5  Table H.3.1-7  [Table 7.3.1-3 in TS 38.508-1 [14] with condition DBT.1] |

Table 11.6.5.2.4.3-2: *ReportConfigNR* for NR SA FR1 Intra-frequency RSSI measurement accuracy on SCC with CCA

TBD

11.6.5.2.5 Test requirements

Table 11.6.5.2.5-1 defines the primary level settings including test tolerances for NR SA FR1 Intra-frequency RSSI measurement accuracy on SCC with CCA. Table 11.6.5.2.5-2 defines the RSSI measurement time configuration (RMTC). Table 11.6.5.2.5-3 defines the absolute accuracy requirements.

Table 11.6.5.2.5-1: Cell specific test parameters for NR SA FR1 Intra-frequency RSSI measurement accuracy on SCC with CCA

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Test 1 | |
| Cell 1 | Cell 2 |
| RF Channel Number | | | |  | 1 | 2 |
| BWchannel | | | | MHz | 40 | 40 |
| SSB configuration | Semi-static channel access Note 1, 3 | Config 1 | |  | SSB.1 CCA | SSB.1 CCA |
| Dynamic channel access Note 2, 3 | Config 1 | |  | SSB.2 CCA | SSB.2 CCA |
| PCCA\_DL | | | |  | 1 | TBD |
| PCCA\_UL | | | |  | 1 | TBD |
| DL CCA model | | | |  | N/A | As specified in A.3.20.2.1 |
| UL CCA model | | | |  | N/A | As specified in A.3.20.2.2 |
| Measurement bandwidth | | | |  | Same as channel access bandwidth | |
| Channel access bandwidth | | | | MHz | 20 | |
| DRX Cycle configuration | | | | ms | Not Applicable | |
| PDSCH Reference measurement channel | | | |  | SR.1.1 CCA | SR.1.1 CCA |
| RMSI CORESET Reference Channel | | | |  | CR.1.1 CCA | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | | | |  | CCR.1.1 CCA | CCR.1.1 CCA |
| OCNG Patterns | | | |  | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS | | | | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | | |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | | |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | | |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | | |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | | |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | | | | dBm/SCS | -106 | -106 |
| in slots corresponding to RSSI measurement time configuration (RMTC) | | | | dBm/SCS | -106 | -87 |
| in slots not corresponding to RSSI measurement time configuration (RMTC) | | | | dB | 2.5 | 2.5 |
| in slots corresponding to RSSI measurement time configuration (RMTC) | | | | dB | 2.5 | -Infinity |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) | | | | dBm/SCS | -103.5 | -103.5 |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) | | | |  | -103.5 | -Infinity |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) | | | | dBm/BW | -101.6 | -101.6 |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) | | | | dBm/BW | -101.6 | -87 |
| Propagation condition | | | - | | AWGN | |
| Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 2 For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | |

11.6.5.2.5-2: RSSI RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

Table 11.6.5.2.5-3: Absolute accuracy requirements for the reported values for NR SA FR1 Intra-frequency RSSI measurement accuracy on SCC with CCA

TBD

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

# 12 to 13 FFS

# 14 NR standalone tests for Satellite access

## 14.0 General

Editor's Note:

* ephemerisInfo is still FFS

The Satellite Access tests defined in this clause apply provided that UE indicates *nonTerrestrialNetwork* and is accessing a cell served by a Satellite Access Node (SAN). The requirements apply provided that serving and all neighbour satellites on the same layer are of same satellite type (LEO or GEO).

### 14.0.1 Principle of testing GSO and NGSO scenarios

The test cases related to satellite access are defined for both GSO and NGSO. The testing principle for these test cases is as follows:

- A UE capable of GSO only is required to pass the test cases with GSO.

- A UE capable of NGSO only is required to pass the test cases with NGSO.

- A UE capable of both GSO and NGSO is required to pass the test cases with NGSO only.

Support of GSO and NGSO scenario is indicated via *ntn-ScenarioSupport-r17*.

### 14.0.2 Principle of testing different RRM requirements

Satellite Access RRM test cases are defined for all applicable RRM requirements. The testing principle for these test cases is as follows:

- A UE capable of NTN only is required to pass all the test cases defined in clause 14.

- A UE capable of both TN and NTN is required to pass the test cases for NTN specific requirements in Table 14.0.2-1.

Table 14.0.2-1: Test cases for NTN specific requirements

|  |  |
| --- | --- |
| Clause | Test case slogan |
| 14.1.2 | SA FR1 Cell reselection for UE configured with [capability for enhanced requirements] for NR satellite access |
| 14.1.3 | SA FR1 Time-based cell reselection for NR satellite access |
| 14.1.4 | SA FR1 Location-based cell reselection for NR satellite access |
| 14.1.7 | SA FR1-FR1 Cell reselection for UE configured with [capability for enhanced requirements] for NR satellite access |
| 14.1.8 | SA FR1-FR1 Time-based Cell reselection for NR satellite access |
| 14.1.9 | SA FR1-FR1 Location-based Cell reselection for NR satellite access |
| 14.2.1.3 | SA FR1 SAN time-based conditional Handover for NR satellite access |
| 14.2.1.4 | SA FR1-FR1 SAN time-based conditional Handover for NR satellite access |
| 14.2.1.5 | SA FR1 SAN distance-based conditional Handover for NR satellite access |
| 14.2.1.6 | SA FR1-FR1 SAN distance-based conditional Handover for NR satellite access |
| 14.3.1.1 | SA FR1 NR UE Transmit Timing Test for NR satellite access |
| 14.5.1.1 | SA FR1 event triggered reporting tests without gap under non-DRX for NR satellite access |
| 14.5.1.2 | SA FR1 event triggered reporting tests without gap under DRX for NR satellite access |
| 14.5.1.3 | SA FR1 event triggered reporting tests without gap under non-DRX with SSB index reading for NR satellite access |
| 14.5.1.4 | SA FR1 event triggered reporting tests with single measurement gap under non-DRX for satellite access for NR satellite access |
| 14.5.1.5 | SA FR1 event triggered reporting tests with FNO concurrent gaps under DRX for satellite access for NR satellite access |
| 14.5.1.6 | SA FR1 event triggered reporting tests with PPO concurrent gaps under non-DRX with SSB index reading for satellite access for NR satellite access |
| 14.5.2.1 | SA FR1-FR1 Event triggered reporting test without gap under non-DRX for NR satellite access |
| 14.5.2.2 | SA FR1-FR1 Event triggered reporting tests without gap under DRX for NR satellite access |
| 14.6.3.1 | SA FR1 SA measurement accuracy for NR satellite access |
| 14.6.3.2 | SA FR1-FR1 SA measurement accuracy for NR satellite access |
| 14.6.4.1 | SA FR1 SSB based L1-RSRP measurement for NR satellite access |
| 14.6.4.2 | SA FR1 CSI-RS based L1-RSRP measurement on resource set with repetition off for NR satellite access |

### 14.0.3 Principle of testing different ephemeris formats

Satellite access RRM test cases are defined such that satellite ephemeris information is sent to UE in each test case, according to Tables 14.0.3-1 and 14.0.3-2.

Table 14.0.3-1: Test cases configuring EphemerisInfo as PositionVelocity

|  |  |
| --- | --- |
| Functional Area | Test Case |
| RRC\_IDLE state mobility | 14.1.3 |
| 14.1.4 |
| 14.1.5 |
| 14.1.6 |
| 14.1.9 |
| 14.1.10 |
| Handover | 14.2.1.3 |
| 14.2.1.4 |
| 14.2.1.5 |
| 14.2.1.6 |
| Timing | 14.3.1 |
| Radio Link Monitoring | 14.4.1.1 |
| 14.4.1.2 |
| 14.4.1.5 |
| 14.4.1.6 |
| BFD and LR procedures | 14.4.2.1 |
| 14.4.2.3 |
| 14.4.2.5 |
| Active BWP switch | 14.4.3.1 |
| UE specific CBW change | 14.4.4.1 |
| PL-RS switching delay | 14.4.5.1 |
| Intra-frequency measurements | 14.5.1.1 |
| 14.5.1.3 |
| 14.5.1.5 |
| Inter-frequency measurements | 14.5.2.1 |
| 14.5.2.3 |
| 14.5.2.7 |
| L1-RSRP measurements | 14.5.3.1 |
| 14.5.3.3 |
| SS-RSRP accuracy | 14.6.1.1 |
| SS-RSRQ accuracy | 14.6.2.1 |
| SS-SINR accuracy | 14.6.3.1 |
| L1-RSRP accuracy | 14.6.4.1 |

Table 14.0.3-2: Test cases configuring EphemerisInfo as Orbital

|  |  |
| --- | --- |
| Functional Area | Test Case |
| RRC\_IDLE state mobility | 14.1.1 |
| 14.1.2 |
| 14.1.5 |
| 14.1.6 |
| Handover | 14.2.1.1 |
| 14.2.1.2 |
| RRC Connection Mobility Control | 14.2.2.1 |
| 14.2.2.2 |
| 14.2.2.3 |
| Timing | 14.3.2 |
| Radio Link Monitoring | 14.4.1.3 |
| 14.4.1.4 |
| 14.4.1.7 |
| 14.4.1.8 |
| BFD and LR procedures | 14.4.2.2 |
| 14.4.2.4 |
| 14.4.2.6 |
| Active BWP switch | 14.4.3.2 |
| Intra-frequency measurements | 14.5.1.2 |
| 14.5.1.4 |
| 14.5.1.6 |
| Inter-frequency measurements | 14.5.2.2 |
| 14.5.2.4 |
| 14.5.2.6 |
| 14.5.2.8 |
| L1-RSRP measurements | 14.5.3.2 |
| 14.5.3.4 |
| SS-RSRP accuracy | 14.6.1.2 |
| SS-RSRQ accuracy | 14.6.2.2 |
| SS-SINR accuracy | 14.6.3.2 |
| L1-RSRP accuracy | 14.6.4.2 |

### 14.0.4 General setup for SIB19

The general parameters for SIB19 setup is specified in Table 14.0.4-1.

Table 14.0.4-1: SIB19 configuration for NTN test cases

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Test 1 |
| Interval between adjacent epoch time | s | LEO: 2.56  GEO: 10.24 |
| ntn-UlSyncValidityDuration | s | LEO: 5  GEO: 900 |
| cellSpecificKoffset | slot | LEO: 8  GEO: 256 |
| kmac | slot | Not configured |
| ta-Common |  | 0 |
| ta-CommonDrift |  | 0 |
| ta-CommonDriftVariant |  | 0 |
| ntn-PolarizationDL |  | linear |
| ntn-PolarizationUL |  | linear |
| ephemerisInfo |  | Detailed ephemeris information is provided in TS 38.508-1 [14] |
| ta-Report |  | Not configured |

### 14.0.5 Initial test environment conditions for RRM NTN tests

The following initial conditions apply to all RRM satellite access specified in this section, unless otherwise specified in the test:

1. UE location according to TS 38.508-1 [14] clause 7.6.1 is provided to the UE through any preconfigured means.

2. Test equipment shall emulate the signal with doppler and delay according to ephemeris defined in TS 38.508-1 [14] Tables 7.6.2.1-1a and 7.6.2.1-1b for GSO at 30º elevation angle conditions for GSO configurations or Tables 7.6.2.1-2a and 7.6.2.1-2b for NGSO (LEO-600) at 30º elevation angle conditions for NGSO (LEO-600) configurations or Tables 7.6.2.1-3a and 7.6.2.1-3b for NGSO (LEO-1200) at 30º elevation angle conditions for NGSO (LEO-1200) configurations. Test system shall send same SIB19 information during the duration of the test as defined in TS 38.508-1 [14] clause 7.6.3.1.

3. Deactivate UE prediction of satellite trajectory by any preconfigured means.

## 14.1 RRC\_IDLE state mobility

### 14.1.0 Minimum conformance requirements

#### 14.1.0.1 Measurements of intra-frequency NR cells

The UE shall be able to identify new intra-frequency cells and perform SS-RSRP and SS-RSRQ measurements of the identified intra-frequency cells without an explicit intra-frequency neighbour list containing physical layer cell identities.

If Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, and the distance between UE and serving cell reference location is smaller than *distanceThresh* if the *distanceThresh* is configured (see 38.304 [30]) and UE has location information, then the UE is not required to perform measurement of intra-frequency.

The UE shall be able to evaluate whether a newly detectable intra-frequency cell meets the reselection criteria defined in 38.304 [30] within Kmulti\_SMTC \* Tdetect,NR\_Intrawhen that Treselection= 0 if the UE does not support the feature for enhanced RRM requirements defined in 38.306 [11] or if the *enhancedMeasurementLEO-r17* is not enabled, or within Kmulti\_SMTC \* Tdetect,NR\_Intra\_enhif the UE supports the feature for enhanced RRM requirements defined in 38.306 [11] and the *enhancedMeasurementLEO-r17* is enabled. An intra frequency cell is considered to be detectable according to the conditions defined in 38.133 [6] Annex B.1.6 for a corresponding Band.

The UE shall measure SS-RSRP and SS-RSRQ at least every Kmulti\_SMTC \* Tmeasure,NR\_Intra (see table 14.1.0.1-1) if the UE does not support the feature for enhanced RRM requirements defined in 38.306 [11] or if the *enhancedMeasurementLEO-r17* is not enabled, or every Kmulti\_SMTC \* Tmeasure,NR\_Intra\_enh (see table 14.1.0.1-2) if the UE supports the feature for enhanced RRM requirements defined in 38.306 [11] and the *enhancedMeasurementLEO-r17* is enabled, for intra-frequency cells that are identified and measured according to the measurement rules.

The UE shall filter SS-RSRP and SS-RSRQ measurements of each measured intra-frequency cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least Tmeasure,NR\_Intra/2.

If smtcs do not overlap with each other,

- , if GEO satellites are measured on the carrier;

- , if LEO satellites are measured on the carrier;

- If smtcs partially overlap with each other,

- , if only GEO satellites are measured on the carrier;

- , if only LEO satellites are measured on the carrier;

Where

- Is the number of LEO satellites to be measured within i-th SMTC,

- Is the number of LEO satellites that UE can measure in parallel within an SMTC,

- Is the number of smtcs that partially overlap with each other.

Note: for deriving Kmulti\_SMTC for Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate,NR\_Intra, two SMTCs are considered as overlapping if they overlap in one or more occasions during a single Tdetect,NR\_Intra, Tmeasure,NR\_Intra or Tevaluate,NR\_Intra.

The parameter Kmulti\_SMTC is the scaling factor for measurements of multiple SMTCs which correspond to different satellites.

The UE shall not consider a NR neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For an intra-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the intra-frequency cell has met reselection criterion defined in 38.304 [30] within Kmulti\_SMTC \* Tevaluate,NR\_Intra if the UE does not support the feature for enhanced RRM requirements defined in 38.306 [11] or if the *enhancedMeasurementLEO-r17* is not enabled, or within Kmulti\_SMTC \* Tevaluate,NR\_Intra\_enh if the UE supports the feature for enhanced RRM requirements defined in 38.306 [11] and the *enhancedMeasurementLEO-r17* is enabled, when Treselection = 0as specified in table 14.1.0.1-1 or table 14.1.0.1-2 provided that:

- when *rangeToBestCell* is not configured:

- the cell is at least 3dB better ranked in FR1 or 4.5dB better ranked in FR2.

- when *rangeToBestCell* is configured:

- the cell has the highest number of beams above the threshold *absThreshSS-BlocksConsolidation* among all detected cells whose cell-ranking criterion R value in 38.304 [30] is within *rangeToBestCell* of the cell-ranking criterion R value of the highest ranked cell.

- if there are multiple such cells, the cell has the highest rank among them.

- the cell is at least 3dB better ranked in FR1 or 4.5dB better ranked in FR2 if the current serving cell is among them.

When evaluating cells for reselection, the SSB side conditions apply to both serving and non-serving intra-frequency cells.

If Treselection timer has a nonzero value and the intra-frequency cell is satisfied with the reselection criteria which are defined in 38.304 [30], the UE shall evaluate this intra-frequency cell for the Treselection time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

Table 14.1.0.1-1: Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate,NR\_Intra

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DRX cycle length [s]** | **Scaling Factor (N1)** | **Tdetect,NR\_Intra [s] (number of DRX cycles)** | **Tmeasure,NR\_Intra [s] (number of DRX cycles)** | **Tevaluate,NR\_Intra**  **[s] (number of DRX cycles)** |
|  | **FR1** |  |  |  |
| 0.32 | 1 | 11.52 x N1 x M2 (36 x N1 x M2) | 1.28 x N1 x M2 (4 x N1 x M2) | 5.12 x N1 x M2 (16 x N1 x M2) |
| 0.64 | 17.92 x N1 (28 x N1) | 1.28 x N1 (2 x N1) | 5.12 x N1 (8 x N1) |
| 1.28 | 32 x N1 (25 x N1) | 1.28 x N1 (1 x N1) | 6.4 x N1 (5 x N1) |
| 2.56 | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 7.68 x N1 (3 x N1) |
| Note 1: M2 = 2 if SMTC periodicity of measured intra-frequency cell > 20 ms and 1<NSMTC ≤ 4 upon more than 1 SMTC configured at the UE; M2 = 1.5 if SMTC periodicity of measured intra-frequency cell > 20 ms and NSMTC=1 upon 1 SMTC configured at the UE; otherwise M2=1. Where, NSMTC is the number of SMTCs configured by SAN If different SMTC periodicities are configured for different cells, the SMTC periodicity in this note is the one used by the cell being identified. During PSS/SSS detection, the periodicity of the SMTC configured for the intra-frequency carrier is assumed, and if the actual SSB transmission periodicity is greater than the SMTC configured for the intra-frequency carrier, longer Tdetect, NR\_intra is expected.  Note 2: The UE is not required to meet the requirements for 2.56s DRX cycle length for earth-moving LEO deployment. | | | | |

Table 14.1.0.1-2: Tdetect,NR\_Intra\_enh, Tmeasure,NR\_Intra\_enh and Tevaluate,NR\_Intra\_enh

|  |  |  |  |
| --- | --- | --- | --- |
| **DRX cycle length [s]** | **Tdetect,NR\_Intra\_enh [s] (number of DRX cycles)** | **Tmeasure,NR\_Intra\_enh [s] (number of DRX cycles)** | **Tevaluate,NR\_Intra\_enh [s] (number of DRX cycles)** |
|
| 0.32 | 2.56 x M2 (8 x M2)Note 1 | 0.32 x M3 (1 x M3) Note 1 | 0.96 x M4 (3 x M4) Note 1 |
| 0.64 | 5.12 (8) | 0.64 (1) | 1.92 (3) |
| 1.28 | 8.96 (7) | 1.28 (1) | 3.84 (3) |
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) |
| Note 1: When SMTC < = 40 ms, M2 = M3 = M4 = 1; and when SMTC > 40 ms, M2 = 2, M3 = M4 = 2.5 | | | |

If ‘*t-Service*’ is broadcasted and applicable, UE shall be able to detect, measure, and evaluate neighbour cells before the serving cell stops serving the area regardless of whether the distance condition based on serving cell reference location is met or the legacy Srxlev/Squal condition are met, and when to start the detection, measurement and evaluation on neighbour cells is up to UE implementation. This requirement does not apply when the time span from the last slot of SI transmission within SI modification period where the broadcasting of the last updated value for t-Service is acquired by the UE for the first time to the first slot when the cell is scheduled to stop serving the area according to the broadcasted information is less than Ttrigger.

Ttrigger = max(Tdetect,NR\_Intra, Kcarrier\* Tdetect,NR\_Inter),

where

- Kcarrier is the number of NR inter-frequency carriers indicated by the serving cell,

- Tdetect,NR\_Intra refers to intra-frequency cell detection delay in IDLE/INACTIVE mode defined Table 14.1.0.1-2,

- Tdetect,NR\_Inter refers to inter-frequency cell detection delay in IDLE/INACTIVE mode defined Table 14.1.0.2-2.

The requirements in this clause apply provided that the number of SMTCs for any inter-frequency carrier does not exceed the *parallelSMTC-r17*, otherwise UE may select one or subset of all the configured SMTCs sequentially for performing the measurements until all of the SMTCs can be measured. The selection of SMTCs to be used is up to UE implementation, and in this case, measurement period longer than the corresponding measurement period specified in Table 14.1.0.1-1 and Table 14.1.0.1-2 is expected.

The normative reference for this requirement is TS 38.133 [6] clause 4.2C.2.3.

#### 14.1.0.2 Measurements of inter-frequency NR cells

The UE shall be able to identify new inter-frequency cells and perform SS-RSRP or SS-RSRQ measurements of identified inter-frequency cells if carrier frequency information is provided by the serving cell, even if no explicit neighbour list with physical layer cell identities is provided.

If Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, and the distance between UE and serving cell reference location is smaller than *distanceThresh* if *distanceThresh* is configured and UE has location information, then the UE shall search for inter-frequency layers of higher priority at least every Thigher\_priority\_search where Thigher\_priority\_search is described in 38.133 [6] clause 4.2C.2.9.

If Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ, or the distance between UE and serving cell reference location is larger than *distanceThresh* if *distanceThresh* is configured and UE has location information, then the UE shall search for and measure inter-frequency layers of higher, equal or lower priority in preparation for possible reselection. The requirements apply provided that the distance exceeds the *distanceThresh* by a margin of 50 m. In this scenario, the minimum rate at which the UE is required to search for and measure higher priority layers shall be the same as that defined below in this clause.

The UE shall be able to evaluate whether a newly detectable inter-frequency cell meets the reselection criteria defined in 38.304 [30] within if the UE does not support the feature for enhanced RRM requirements defined in 38.306 [11] or if the *enhancedMeasurementLEO-r17* is not enabled, or within if the UE supports the feature for enhanced RRM requirements defined in 38.306 [11] and the *enhancedMeasurementLEO-r17* is enabled, if at least carrier frequency information is provided for inter-frequency neighbour cells by the serving cells when Treselection = 0 provided that the reselection criteria is met by a margin of at least [5]dB in FR1 for reselections based on ranking or [6]dB in FR1 for SS-RSRP reselections based on absolute priorities or [4]dB in FR1 for SS-RSRQ reselections based on absolute priorities. The parameter Kcarrier is the number of NR inter-frequency carriers indicated by the serving cell.

The parameter Kmulti\_SMTC,i is the scaling factor for measurement of multiple SMTCs or multiple satellites

- If SMTCs do not overlap with each other,

- , if GEO satellites are measured on the carrier;

- , if LEO satellites are measured on the carrier;

- If SMTCs partially overlap with each other,

- , if only GEO satellites are measured on the carrier;

- , if only LEO satellites are measured on the carrier;

where:

is the number of LEO satellites to be measured within i-th SMTC,

is the number of LEO satellites that UE can measure in parallel within an SMTC, is the number of SMTCs that partially overlap with each other.

Note: for deriving Kmulti\_SMTC,i for Tdetect,NR\_Inter, Tmeasure,NR\_Inter and Tevaluate,NR\_Inter of frequency layer *i*, two SMTCs are considered as overlapping if they overlap in one or more occasions during a single Tdetect,NR\_Inter, Tmeasure,NR\_Inter or Tevaluate,NR\_Inter.

An inter-frequency cell is considered to be detectable according to the conditions defined in 38.133 [6] Annex B.1.7 for a corresponding Band.

When higher priority cells are found by the higher priority search, they shall be measured at least every Tmeasure,NR\_Inter. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the minimum measurement filtering requirements specified later in this clause shall still be met by the UE before it makes any determination that it may stop measuring the cell. If the UE detects on a NR carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall measure SS-RSRP or SS-RSRQ at least every (see table 14.1.0.2-1) if the UE does not support the feature for enhanced RRM requirements defined in 38.306 [11] or if the *enhancedMeasurementLEO-r17* is not enabled, or every (see table 14.1.0.2-2) if the UE supports the feature for enhanced RRM requirements defined in 38.306 [11] and the *enhancedMeasurementLEO-r17*is enabled, for identified lower or equal priority inter-frequency cells. If the UE detects on a NR carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall filter SS-RSRP or SS-RSRQ measurements of each measured higher, lower and equal priority inter-frequency cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least Tmeasure,NR\_Inter/2.

The UE shall not consider a NR neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For an inter-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the inter-frequency cell has met reselection criterion defined 38.304 [30] within if the UE does not support [capability for enhanced requirements] or if the [NW configuration for enhanced requirements] is not enabled, or within if the UE supports the feature for enhanced RRM requirements defined in 38.306 [11] and the *enhancedMeasurementLEO-r17* is enabled, when Treselection = 0as specified in table 14.1.0.2-1 provided that the reselection criteria is met by

- the condition when performing equal priority reselection and

when *rangeToBestCell* is not configured:

- the cell is at least [5]dB better ranked in FR1 or.

when *rangeToBestCell* is configured:

- the cell has the highest number of beams above the threshold *absThreshSS-BlocksConsolidation* among all detected cells whose cell-ranking criterion R value in TS38.304 [30] is within *rangeToBestCell* of the cell-ranking criterion R value of the highest ranked cell.

- if there are multiple such cells, the cell has the highest rank among them

- the cell is at least [5]dB better ranked in FR1 if the current serving cell is among them. or

- [6]dB in FR1 for SS-RSRP reselections based on absolute priorities or

- [4]dB in FR1 for SS-RSRQ reselections based on absolute priorities.

When evaluating cells for reselection, the SSB side conditions apply to both serving and inter-frequency cells.

If Treselection timer has a non-zero value and the inter-frequency cell is satisfied with the reselection criteria, the UE shall evaluate this inter-frequency cell for the Treselection time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

The UE is not expected to meet the measurement requirements for an inter-frequency carrier under DRX cycle=320 ms defined in Table 14.1.0.2-1 under the following conditions:

- TSMTC\_intra = TSMTC\_inter = 160 ms; where

- TSMTC\_intra is the periodicity of the SMTC configured for the intra-frequency carrier if no identified intra-frequency cell is in the PCI list of smtc2-LP on this intra-frequency carrier; TSMTC\_intra is the periodicity of the smtc2-LP configured for the intra-frequency carrier if at least one identified intra-frequency cell is in the PCI list of smtc2-LP on this intra-frequency carrier. During PSS/SSS detection, the periodicity of the SMTC configured for the intra-frequency carrier is assumed for TSMTC\_intra. If the actual SSB transmission periodicity is greater than the SMTC configured for the intra-frequency carrier, longer Tdetect, NR\_intra is expected.

- TSMTC\_inter is the actual SMTC periodicity used by the inter-frequency cell being identified. During PSS/SSS detection, the periodicity of the SMTC configured for the inter-frequency carrier is assumed for TSMTC\_inter. If the actual SSB transmission periodicity is greater than the SMTC configured for the inter-frequency carrier, longer Tdetect, NR\_inter is expected.

- SMTC occasions configured for the inter-frequency carrier occur up to 1 ms before the start or up to 1 ms after the end of the SMTC occasions configured for the intra-frequency carrier, and

- SMTC occasions configured for the intra-frequency carrier and for the inter-frequency carrier occur up to 1 ms before the start or up to 1 ms after the end of the paging occasion in TS38.304 [30].

Table 14.1.0.2-1: Tdetect,NR\_Inter, Tmeasure,NR\_Inter and Tevaluate,NR\_Inter

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DRX cycle length [s] | Scaling Factor (N1) | Tdetect,NR\_Inter [s] (number of DRX cycles) | Tmeasure,NR\_Inter [s] (number of DRX cycles) | Tevaluate,NR\_Inter [s] (number of DRX cycles) |
| FR1 |
| 0.32 | 1 | 11.52 x N1 x 1.5 (36 x N1 x 1.5) | 1.28 x N1 x 1.5 (4 x N1 x 1.5) | 5.12 x N1 x 1.5 (16 x N1 x 1.5) |
| 0.64 | 17.92x N1 (28 x N1) | 1.28 x N1 (2 x N1) | 5.12 x N1 (8 x N1) |
| 1.28 | 32 x N1 (25 x N1) | 1.28 x N1 (1 x N1) | 6.4 x N1 (5 x N1) |
| 2.56 | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 7.68 x N1 (3 x N1) |
| Note 1: UE is not required to fulfil the requirements for 2.56s DRX cycle length for earth-moving LEO deployment. | | | | |

Table 14.1.0.2-2: Tdetect,NR\_Inter\_enh, Tmeasure,NR\_Inter\_enh and Tevaluate,NR\_Inter\_enh

|  |  |  |  |
| --- | --- | --- | --- |
| DRX cycle length [s] | Tdetect,NR\_Inter\_enh [s] (number of DRX cycles) | Tmeasure,NR\_Inter\_enh [s] (number of DRX cycles) | Tevaluate,NR\_Inter\_enh [s] (number of DRX cycles) |
|
| 0.32 | [3.2 x M2 (10 x M2)] Note 1 | [0.32 x M3 ([1] x M3)] Note 1 | 0.96 x M4 (3 x M4) Note 1 |
| 0.64 | [6.4 (10)] | [0.64 (1)] | 1.92 (3) |
| 1.28 | [10.24 (8)] | 1.28 (1) | 3.84 (3) |
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) |
| Note 1: When SMTC < = 40 ms, M2 = M3 = M4 = 1; and when SMTC > 40 ms, M2 = 1.5, M3 = M4 = 2 | | | |

If *t-Service* is broadcasted and applicable, UE shall be able to detect, measure, and evaluate neighbour cells before the serving cell stops serving the area regardless of whether the distance condition based on serving cell reference location or the legacy Srxlev/Squal condition are met, and when to start detection, measurement, and evaluation is up to UE implementation. This requirement does not apply when the time span from the last slot of SI transmission within SI modification period where the broadcasting of the last updated value for t-Service is acquired by the UE for the first time to the first slot when the cell is scheduled to stop serving the area according to the broadcasted information is less than Ttrigger, and Ttrigger = max(Tdetect,NR\_Intra, Kcarrier\* Tdetect,NR\_Inter) when serving cell is below the search threshold, and Ttrigger = max(Tdetect,NR\_Intra, Nlayer\* [60s]) when serving cell is above the search threshold, where

- Kcarrier is the number of NR inter-frequency carriers indicated by the serving cell,

- Nlayer is the total number of higher priority NR carrier frequencies broadcasted in system information,

- Tdetect,NR\_Intra refers to HST intra-frequency cell detection delay in IDLE/INACTIVE mode defined 38.133 [6] Table 4.2.2.3-2,

- Tdetect,NR\_Inter refers to HST inter-frequency cell detection delay in IDLE/INACTIVE mode defined 38.133 [6] Table 4.2.2.4-2.

The requirements in this clause apply provided that the number of SMTCs for any inter-frequency carrier does not exceed the [UE capability], otherwise UE may select one or subset of all the configured SMTCs sequentially until all of the SMTCs can be measured, the selection of SMTCs to be used is up to UE implementation, and longer measurement delay than the corresponding measurement period specified in Table 14.1.0.2-1 and Table 14.1.0.2-2 is expected.

The requirements in this clause apply provided that the valid information for the satellite serving the target cell has been provided by the serving cell.

The requirements in this clause apply provided that SSB of neighbour cells are within the time shifted SMTC.

The normative reference for this requirement is TS 38.133 [6] clause 4.2C.2.4.

### 14.1.1 NR SA FR1 Cell Reselection for Satellite Access

FFS

### 14.1.2 NR SA FR1 Cell Reselection for UE configured with the feature for enhanced requirements for Satellite Access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability needs to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets
* Annex E and F need to be updated

14.1.2.1 Test purpose

This test is to verify the requirement for the intra frequency NR cell reselection requirements for satellite access specified in clause 14.1.0.1.

14.1.2.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access [and enhanced RRM measurement requirements for NTN bands].

14.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.14.1.2.

14.1.2.4 Test description

The test scenario comprises of 1 NR carrier and 2 cells as given in tables 14.1.2.4.1-1, 14.1.2.4.1-3 and 14.1.2.5-1. 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. The flag *enhancedMeasurementLEO-r17* should be set.

14.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.1.2.4.1-1.

Table 14.1.2.4.1-1: Supported test configurations for NR SA FR1 Cell Reselection for UE configured with the feature for enhanced requirements for Satellite Access

|  |  |
| --- | --- |
| Configuration | Description |
| 14.1.2-1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 14.1.2.4.1-2

Table 14.1.2.4.1-2: Initial conditions for NR SA FR1 Cell Reselection for UE configured with the feature for enhanced requirements for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.12-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.1.2.4.1-1 | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.1.2.4.1-3.

2. Message contents are defined in clause 14.1.2.4.3.

3. Cell 1 and Cell 2 are NR cells with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

4. The initial test environment conditions are setup according to section 14.0.5.

Table 14.1.2.4.1-3: General test parameters for NR SA FR1 Cell Reselection for UE configured with the feature for enhanced requirements for Satellite Access

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
|  | |  |
| Initial condition | Active cell |  | Cell1 |  |
| T2 end condition | Active cell |  | Cell2 |  |
|  | Neighbour cells |  | Cell1 |  |
| Final condition | Active cell |  | Cell1 |  |
|  | Neighbour cells |  | Cell2 |  |
| RF Channel Number | |  | 1 |  |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| 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. |
| PRACH configuration index | |  | 102 | The detailed configuration is specified in TS 38.211 [7] clause 6.3.3.2 |
| rangeToBestCell | |  | Not configured |  |
| 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  (NOTE 1) | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15  (NOTE 1) | T3 needs to be defined so that cell re-selection reaction time is taken into account. |
| NOTE 1: If the test is performed in a LEO configuration, and the scaling factor Kmulti\_SMTC defined in clause 14.1.0.1 is greater than 1, according to UE capabilities, the duration of times T2 and T3 shall be scaled for the same factor to allow the UE to complete the cell reselection within the duration of the test case. | | | | |

14.1.2.4.2 Test procedure

The test scenario comprises of two satellite access NR FDD intra-frequency cells as given in table 14.1.2.4.1-3. 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.

In the following test procedure "UE responds" means "UE starts transmitting preamble on PRACH for sending the *RRCSetupRequest* message to perform a registration procedure for mobility.

For NGSO configurations, the number of LEO satellites that a UE can measure in parallel within an SMTC is a capability the UE reports via *maxNumber-NGSO-SatellitesWithinOneSMTC-r17*. This value will determine the requirement to be used in the test, as well as the duration of T2 and T3.

1. Ensure the UE is in [state RRC\_IDLE with generic procedure parameters Connectivity NR and Test Mode On according to TS 38.508-1 [14] clause 4.5]. Cell 1 is an active cell and Cell 2 is powered off.

2. Set the parameters according to T1 in Table 14.1.2.5-1. Propagation conditions are set according to Annex C clause C.2.2. T1 starts.

3. Set Cell 2 physical cell identity = ((current Cell 2 physical cell identity + 1) mod 1008) for this iteration of the test procedure loop.

4. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.1.2.5-1. T2 starts.

5. The SS waits for random access requests information from the UE to perform cell re-selection to a newly detectable cell, Cell 2.

6. If the UE responds on the newly detectable cell, Cell 2 during time duration T2 within 11 seconds for GSO configurations or for NGSO configurations for UEs supporting measurement of only one LEO satellite in parallel within an SMTC, or within 20 seconds for NGSO configurations for UEs supporting measurement of two or more LEO satellites in parallel within an SMTC, from the beginning of time period T2, then count a success for the event “Re-select newly detected Cell 2”. Otherwise count a fail for the event “Re-select newly detected Cell 2”.

7. If the UE has re-selected Cell 2 within T2, after the re-selection or when T2 expires, continue with step 7a.  
Otherwise, if T2 expires and the UE has not yet re-selected Cell 2, the TE shall switch off and on the UE and skip to step 11a.

7a The SS shall send an *RRCRelease* message to ensure that the UE is in state RRC\_IDLE on Cell 2.

8. The SS shall switch the power setting from T2 to T3 as specified in Table 14.1.2.5-1. T3 starts.

9. The SS waits for random access requests information from the UE to perform cell re-selection to an already detected cell, Cell 1.

10. If the UE responds on the already detected cell, Cell 1 during time duration T3 within 6 seconds for GSO configurations or for NGSO configurations for UEs supporting measurement of only one LEO satellite in parallel within an SMTC, or within 9 seconds for NGSO configurations for UEs supporting measurement of two or more LEO satellites in parallel within an SMTC, from the beginning of time period T3, then count a success for the event “Re-select already detected Cell 1”. Otherwise count a fail for the event “Re-select already detected Cell 1”.

11. If the UE has re-selected to Cell 1 within T3, after the re-selection or when T3 expires, the SS shall send an *RRCRelease* message to the UE and then proceed with step 1 for the next iteration. Otherwise proceed with step 11a.

11a.The SS shall switch off and on the UE, and skip to step 1 for the next iteration.

12. Repeat step 2-11 until a test verdict has been achieved. Each of the events “Re-select newly detected Cell 2” and “Re-select already detected Cell 1” is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G clause G.2 is achieved. Different events may require different times for a verdict. If both events pass, the test passes. If one event fails, the test fails.

14.1.2.4.3 Message contents

FFS

14.1.2.5 Test requirements

Table 14.1.2.5-1 defines the primary level settings including test tolerances for NR SA FR1 Cell Reselection for UE configured with the feature for enhanced requirements for Satellite Access.

Table 14.1.2.5-1: Cell specific parameters for NR SA FR1 Cell Reselection for UE configured with the feature for enhanced requirements for Satellite Access

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Satellite information |  | SSC.1 for GSO test  SSC.2 for NGSO test | | | NSC.1 for GSO test  NSC.2 for NGSO test | | |
| PDSCH RMC configuration |  | SR.1.1 FDD | | | SR.1.1 FDD | | |
| RMSI CORESET configuration |  | CR.1.1 FDD | | | CR.1.1 FDD | | |
| Dedicated CORESET configuration |  | CCR.1.1 FDD | | | CCR.1.1 FDD | | |
| OCNG Pattern |  | OP.1 | | | OP.1 | | |
| Initial DL BWP configuration |  | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | ULBWP.0.1 | | | ULBWP.0.1 | | |
| SSB configuration |  | SSB.1 FR1 | | | SSB.X FR1 | | |
| SMTC configuration |  | #1: SMTC.2 for Cell 1  #2: SMTC.7 for Cell 2 | | | #1: SMTC.2 for Cell 1  #2: SMTC.7 for Cell 2 | | |
| RLM-RS |  | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | -130 | | | -130 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| Qhysts | dB | 0 | | | 0 | | |
| Qoffsets, n | dB | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | SS-RSRP | | | SS-RSRP | | |
|  | dB | 16+TT | -3.11+TT | 2.79+TT | -infinity | 2.79+TT | -3.11+TT |
| Note2 | dBm/SCS | -98+TT | | | | | |
| Note2 | dBm/15 kHz | -98+TT | | | | | |
|  | dB | 16+TT | 13+TT | 16+TT | -infinity | 16+TT | 13+TT |
| SS-RSRP Note3 | dBm/SCS | -82+TT | -85+TT | -82+TT | -infinity | -82+TT | -85+TT |
| Io | dBm/9.36 MHz | -53.94+TT | -52.21+TT | -52.21+TT | Same as parameters specified in Cell 1 columns- | | |
| Treselection | s | 0+TT | 0+TT | 0+TT | 0+TT | 0+TT | 0+TT |
| SintrasearchP | dB | 60 | | | 60 | | |
| Propagation Condition |  | AWGN | | | | | |

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 *RRCSetupRequest* message to perform a registration procedure for mobility and periodic registration update on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than:

11 s if Kmulti\_SMTC is equal to 1 (see note on Table 14.1.2.4.1-3); or

20 s if Kmulti\_SMTC is equal to 2.

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 *RRCSetupRequest* message to perform a registration procedure for mobility and periodic registration update on cell 1.

The cell re-selection delay to an already detected cell shall be less than:

6 s if Kmulti\_SMTC is equal to 1 (see note on Table 14.1.2.4.1-3); or

9 s if Kmulti\_SMTC is equal to 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: Kmulti\_SMTC \*Tdetect, NR\_Intra\_enh + TSI-NR, and to an already detected cell can be expressed as: Kmulti\_SMTC \*Tevaluate, NR\_ intra\_enh + TSI-NR,

Where:

Tdetect, NR\_Intra\_enh See Table 14.1.0.1-2 in clause 14.1.0.1

Tevaluate, NR\_ Intra\_enh See Table 14.1.0.1-2 in clause 14.1.0.1

TSI-NR Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280ms is assumed in this test case provided that SIB1 and SIB19 are scheduled with 20ms period and 80 ms period, respectively.

If Kmulti\_SMTC = 1, Kmulti\_SMTC \*Tevaluate, NR\_Intra\_enh + TSI-NR = 5.12 s; allow 6 s. And Kmulti\_SMTC \*Tdetect, NR\_ Intra\_enh + TSI-NR = 10.24 s, allow 11 s.

If K\_multi\_SMTC = 2, Kmulti\_SMTC \*Tevaluate, NR\_Intra\_enh + TSI-NR = 8.96 s; allow 9 s. And Kmulti\_SMTC \*Tdetect, NR\_Intra\_enh + TSI-NR = 19.2 s, allow 20s.

In this test, SMTC.2 (period 20ms, duration 5ms, offset 0ms) and SMTC.7 (period 20ms, duration 5ms, offset 5ms) are configured. These are non-overlapping SMTCs therefore, according to clause 14.1.0.1, Kmulti\_SMTC = 1 for GEO, Kmulti\_SMTC = 1 for LEO for UEs supporting measurement of only one LEO satellite in parallel within an SMTC , and Kmulti\_SMTC = 2 for LEO for Ues supporting measurement of two or more LEO satellites in parallel within an SMTC .

### 14.1.3 NR SA FR1 Time-based Measurement Initiation Cell Reselection for Satellite Access

Editor’s Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability needs to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets
* Annex E and F need to be updated

14.1.3.1 Test purpose

This test is to verify the requirement for the intra frequency NR cell reselection requirements for satellite access specified in clause 14.1.0.1.

14.1.3.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access [and time-based measurement initiation].

14.1.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.14.1.3.

14.1.3.4 Test description

The test scenario comprises of 1 NR carrier and 2 cells as given in tables 14.1.3.4.1-1, 14.1.3.4.1-3 and 14.1.3.5-1. The test consists of two successive time periods, with time duration of T1 and T2, 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. *T-Service* broadcasted in SIB19 of Cell 1 is set to the time point that is 36s after start of T2.

14.1.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.1.3.4.1-1.

Table 14.1.3.4.1-1: Supported test configurations for NR SA FR1 Time-based Measurement Initiation Cell Reselection for Satellite Access

|  |  |
| --- | --- |
| Configuration | Description |
| 14.1.3-1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 14.1.3.4.1-2

Table 14.1.3.4.1-2: Initial conditions for NR SA FR1 Time-based Measurement Initiation Cell Reselection for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.12-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.1.3.4.1-1 | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable Ues without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.1.3.4.1-3.

2. Message contents are defined in clause 14.1.3.4.3.

3. Cell 1 and Cell 2 are NR cells with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

4. The initial test environment conditions are setup according to section 14.0.5.

Table 14.1.3.4.1-3: General test parameters for NR SA FR1 Time-based Measurement Initiation Cell Reselection for Satellite Access

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
|  | |  |
| Initial condition | Active cell |  | Cell1 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| RF Channel Number | |  | 1 |  |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| 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. |
| PRACH configuration index | |  | 102 | The detailed configuration is specified in TS 38.211 [7] clause 6.3.3.2 |
| rangeToBestCell | |  | Not configured |  |
| 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  (NOTE 1) | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| NOTE 1: If the test is performed in a LEO configuration, and the scaling factor Kmulti\_SMTC defined in clause 14.1.0.1 is greater than 1, according to UE capabilities, the duration of time T2 shall be scaled for the same factor to allow the UE to complete the cell reselection within the duration of the test case. | | | | |

14.1.3.4.2 Test procedure

In the following test procedure “UE responds” means “UE starts transmitting preamble on PRACH for sending the *RRCSetupRequest* message to perform a registration procedure for mobility.

For NGSO configurations, the number of LEO satellites that a UE can measure in parallel within an SMTC is a capability the UE reports via *maxNumber-NGSO-SatellitesWithinOneSMTC-r17*. This value will determine the requirement to be used in the test, as well as the duration of T2.

1. Ensure the UE is in [state RRC\_IDLE with generic procedure parameters Connectivity NR and Test Mode On according to TS 38.508-1 [14] clause 4.5]. Cell 1 is an active cell and Cell 2 is powered off.

2. Set the parameters according to T1 in Table 14.1.3.5-1. Propagation conditions are set according to Annex C clause C.2.2. *T-Service* broadcasted in SIB19 of Cell 1 is set to the time point that is 36s after start of T2, according to Table 14.1.3.4.3-FFS (this timestamp indicates the UE when Cell 1 will stop providing service). T1 starts.

3. Set Cell 2 physical cell identity = ((current Cell 2 physical cell identity + 1) mod 1008) for this iteration of the test procedure loop.

4. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.1.3.5-1. T2 starts.

5. The SS waits for random access requests information from the UE to perform cell re-selection to a newly detectable cell, Cell 2.

6. If the UE responds on the newly detectable cell, Cell 2 during time duration T2 within 34 seconds for GSO configurations or for NGSO configurations for Ues supporting measurement of only one LEO satellite in parallel within an SMTC, or within 66 seconds for NGSO configurations for Ues supporting measurement of two or more LEO satellites in parallel within an SMTC, from the beginning of time period T2, then count a success for the test.

7. If the UE has re-selected to Cell 2 within T2, after the re-selection or when T2 expires, the SS shall send an *RRCRelease* message to the UE and then proceed with step 1 for the next iteration. Otherwise proceed with step 7a.

7a. The SS shall switch off and on the UE, and skip to step 1 for the next iteration.

8. Repeat step 2-7 until a test verdict has been achieved.

14.1.3.4.3 Message contents

FFS

14.1.3.5 Test requirements

Table 14.1.3.5-1 defines the primary level settings including test tolerances for NR SA FR1 Time-based Measurement Initiation Cell Reselection for Satellite Access.

Table 14.1.3.5-1: Cell specific parameters for NR SA FR1 Time-based Measurement Initiation Cell Reselection for Satellite Access

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | Cell 2 | |
|  |  | T1 | T2 | T1 | T2 |
| Satellite information |  | SSC.1 for GSO test  SSC.2 for NGSO test | | NSC.1 for GSO test  NSC.2 for NGSO test | |
| PDSCH RMC configuration |  | SR.1.1 FDD | | SR.1.1 FDD | |
| RMSI CORESET configuration |  | CR.1.1 FDD | | CR.1.1 FDD | |
| Dedicated CORESET configuration |  | CCR.1.1 FDD | | CCR.1.1 FDD | |
| OCNG Pattern |  | OP.1 | | OP.1 | |
| Initial DL BWP configuration |  | DLBWP.0.1 | | DLBWP.0.1 | |
| Initial UL BWP configuration |  | ULBWP.0.1 | | ULBWP.0.1 | |
| SSB configuration |  | SSB.1 FR1 | | SSB.1 FR1 | |
| SMTC configuration |  | #1: SMTC.1 for Cell 1 and Cell 2 | | #1: SMTC.1 for Cell 1 and Cell 2 | |
| RLM-RS |  | SSB | | SSB | |
| Qrxlevmin | dBm/SCS | -130 | | -130 | |
| Pcompensation | dB | 0 | | 0 | |
| Qhysts | dB | 0 | | 0 | |
| Qoffsets, n | dB | 0 | | 0 | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | SS-RSRP | | SS-RSRP | |
|  | dB | 16+TT | -3.11+TT | -infinity | 2.79+TT |
| Note2 | dBm/SCS | -98+TT | | | |
| Note2 | dBm/15 kHz | -98+TT | | | |
|  | dB | 16+TT | 13+TT | -infinity | 16+TT |
| SS-RSRP Note3 | dBm/SCS | -82+TT | -85+TT | -infinity | -82+TT |
| Io | dBm/9.36 MHz | -53.94+TT | -52.21+TT | Same as parameters specified in Cell 1 columns- | |
| Treselection | s | 0 | 0 | 0 | 0 |
| SintrasearchP | dB | 40 | | 40 | |
| Propagation Condition |  | AWGN | | | |

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 *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than:

34 s if Kmulti\_SMTC is equal to 1 (see note on Table 14.1.3.4.1-3); or

66 s if Kmulti\_SMTC is equal to 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: Kmulti\_SMTC \*Tdetect, NR\_Intra + TSI-NR,

Where:

Tdetect, NR\_Intra See Table 14.1.0.1-1 in clause 14.1.0.1

TSI-NR Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280ms is assumed in this test case provided that SIB1 and SIB19 are scheduled with 20ms period and 80 ms period, respectively.

If Kmulti\_SMTC = 1, Kmulti\_SMTC \*Tdetect, NR\_ intra + TSI-NR = 33.28 s, allow 34s.

If Kmulti\_SMTC = 2, Kmulti\_SMTC \*Tdetect, NR\_ intra + TSI-NR = 65.28 s, allow 66s.

In this test, SMTC.1 (period 20ms, duration 1ms, offset 0ms) is configured on both cells. Since only one SMTC is configured there is no chance for overlap, therefore according to clause 14.1.0.1, Kmulti\_SMTC = 1 for GEO, Kmulti\_SMTC = 1 for LEO for UEs supporting measurement of only one LEO satellite in parallel within an SMTC , and Kmulti\_SMTC = 2 for LEO for UEs supporting measurement of two or more LEO satellites in parallel within an SMTC .

### 14.1.4 NR SA FR1 Location-based Measurement Initiation Cell Reselection for Satellite Access

Editor’s Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability needs to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets
* Annex E and F need to be updated

14.1.4.1 Test purpose

This test is to verify the requirement for the intra frequency NR cell reselection requirements for satellite access specified in clause 14.1.0.1.

14.1.4.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access [and location-based measurement initiation].

14.1.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.14.1.4.

14.1.4.4 Test description

The test scenario comprises of 1 NR carrier and 2 cells as given in tables 14.1.4.4.1-1, 14.1.4.4.1-3 and 14.1.4.5-1. The test consists of two successive time periods, with time duration of T1 and T2, 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.

At 4s after the start of T2, the UE location is changed such that the distance to the reference location broadcasted in SIB19 of Cell 1 is exceeded by the configured value in *distanceThresh* plus 50m.

14.1.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.1.4.4.1-1.

Table 14.1.4.4.1-1: Supported test configurations for NR SA FR1 Location-based Measurement Initiation Cell Reselection for Satellite Access

|  |  |
| --- | --- |
| Configuration | Description |
| 14.1.4-1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |

Configure the test equipment and the DUT according to the parameters in Table 14.1.4.4.1-2

Table 14.1.4.4.1-2: Initial conditions for NR SA FR1 Location-based Measurement Initiation Cell Reselection for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.12-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.1.4.4.1-1 | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable Ues without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.1.4.4.1-3.

2. Message contents are defined in clause 14.1.4.4.3.

3. Cell 1 and Cell 2 are NR cells with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

4. The initial test environment conditions are setup according to section 14.0.5.

Table 14.1.4.4.1-3: General test parameters for NR SA FR1 Location-based Measurement Initiation Cell Reselection for Satellite Access

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
|  | |  |
| Initial condition | Active cell |  | Cell1 |  |
| T2 end condition | Active cell |  | Cell2 |  |
| Neighbour cells |  | Cell1 |  |
| RF Channel Number | |  | 1 |  |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| 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. |
| PRACH configuration index | |  | 102 | The detailed configuration is specified in TS 38.211 [7] clause 6.3.3.2 |
| rangeToBestCell | |  | Not configured |  |
| 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  (NOTE 1) | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| NOTE 1: If the test is performed in a LEO configuration, and the scaling factor Kmulti\_SMTC defined in clause 14.1.0.1 is greater than 1, according to UE capabilities, the duration of time T2 shall be scaled for the same factor to allow the UE to complete the cell reselection within the duration of the test case. | | | | |

14.1.4.4.2 Test procedure

In the following test procedure “UE responds” means “UE starts transmitting preamble on PRACH for sending the *RRCSetupRequest* message to perform a registration procedure for mobility.

For NGSO configurations, the number of LEO satellites that a UE can measure in parallel within an SMTC is a capability the UE reports via *maxNumber-NGSO-SatellitesWithinOneSMTC-r17*. This value will determine the requirement to be used in the test, as well as the duration of T2.

1. Ensure the UE is in [state RRC\_IDLE with generic procedure parameters Connectivity NR and Test Mode On according to TS 38.508-1 [14] clause 4.5]. Cell 1 is an active cell and Cell 2 is powered off.

2. Set the parameters according to T1 in Table 14.1.4.5-1. Propagation conditions are set according to Annex C clause C.2.2. T1 starts.

3. Set Cell 2 physical cell identity = ((current Cell 2 physical cell identity + 1) mod 1008) for this iteration of the test procedure loop.

4. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.1.4.5-1. T2 starts.

5. After 4 seconds from the start of T2, the UE location is changed such that the distance to the reference location broadcasted in SIB19 of Cell 1 is exceeded by the configured value in *distanceThresh* plus 50m, according to Table 14.1.4.4.3-FFS.

6. The SS waits for random access requests information from the UE to perform cell re-selection to a newly detectable cell, Cell 2.

7. If the UE responds on the newly detectable cell, Cell 2 during time duration T2 within 34 seconds for GSO configurations or for NGSO configurations for Ues supporting measurement of only one LEO satellite in parallel within an SMTC, or within 66 seconds for NGSO configurations for UEs supporting measurement of two or more LEO satellites in parallel within an SMTC, from the beginning of time period T2, then count a success for the test.

8. If the UE has re-selected to Cell 2 within T2, after the re-selection or when T2 expires, the SS shall send an *RRCRelease* message to the UE and then proceed with step 1 for the next iteration. Otherwise proceed with step 8a.

8a. The SS shall switch off and on the UE, and skip to step 1 for the next iteration.

9. Repeat step 2-8 until a test verdict has been achieved.

14.1.4.4.3 Message contents

FFS

14.1.4.5 Test requirements

Table 14.1.4.5-1 defines the primary level settings including test tolerances for NR SA FR1 Location-based Measurement Initiation Cell Reselection for Satellite Access.

Table 14.1.4.5-1: Cell specific parameters for NR SA FR1 Location-based Measurement Initiation Cell Reselection for Satellite Access

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | Cell 2 | |
|  |  | T1 | T2 | T1 | T2 |
| Satellite information |  | SSC.1 for GSO test  SSC.2 for NGSO test | | NSC.1 for GSO test  NSC.2 for NGSO test | |
| PDSCH RMC configuration |  | SR.1.1 FDD | | SR.1.1 FDD | |
| RMSI CORESET configuration |  | CR.1.1 FDD | | CR.1.1 FDD | |
| Dedicated CORESET configuration |  | CCR.1.1 FDD | | CCR.1.1 FDD | |
| OCNG Pattern |  | OP.1 | | OP.1 | |
| Initial DL BWP configuration |  | DLBWP.0.1 | | DLBWP.0.1 | |
| Initial UL BWP configuration |  | ULBWP.0.1 | | ULBWP.0.1 | |
| SSB configuration |  | SSB.1 FR1 | | SSB.1 FR1 | |
| SMTC configuration |  | #1: SMTC.1 for Cell 1 and Cell 2 | | #1: SMTC.1 for Cell 1 and Cell 2 | |
| RLM-RS |  | SSB | | SSB | |
| Qrxlevmin | dBm/SCS | -130 | | -130 | |
| Pcompensation | dB | 0 | | 0 | |
| Qhysts | dB | 0 | | 0 | |
| Qoffsets, n | dB | 0 | | 0 | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | SS-RSRP | | SS-RSRP | |
|  | dB | 16+TT | -3.11+TT | -infinity | 2.79+TT |
| Note2 | dBm/SCS | -98+TT | | | |
| Note2 | dBm/15 kHz | -98+TT | | | |
|  | dB | 16+TT | 13+TT | -infinity | 16+TT |
| SS-RSRP Note3 | dBm/SCS | -82+TT | -85+TT | -infinity | -82+TT |
| Io | dBm/9.36 MHz | -53.94+TT | -52.21+TT | Same as parameters specified in Cell 1 columns- | |
| Treselection | s | 0 | 0 | 0 | 0 |
| SintrasearchP | dB | 40 | | 40 | |
| Propagation Condition |  | AWGN | | | |

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 *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than:

34 s if Kmulti\_SMTC is equal to 1 (see note on Table 14.1.4.4.1-3); or

66 s if Kmulti\_SMTC is equal to 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: Kmulti\_SMTC \*Tdetect, NR\_Intra + TSI-NR, and to an already detected cell can be expressed as: Kmulti\_SMTC \*Tevaluate, NR\_ intra + TSI-NR,

Where:

Tdetect, NR\_Intra See Table 14.1.0.1-1 in clause 14.1.0.1

Tevaluate, NR\_ intra See Table 14.1.0.1-1 in clause 14.1.0.1

TSI-NR Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280ms is assumed in this test case provided that SIB1 and SIB19 are scheduled with 20ms period and 80 ms period, respectively.

If Kmulti\_SMTC = 1, Kmulti\_SMTC \*Tdetect, NR\_ intra + TSI-NR = 33.28 s, allow 34s.

If Kmulti\_SMTC = 2, Kmulti\_SMTC \*Tdetect, NR\_ intra + TSI-NR = 65.28 s, allow 66s.

In this test, SMTC.1 (period 20ms, duration 1ms, offset 0ms) is configured on both cells. Since only one SMTC is configured there is no chance for overlap, therefore according to clause 14.1.0.1, Kmulti\_SMTC = 1 for GEO, Kmulti\_SMTC = 1 for LEO for UEs supporting measurement of only one LEO satellite in parallel within an SMTC , and Kmulti\_SMTC = 2 for LEO for UEs supporting measurement of two or more LEO satellites in parallel within an SMTC .

## 14.2 RRC\_CONNECTED state mobility

### 14.2.1 Handover for SAN

#### 14.2.1.0 Minimum conformance requirements

##### 14.2.1.0.1 Minimum conformance requirements for handover

The requirements in this clause are applicable to both intra-frequency and inter-frequency handovers from NR SAN FR1 cell to NR SAN FR1 cell. The requirements in this clause apply provided that UE has the valid and applicable parameters of ephemeris information, common TA, DL and UL Polarization information, Koffset, and Kmac for target NR SAN cell during Dhandover, otherwise interruption time may be longer than the requirements in this clause.

The normative reference for this requirement is TS 38.133 [6] clause 6.1C.1.2.

14.2.1.0.1.1 Handover delay

When the UE receives a RRC message implying handover to NR SAN cell, the UE shall be ready to start the transmission of the new uplink PRACH channel within Dhandover msec from the end of the last TTI containing the RRC command.

Where:

- Dhandover equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [13] plus the interruption time stated in clause 14.2.1.0.1.2.

The normative reference for this requirement is TS 38.133 [6] clause 6.1C.1.2.1

14.2.1.0.1.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay.

When intra-frequency or inter-frequency handover to NR SAN cell is commanded,

the interruption time shall be less than Tinterrupt

Tinterrupt = Tsearch + TIU + Tprocessing + T∆ + Tmargin ms

Otherwise, no interruption time requirement is applied.

Where:

- Tsearch is the time required to search the target NR SAN cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then Tsearch = 0 ms. If the target cell is an unknown intra-frequency cell and the target cell Es/Iot ≥ -2 dB, then Tsearch = Trs ms. If the target cell is an unknown inter-frequency cell and the target cell Es/Iot ≥ -2 dB, then Tsearch = 3\* Trs ms. Regardless of whether DRX is in use by the UE, Tsearch shall still be based on non-DRX target cell search times.

- T∆ is time for fine time tracking and acquiring full timing information of the target cell. T∆ = Trs.

- Tprocessing is time for UE processing. Tprocessing can be up to 20ms.

- Tmargin is time for SSB post-processing. Tmargin can be up to 2ms.

- TIU is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. TIU can be up to the summation of SSB to PRACH occasion association period and [10] ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [8].

- Trs is the SMTC periodicity of the target NR SAN cell if the UE has been provided with an SMTC configuration for the target cell in the handover command, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with Trs=5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms. If the UE has been provided with higher layer in TS 38.331 [13] signalling of *smtc2*prior to the handover command, Trs follows *smtc1* or *smtc2* according to the physical cell ID of the target cell.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in 38.133 [6] clause 9.2.5 for intra-frequency handover and 38.133 [6] clause 9.3.4 for inter-frequency handover.

The normative reference for this requirement is TS 38.133 [6] clause 6.1C.1.2.2

##### 14.2.1.0.2 Minimum conformance requirements for conditional handover

The requirements in this clause are applicable to both intra-frequency and inter-frequency conditional handover from NR SAN FR1 cell to NR SAN FR1 cell. The requirements in this clause apply provided that UE has the valid and applicable parameters of ephemeris information, common TA, DL and UL Polarization information, Koffset, and Kmac for target NR SAN cell during DCHO, otherwise the measurement time, preparation time and interruption time may be longer than the requirements in clauses 14.2.1.0.2.2, 14.2.1.0.2.3 and 14.2.1.0.2.4.

The normative reference for this requirement is TS 38.133 [6] clause 6.1C.2.2.

14.2.1.0.2.1 Handover delay

Procedure delays for all procedures that can command a conditional handover are specified in TS 38.331 [13]. UE shall start RRM measurement before the time or distance condition is met, the time/distance condition is defined in clause 5.5.4 in TS 38.331[13]

When the UE receives a RRC message implying conditional handover the UE shall be ready to start the transmission of the new uplink PRACH channel within DCHO seconds from the end of the last TTI containing the RRC command.

DCHO = TRRC + TEvent\_DU + Tmeasure + Tinterrupt + TCHO\_execution

Where:

- TRRC is the RRC procedure delay defined in clause 12 in TS 38.331 [13].

- TEvent\_DU is the delay uncertainty which is the time from when the UE successfully decodes a conditional handover command until a condition exists at the measurement reference point which will trigger the conditional handover

- Tmeasure is the measurements time stated in clause 14.2.1.0.2.2.

- TCHO\_execution is the UE conditional execution preparation time for conditional handover in clause 14.2.1.0.2.3.

- Tinterrupt is the interruption time stated in clause 14.2.1.0.2.4.

The conditional handover delay requirements are applied if condition T1-2 is later than the end of Tmeasure for time based CHO, or both condition D1-1 and condition D1-2 are fulfilled before the end of Tmeasure for location-based CHO, otherwise no CHO requirement is applied.

The normative reference for this requirement is TS 38.133 [6] clause 6.1C.2.2.1.

14.2.1.0.2.2 Measurement time

The measurement time delay is defined from the end of TEvent\_DU until UE executes a handover to a target cell and interruption time starts.

For intra-frequency handover, the requirements for identifying a new detectable intra frequency cell measured without Time To Trigger (TTT) and L3 filtering, Tidentify\_intra\_with\_index or Tidentify\_intra\_without\_index, defined in 38.133 [6] clauses 9.2C.5.1 and 9.2C.6.1 are used.

For time-based conditional intra-frequency handover:

- If condition T1-1 occurs earlier than TEvent\_DU + Tidentify\_intra\_with\_index or TEvent\_DU + Tidentify\_intra\_without\_index, then the measurement time delay equal to Tidentify\_intra\_with\_index or Tidentify\_intra\_without\_index assuming UE only performs the measurements within SMTC window of the target cell.

- If condition T1-1 occurs later than TEvent\_DU + Tidentify\_intra\_with\_index or TEvent\_DU + Tidentify\_intra\_without\_index, then the measurement time delay equals to the time from the end of Tevent\_DU until condition T1-1.

For location-based conditional intra-frequency handover:

- If both condition D1-1 and condition D1-2 are fulfilled earlier than TEvent\_DU + Tidentify\_intra\_with\_index or TEvent\_DU + Tidentify\_intra\_without\_index, then the measurement time delay equal to Tidentify\_intra\_with\_index or Tidentify\_intra\_without\_index assuming UE only performs measurements within SMTC window of the target cell.

- If both condition D1-1 and condition D1-2 are fulfilled is later than TEvent\_DU plus Tidentify\_intra\_with\_index or Tidentify\_intra\_without\_index for intra-frequency handover, then the measurement time delay equal to the time from the end of Tevent\_DU until time when both condition D1-1 and condition D1-2 are fulfilled.

For inter-frequency handover, the requirements for identifying a new detectable inter frequency cell measured without Time To Trigger (TTT) and L3 filtering, Tidentify\_inter\_with\_index or Tidentify\_inter\_without\_index, defined in 38.133 [6] clause 9.3C.7.1 are used.

For time-based conditional inter-frequency handover:

- If condition T1-1 occurs earlier than TEvent\_DU + Tidentify\_inter\_with\_index or TEvent\_DU + Tidentify\_inter\_without\_index, then the measurement time delay equal to Tidentify\_inter\_with\_index or Tidentify\_inter\_without\_index assuming that the UE uses only the SMTC window of the target inter-frequency carrier for performing the measurements. In this case Ksatellite=1, CSSFinter=1.

- If condition T1-1 occurs later than TEvent\_DU + Tidentify\_inter\_with\_index or TEvent\_DU + Tidentify\_inter\_without\_index, then the measurement time delay equals to the time from the end of Tevent\_DU until condition T1-1.

For location-based conditional inter-frequency handover,

- If both condition D1-1 and condition D1-2 are fulfilled earlier than TEvent\_DU + Tidentify\_inter\_with\_index or TEvent\_DU + Tidentify\_inter\_without\_index, then the measurement time delay equal to Tidentify\_inter\_with\_index or Tidentify\_inter\_without\_index, assuming that the UE uses only the SMTC window of the target inter-frequency carrier for performing the measurements. In this case Ksatellite=1, CSSFinter=1.

- If both condition D1-1 and condition D1-2 are fulfilled later than TEvent\_DU plus Tidentify\_inter\_with\_index or Tidentify\_inter\_without\_index, then the measurement time delay equal to the time from the end of Tevent\_DU until time of both condition D1-1 and condition D1-2 are fulfilled.

When TTT or L3 filtering is used an additional delay can be expected.

A cell is detectable only if at least one SSB measured from the cell being configured remains detectable during the time period [Tidentify\_intra\_without\_index] or [Tidentify\_intra\_with\_index] for intra-frequency handover or [Tidentify\_inter\_without\_index] for inter-frequency handover.

The normative reference for this requirement is TS 38.133 [6] clause 6.1C.2.2.2.

14.2.1.0.2.3 Preparation time

TCHO\_execution is the UE execution preparation time for conditional handover and starts after UE realizes the condition of CHO is met and identity of the target cell is determined. TCHO\_execution can be up to 10ms.

The normative reference for this requirement is TS 38.133 [6] clause 6.1C.2.2.3.

14.2.1.0.2.4 Interruption time

The interruption time is the time between when the UE starts to execute the conditional handover to the target cell and the time the UE starts transmission of the new PRACH.

For intra-frequency or inter-frequency conditional handover, the measurment time shall be less than

Tinterrupt = Tprocessing + TIU + T∆ + Tmargin ms

Where:

- Tprocessing is time for UE processing. Tprocessing can be up to 20ms.

- TIU is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. TIU can be up to the summation of SSB to PRACH occasion association period and [10] ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [8]

- T∆ is time for fine time tracking and acquiring full timing information of the target cell. TΔ = Trs.

- Tmargin is time for SSB post-processing. Tmargin can be up to 2ms.

- Trs is the SMTC periodicity of the target NR SAN cell if the UE has been provided with an SMTC configuration for the target cell in the handover command, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with Trs=5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms. If the UE has been provided with higher layer in TS 38.331 [13] signalling of *smtc2*prior to the handover command, Trs follows *smtc1* or *smtc2* according to the physical cell ID of the target cell.

NOTE 1: The actual value of TIU shall depend upon the PRACH configuration used in the target cell.

The normative reference for this requirement is TS 38.133 [6] clause 6.1C.2.2.4.

#### 14.2.1.1 NR SA FR1 Handover for Satellite Access

FFS

#### 14.2.1.2 NR SA FR1-FR1 Handover for Satellite Access

FFS

#### 14.2.1.3 NR SA FR1 Time-based Conditional Handover for Satellite Access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability may need to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets
* Annex E and F need to be updated

14.2.1.3.1 Test purpose

This test is to verify the requirement for intra-frequency SAN time-based conditional handover from FR1 to FR1 specified in clause 14.2.1.0.2.

14.2.1.3.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access and time-based conditional handover.

14.2.1.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.2.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.14.2.1.3.

14.2.1.3.4 Test description

The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2. During T1, the UE is configured to measure intra-frequency neighbour cell. The RRC message implying time-based handover to cell 2 with Event CondEvent T1 shall be sent to UE, at a time earlier than TRRC (10ms) before the beginning of T2.

Starting T2, cell 2 becomes detectable and offset better than cell 1 and time condition event t1-Threshold-r17 is fulfilled.

14.2.1.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.2.1.3.4.1-1.

Table 14.2.1.3.4.1-1: Supported test configurations for NR SA FR1 Time-based Conditional Handover for Satellite Access

|  |  |
| --- | --- |
| Configuration | Description |
| 14.2.1.3-1 | GSO, NR FDD, 15kHz SSB SCS, 10 MHz BW |
| 14.2.1.3-2 | NGSO, NR FDD, 15kHz SSB SCS, 10 MHz BW |
| Note: If UE supports both NGSO and GSO, the GSO-based test cases can be skipped if the UE passes NGSO-based test cases. | |

Configure the test equipment and the DUT according to the parameters in Table 14.2.1.3.4.1-2

Table 14.2.1.3.4.1-2: Initial conditions for NR SA FR1 Time-based Conditional Handover for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.12-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.2.1.3.4.1-1 | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.2.1.3.4.1-3.

2. Message contents are defined in clause 14.2.1.3.4.3.

3. Cell 1 and Cell 2 are NR cells (PCell and neighbour cell, respectively) with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

4. The initial test environment conditions are setup according to section 14.0.5.

Table 14.2.1.3.4.1-3: General test parameters for NR SA FR1 Time-based Conditional Handover for Satellite Access

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| RF Channel Number | |  | 1 | One NR NTN satellite RF channel |
| Initial conditions | Active cell |  | Cell 1 | FDD duplex mode cell |
|  | Neighbouring cell |  | Cell 2 | FDD duplex mode cell |
| Final condition | Active cell |  | Cell 2 |  |
| Satellite configuration | Config 1 |  | RMC in [A.x] | For GSO satellite configuration |
| Config 2 |  | RMC in [A.x] | For NGSO satellite configuration |
| UE position (N,S, H) | |  | [(0, 0, 0)] | Set by AT command |
| t1-Threshold-r17.condEventT1-r17 | | s | T2 | Entering condition |
| duration-r17.condEventT1-r17 | | slot | 1000 | Give 1s search duration |
| A3-Offset in condition | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | S | ≤ 2 |  |

14.2.1.3.4.2 Test procedure

The test scenario comprises of two satellite access NR FDD intra-frequency cells as given in table 14.2.1.3.4.1-3. The handover delay is tested.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On and Test Mode On according to TS 38.508-1 [14] clause 4.5]. Cell 1 is the active cell. Establish SRB2 and DRB. Set Cell 2 physical cell identity to the initial physical cell identity.

2. Set the parameters according to T1 in Table 14.2.1.3.5-1. Propagation conditions are set according to Annex C clause C.2.2. T1 starts.

3. The SS shall transmit an *RRCReconfiguration* message [with *conditionalReconfiguration* on Cell 1] to configure time-based CHO condition on the UE.

4. The UE shall transmit an *RRCReconfigurationComplete* message.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.2.1.3.5-1. T2 starts.

6. If the UE transmits the PRACH preambles to Cell 2 less than 872 ms from the beginning of time period T2, then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.

7. After T2 expires, [the SS sends an *RRCReconfiguration* with *reconfigurationWithSync*] to cause UE handover back to Cell 1. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2). If the handover back to Cell 1 was successful go to step 9. If the handover back to Cell 2 was not successful, go to step 8.

8. Switch off and then on the UE and go to step 1.

9. Repeat steps 2-7 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

14.2.1.3.4.3 Message contents

FFS

14.2.1.3.5 Test requirements

Table 14.2.1.3.5-1 defines the primary level settings including test tolerances for NR SA FR1 Time-based Conditional Handover for Satellite Access.

Table 14.2.1.3.5-1: Cell specific parameters for NR SA FR1 Time-based Conditional Handover for Satellite Access

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Test configuration | Unit | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| NR RF Channel Number | | Config 1,2 |  | 1 | | 1 | |
| BWchannel | |  | MHz | 10: NRB,c = 52 | | 10: NRB,c = 52 | |
| BWP BW | |  | MHz | 10: NRB,c = 52 | | 10: NRB,c = 52 | |
| TACommon | | Config 1,2 | s | 0 | | 0 | |
| TACommonDrift | |  | s | 0 | | 0 | |
| TACommonDriftVariation | |  | s | 0 | | 0 | |
| Koffset | | Config 1 | ms | [239] | | [239] | |
|  | | Config 2 | ms | [4] | | [4] | |
| Kmac | | Config 1,2 | ms | 0 | | 0 | |
| DRX Cycle | | ms | Not Applicable | | | |
| PDSCH Reference measurement channel | |  | SR.1.1 FDD | | | |
| CORESET Reference Channel | |  | CR.1.1 FDD | | | |
| TRS configuration | |  | TRS.1.1 FDD | | | |
| OCNG Patterns | |  | OP.1 | | | |
| SMTC Configuration | |  | SMTC.1 | | | |
| SSB Configuration | |  | SSB.1 FR1 | | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 15 kHz | | | |
| PUCCH/PUSCH subcarrier spacing | | kHz | 15 kHz | | | |
| PRACH configuration | |  | FR1 PRACH configuration 1 | | | |
| BWP configuration | Initial DL BWP | Config 1,2 |  | DLBWP.0.1 | | | |
| Dedicated DL BWP |  | DLBWP.1.1 | | | |
| Initial UL BWP |  | ULBWP.0.1 | | | |
| Dedicated UL BWP |  | ULBWP.1.1 | | | |
| EPRE ratio of PSS to SSS | | Config 1,2 | dB | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Note2 | | Config 1,2 | dBm/ 15kHz | -98+TT | | | |
| Note2 | | dBm/ SCS | -98+TT | | | |
|  | | dB | 8+TT | -3.3+TT | -Infinity | 2.36+TT |
|  | | dB | 8+TT | 8+TT | -Infinity | 11+TT |
| SSB\_RP | | dBm/ SCS | -90+TT | -90+TT | -Infinity | -87+TT |
| IoNote3 | | dBm/ 9.36MHz | -61.41+TT | -57.06+TT | -61.41+TT | -57.06+TT |
| 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

The UE shall start to transmit the PRACH to Cell 2 less than 872 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 defined in clause 14.2.1.0.2.1, can be expressed as:

DCHO = TRRC + TEvent\_DU + Tmeasure + Tinterrupt + TCHO\_execution

where:

RRC procedure delay TRRC = 10 ms and is specified in clause 12 in TS 38.331 [13].

TEvent\_DU = start of T2

Tmeasure = 600 + 200 ms; Tinterrupt = 62ms; TCHO\_execution = 10ms.

This gives a total of 872 ms.

#### 14.2.1.4 NR SA FR1-FR1 Time-based Conditional Handover for NR Satellite Access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability may need to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets
* Annex E and F need to updated

14.2.1.4.1 Test purpose

This test is to verify the requirement for inter-frequency SAN time-based conditional handover from FR1 to FR1 specified in clause 14.2.1.0.2.

14.2.1.4.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access and time-based conditional handover.

14.2.1.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.2.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.14.2.1.4.

14.2.1.4.4 Test description

The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2. During T1, the UE is configured to measure inter-frequency neighbour cell and Gap pattern ID gp0. The RRC message implying time-based handover to cell 2 with Event CondEvent T1 shall be sent to UE, at a time earlier than TRRC (10ms) before the beginning of T2.

Starting T2, cell 2 becomes detectable and offset better than cell 1 and after 1000ms of T2, time condition event t1-Threshold-r17 is fulfilled.

14.2.1.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.2.1.4.4.1-1.

Table 14.2.1.4.4.1-1: Supported test configurations for NR SA FR1-FR1 Time-based Conditional Handover for Satellite Access

|  |  |
| --- | --- |
| Configuration | Description |
| 14.2.1.4-1 | GSO, NR FDD, 15kHz SSB SCS, 10 MHz BW |
| 14.2.1.4-2 | NGSO, NR FDD, 15kHz SSB SCS, 10 MHz BW |
| Note: If UE supports both NGSO and GSO, the GSO-based test cases can be skipped if the UE passes NGSO-based test cases. | |

Configure the test equipment and the DUT according to the parameters in Table 14.2.1.4.4.1-2

Table 14.2.1.4.4.1-2: Initial conditions for NR SA FR1-FR1 Time-based Conditional Handover for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.12-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.2.1.4.4.1-1 | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.2.1.4.4.1-3.

2. Message contents are defined in clause 14.2.1.4.4.3.

3. Cell 1 and Cell 2 are NR cells (PCell and neighbour cell, respectively) with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

4. The initial test environment conditions are setup according to section 14.0.5.

Table 14.2.1.4.4.1-3: General test parameters for NR SA FR1-FR1 Time-based Conditional Handover for Satellite Access

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| RF Channel Number | |  | 1, 2 | Two NR NTN satellite RF channel |
| Initial conditions | Active cell |  | Cell 1 | FDD duplex mode cell |
|  | Neighbouring cell |  | Cell 2 | FDD duplex mode cell |
| Final condition | Active cell |  | Cell 2 |  |
| Satellite configuration | Config 1 |  | RMC in [A.x] | For GSO satellite configuration |
| Config 2 |  | RMC in [A.x] | For NGSO satellite configuration |
| UE position (N,S, H) | |  | [(0, 0, 0)] | Set by AT command |
| t1-Threshold-r17.condEventT1-r17 | | s | T2 | Entering condition |
| duration-r17.condEventT1-r17 | | slot | 1000 | Give 1s search duration |
| A3-Offset in condition | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤ 2 |  |

14.2.1.4.4.2 Test procedure

The test scenario comprises of two satellite access NR FDD inter-frequency cells as given in table 14.2.1.4.4.1-3. The handover delay is tested.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On and Test Mode On according to TS 38.508-1 [14] clause 4.5]. Cell 1 is the active cell. Establish SRB2 and DRB. Set Cell 2 physical cell identity to the initial physical cell identity.

2. Set the parameters according to T1 in Table 14.2.1.4.5-1. Propagation conditions are set according to Annex C clause C.2.2. T1 starts.

3. The SS shall transmit an *RRCReconfiguration* message [with *conditionalReconfiguration* on Cell 1] to configure time-based CHO condition on the UE.

4. The UE shall transmit an *RRCReconfigurationComplete* message.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.2.1.4.5-1. T2 starts.

6. If the UE transmits the PRACH preambles to Cell 2 less than 872 ms from the beginning of time period T2, then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.

7. After T2 expires, [the SS sends an *RRCReconfiguration* with *reconfigurationWithSync*] to cause UE handover back to Cell 1. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2). If the handover back to Cell 1 was successful go to step 9. If the handover back to Cell 2 was not successful, go to step 8.

8. Switch off and then on the UE and go to step 1.

9. Repeat steps 2-7 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

14.2.1.4.4.3 Message contents

FFS

14.2.1.4.5 Test requirements

Table 14.2.1.4.5-1 defines the primary level settings including test tolerances for NR SA FR1-FR1 Time-based Conditional Handover for Satellite Access.

Table 14.2.1.4.5-1: Cell specific parameters for NR SA FR1-FR1 Time-based Conditional Handover for Satellite Access

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Test configuration | Unit | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| NR RF Channel Number | | Config 1, 2 |  | 1 | | 2 | |
| BWchannel | | MHz | 10: NRB,c = 52 | | 10: NRB,c = 52 | |
| BWP BW | | MHz | 10: NRB,c = 52 | | 10: NRB,c = 52 | |
| TACommon | | Config 1, 2 | s | 0 | | 0 | |
| TACommonDrift | | s | 0 | | 0 | |
| TACommonDriftVariation | | s | 0 | | 0 | |
| Koffset | | Config 1 | ms | [239] | | [239] | |
|  | | Config 2 | ms | [4] | | [4] | |
| Kmac | | Config 1, 2 | ms | 0 | | 0 | |
| DRX Cycle | | ms | Not Applicable | | | |
| PDSCH Reference measurement channel | |  | SR.1.1 FDD | | | |
| CORESET Reference Channel | |  | CR.1.1 FDD | | | |
| TRS configuration | |  | TRS.1.1 FDD | | | |
| OCNG Patterns | |  | OP.1 | | | |
| SMTC Configuration | |  | SMTC.1 | | | |
| SSB Configuration | |  | SSB.1 FR1 | | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 15 kHz | | | |
| PUCCH/PUSCH subcarrier spacing | | kHz | 15 kHz | | | |
| PRACH configuration | |  | FR1 PRACH configuration 1 | | | |
| BWP configuration | Initial DL BWP | Config 1, 2 |  | DLBWP.0.1 | | | |
| Dedicated DL BWP |  | DLBWP.1.1 | | | |
| Initial UL BWP |  | ULBWP.0.1 | | | |
| Dedicated UL BWP |  | ULBWP.1.1 | | | |
| EPRE ratio of PSS to SSS | | Config 1, 2 | dB | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Note2 | | Config 1, 2 | dBm/ 15kHz | -98+TT | | | |
| Note2 | | dBm/ SCS | -98+TT | | | |
|  | | dB | 4+TT | 4+TT | -Infinity | 9+TT |
|  | | dB | 4+TT | 4+TT | -Infinity | 9+TT |
| SSB\_RP | | dBm/ SCS | -94+TT | -94+TT | -Infinity | -89+TT |
| IoNote3 | | dBm/ 9.36MHz | -64.59+TT | -64.59+TT | -70.05+TT | -60.53+TT |
| 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

The UE shall start to transmit the PRACH to Cell 2 l later than 1000ms and ess than 1072 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 defined in clause 14.2.1.0.2.1, can be expressed as:

DCHO = TRRC + TEvent\_DU + Tmeasure + Tinterrupt + TCHO\_execution

where:

RRC procedure delay TRRC = 10 ms and is specified in clause 12 in TS 38.331 [13].

TEvent\_DU = start of T2

Tmeasure = max(600 + 200, 1000) ms; Tinterrupt = 62ms; TCHO\_execution = 10ms.

This gives a total of 1072 ms.

## 14.3 Timing for Satellite Access

### 14.3.1 UE transmit timing for Satellite Access

#### 14.3.1.0 Minimum conformance requirements

The UE shall have capability to follow the frame timing change of the reference cell in connected state. The uplink frame transmission takes place before the reception of the first detected path (in time) of the corresponding downlink frame from the reference cell. UE initial transmit timing accuracy and gradual timing adjustment requirements are defined in the following requirements.

The normative reference for this requirement is TS.38.133 [6] clause 7.1C.1.

14.3.1.0.1 Minimum conformance requirements for UE transmit timing accuracy

The UE initial transmission timing error shall be less than or equal to ±Te\_NTN where the timing error limit value Te\_NTN is specified in Table 14.3.1.0.1-1. This requirement applies:

- when it is the first transmission in a DRX cycle for PUCCH, PUSCH and SRS, or it is the PRACH transmission, or it is the msgA transmission.

The UE shall meet the Te\_NTN requirement for an initial transmission provided that at least one SSB is available at the UE during the last 160 ms. The reference point for the UE initial transmit timing control requirement shall be the downlink timing of the reference cell minus .

The downlink timing is defined as the time when the first path (in time) of the corresponding downlink frame used by the UE to determine downlink timing is received from the reference cell at the UE antenna.

*N*TA for PRACH is defined as 0. (in *T*c units) for other channels is the difference between UE transmission timing and the downlink timing immediately after when the last timing advance in 38.133 [6] clause 7.3 was applied. or after the last update in or .

The value of *N*TA-offset depends on the duplex mode of the cell in which the uplink transmission takes place and the frequency range (FR). *N*TA-offset is defined in 38.133 [6] Table 7.1.2-2.

and are as defined in 38.211 [7].

Table 14.3.1.0.1-1: Te\_NTN Timing Error Limit

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range | SCS of SSB signals (kHz) | SCS of uplink signals (kHz) | Te\_NTN |
| 1 | 15 | 15 | 29\*64\*Tc |
|  |  | 30 | 24\*64\*Tc |
|  |  | 60 | N/A |
|  | 30 | 15 | 24\*64\*Tc |
|  |  | 30 | 22\*64\*Tc |
|  |  | 60 | N/A |
| Note 1: Tc is the basic timing unit defined in TS 38.211 [7] | | | |

When it is not the first transmission in a DRX cycle or there is no DRX cycle, and when it is the transmission for PUCCH, PUSCH and SRS transmission, the UE shall be capable of changing the transmission timing according to the received downlink frame of the reference cell, the updating of and the updating of , except when the timing advance in 38.133 [6] clause 7.3C is applied.

The normative reference for this requirement is TS.38.133 [6] clause 7.1C.2.

14.3.1.0.2 Minimum conformance requirements for gradual timing adjustment

When the transmission timing error between the UE and the reference timing exceeds ±Te\_NTN then the UE shall adjust the timing such that timing error is to within ±Te\_NTN. The reference timing shall be before the downlink timing of the reference cell. All adjustments made to the UE uplink timing shall follow these rules:

1) The maximum amount of the magnitude of the timing change, apart from a change of due to satellite position update and between the previous transmission and the current transmission, in one adjustment shall be Tq\_NTN.

2) The minimum aggregate adjustment rate, apart from a change of due to satellite position update and during the last one second, shall be Tp\_NTN per second.

3) The maximum aggregate adjustment rate, apart from a change of due to satellite position update and during the last 200ms, shall be Tq\_NTN per 200 ms.

Where, the maximum autonomous time adjustment step Tq\_NTN and the aggregate adjustment rate Tp\_NTN are specified in Table 14.3.1.0.2-1.

**Table 14.3.1.0.2-1: Tq\_NTN Maximum Autonomous Time Adjustment Step and Tp\_NTN Minimum Aggregate Adjustment rate**

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency Range** | **SCS of uplink signals (kHz)** | **Tq\_NTN** | **Tp\_NTN** |
| 1 | 15 | 5.5\*64\*Tc | 5.5\*64\*Tc |
|  | 30 | 5.5\*64\*Tc | 5.5\*64\*Tc |
|  | 60 | N/A | N/A |
| NOTE: Tc is the basic timing unit defined in TS 38.211 [7] | | | |

The normative reference for this requirement is TS.38.133 [6] clause 7.1C.2.1

#### 14.3.1.1 NR SA FR1 UE transmit timing accuracy for Satellite Access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability may need to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets
* Whether GNSS is used and its config is FFS

14.3.1.1.1 Test purpose

The purpose of this test is to verify that the UE can follow frame timing change of the reference cell and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clauses 14.3.1.0.1 and 14.3.1.0.2. Supported test configurations are shown in Table 14.3.1.1.4.1-1.

14.3.1.1.2 Test applicability

This test applies to all types of NR UE from Release 17 and onwards supporting satellite access. Test 2 requires support of long DRX cycle.

14.3.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 14.3.1.0.1 and 14.3.1.0.2.

The normative reference for this requirement is 38.133 [6] clause A.14.3.1.1

14.3.1.1.4 Test Description

The test consists of a single NR cell (PCell). Table 14.3.1.1.5-1 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table 14.3.1.1.5-2.

14.3.1.1.4.1 Initial Conditions

This test shall be tested in one of the configurations defined in Table 14.3.1.1.4.1-1.

Table 14.3.1.1.4.1-1: Supported test configurations for NR SA FR1 UE transmit timing accuracy for Satellite Access

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | GSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 2 | NGSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

Configure the test equipment and the DUT according to the parameters in Table 14.3.1.1.4.1-2

Table 14.3.1.1.4.1-2: Initial conditions for NR SA FR1 UE transmit timing accuracy for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.12-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.5.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. Message contents are defined in clause 14.3.1.1.4.3.

2. Cell 1 is the NR PCell with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Cell 1 is a satellite access cell].

3. The initial test environment conditions are setup according to section 14.0.5, with the following exceptions:

- For GSO instead of 38.508-1 [14] Tables 7.6.2.1-1a and 7.6.2.1-1b, use Tables 7.6.2.2-1, 7.6.2.2-3 and 7.6.2.2-5.

- For NGSO (LEO-600) instead of 38.508-1 [14] Tables 7.6.2.1-2a and 7.6.2.1-2b, use Tables 7.6.2.2-4 and 7.6.2.2-6.

- For NGSO (LEO-1200) instead of 38.508-1 [14] Tables 7.6.2.1-3a and 7.6.2.1-3b, use Table 7.6.2.2-2.

14.3.1.1.4.2 Test procedure

The test consists of a single NR cell (PCell). The downlink timing of the NR Cell is changed and the changes in UE transmit timing are observed. The transmit timing is verified by the UE transmitting SRS used as a measurement reference facilitating the SS timing estimation.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters *Connectivity* NR, Connected without release *On* according to TS 38.508-1 [6] clause 4.5]. Cell 1 is the active cell.

2. Set up NR Cell according to parameters given in Table 14.3.1.1.5-1.

3. The SS shall transmit an *RRCReconfiguration* message configuring the UE with periodic SRS transmissions according to clause 14.3.1.1.4.3. In Test 2, the UE is also configured with DRX configuration according to Table 14.3.1.1.5-2, for Test 1 and Test 2, correspondingly.

4. The UE shall transmit *RRCReconfigurationComplete* message.

5. After connection set up with the cell, and before the DL timing adjustment, the test equipment shall verify that the timing of the NR cell is within of the first detected path of DL SSB.

a. The NTA\_offset value (in Tc units) is 25600

b. The value is derived from the higher-layer parameters *TACommon*, *TACommonDrift*, and *TACommonDriftVariation*.

c. The value is computed by the UE based on UE position and serving-satellite-ephemeris-related higher-layers parameters.

d. The values depend on the DL and UL SCS for which the test is being run and are given in Table 14.3.1.1.5-4.

e. The is the margin for the GNSS position definition error considered in the core requirement, which needs to be substracted for the test requirement, due to the usuage of AT commands in the test.

6. The test system shall adjust the timing of the DL path by values given in Table 14.3.1.1.4.2-1. For Test 2, the DL timing change shall be applied within the first half of the DRX cycle upon expiration of the preceding DRX ON duration.

Table 14.3.1.1.4.2-1: Adjustment Value for NR SA FR1 UE transmit timing accuracy for Satellite Access

|  |  |  |
| --- | --- | --- |
| SCS of SSB signals (kHz) | Adjustment Value | |
|  | Test1 | Test2 |
| 15 | +64\*64Tc | +32\*64Tc |

7. For Test 1, the test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in Table 14.3.1.1.5-5. The test system samples the UE Transmit Timing once per SRS transmission (as per configured SRS periodicity) and checks these against the following rules:

- Rule 1: the SS shall check that the maximum amount of the magnitude of the timing change, apart from a change of due to satellite position update and between the previous transmission and the current transmission, in one adjustment shall be Tq\_NTN, as specified in Table 14.3.1.1.5-5.

- Rule 2: to check that the minimum adjustment rate is within Rule 2 as specified in clause 14.3.1.0.1 and Table 14.3.1.1.5-5, the SS shall measure the change in SRS transmission timing, apart from a change of due to satellite position update and , over a 1 + offset seconds sliding window (offset in ms to the next consecutive SRS transmission), with step size p (where p is the periodicity of SRS) , as long as the resulting slot is a valid UL slot.

- Rule 3: to check that the maximum aggregate adjustment rate is within Rule 3 as specified in clause 14.3.1.0.1 and Table 14.3.1.1.5-5, the SS shall measure the change in SRS transmission timing, apart from a change of due to satellite position update and , over a 200ms - offset sliding window of previous SRS transmission, with step size p (where p is the periodicity of SRS), as long as the resulting slot is a valid UL slot.

The three rules apply until the UE transmit timing offset is within the limits specified in Table 14.3.1.1.5-5 with respect to the first detected path (in time) of the corresponding downlink frame of Cell 1. The test system will wait till evaluation interval of T seconds is met to ensure UE transmit timing is stable at the end of this test step, where T=DL\_timing\_change[Ts]/[5.5+TT]Ts and DL\_timing\_change is specified in Table 14.3.1.1.4.2-1.

8. Once the UE transmit timing is within the limits specified in step 7, the test system shall verify that the UE transmit timing offset is within of the first detected path of DL SSB (similar to test step 5). For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

9. The SS shall transmit an *RRCRelease* message to release the UE from the NR cell.

14.3.1.1.4.3 Message contents

Editor’s Note: Message contents are FFS

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 14.3.1.1.4.3-0: Common Exception messages for NR SA FR1 UE transmit timing accuracy for Satellite Access

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | FFS |

Table 14.3.1.1.4.3-1: *SRS-Config* for NR SA FR1 UE transmit timing accuracy for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-182 | | | |
| Information Element | Value/remark | Comment | Condition |
| SRS-Config ::= SEQUENCE { |  |  |  |
| srs-ResourceSetToAddModList SEQUENCE (SIZE(0..maxNrofSRS-ResourceSets)) OF SEQUENCE { |  |  |  |
| SRS-ResourceSet[1] SEQUENCE { |  | entry 1 |  |
| resourceType CHOICE { |  |  |  |
| periodic SEQUENCE { |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| srs-ResourceToAddModList SEQUENCE (SIZE(1..maxNrofSRS-Resources)) OF SEQUENCE { |  |  |  |
| SRS-Resource[1] SEQUENCE { |  | entry 1 |  |
| freqHopping SEQUENCE { |  |  |  |
| c-SRS | 14 |  |  |
| } |  |  |  |
| groupOrSequenceHopping | neither |  |  |
| resourceType CHOICE { |  |  |  |
| periodic SEQUENCE { |  |  |  |
| periodicityAndOffset-p CHOICE { |  |  |  |
| sl1 | 0 |  | Test 1 |
| sl320 | 3 |  | Test 2 |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 14.3.1.1.4.3-2: *DRX-Config* for NR SA FR1 UE transmit timing accuracy for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [14], Table 4.6.3-56 | | | |
| Information Element | Value/remark | Comment | Condition |
| DRX-Config ::= CHOICE { |  |  |  |
| drx-InactivityTimer | ms1 |  |  |
| drx-RetransmissionTimerDL | sl1 |  |  |
| drx-RetransmissionTimerUL | sl1 |  |  |
| drx-LongCycleStartOffset CHOICE { |  |  |  |
| ms320 | 0 |  |  |
| } |  |  |  |
| } |  |  |  |

14.3.1.1.5 Test Requirements

Tables 14.3.1.1.5-1, 14.3.1.1.5-2, 14.3.1.1.5-3, 14.3.1.1.5-4 and 14.3.1.1.5-5 define the primary level settings including test tolerances for NR SA FR1 UE transmit timing accuracy for Satellite Access.

Table 14.3.1.1.5-1: Cell Specific Test Parameters for NR SA FR1 UE transmit timing accuracy for Satellite Access

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test1 | Test2 |
| SSB ARFCN |  | 1,2 | 1 | 1 |
| Serving satellite configuration |  | 1 | SSC.1 | |
|  | 2 | SSC.2 | |
| BWchannel | MHz | 1,2 | 10: NRB,c = 52 | |
| Initial BWP Configuration |  | 1,2 | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP Configuration |  | 1,2 | DLBWP.1.1  ULBWP.1.1 | |
| DRX Cycle | ms | 1,2 | N/A | DRX.8Note5 |
| PDSCH Reference measurement channel |  | 1,2 | SR.1.1 FDD | |
| RMSI CORESET Reference Channel |  | 1,2 | CR.1.1 FDD | |
| Dedicated CORESET Reference Channel |  | 1,2 | CCR.1.1 FDD | |
| OCNG Patterns |  | 1,2 | OP.1 | |
| SSB configuration |  | 1,2 | SSB.1 FR1 | |
| SMTC Configuration |  | 1,2 | SMTC.1 | |
| TRS configuration |  | 1,2 | TRS.1.1 FDD | |
| EPRE ratio of PSS to SSS | dB | 1,2 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |  |
| Note2 | dBm/15 kHz | 1,2 | -98+TT | -98+TT |
| Note2 | dBm/SCS | 1,2 | -98+TT | -98+TT |
|  |  | 1,2 | 3+TT | 3+TT |
|  |  | 1,2 | 3+TT | 3+TT |
| SS-RSRPNote3 | dBm/SCS | 1,2 | -95+TT | -95+TT |
| IoNote3 | dBm/9.36MHz | 1,2 | -65.2+TT | -65.2+TT |
| Propagation condition |  | 1,2 | AWGN | |
| SRS Config |  | 1,2 | SRSConf.1Note6 | SRSConf.2Note6 |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: DRX related parameters are given in Table 14.3.1.1.5-3  Note 6: SRS configs are given in Table 14.3.1.1.5-2 | | | | |

**Table 14.3.1.1.5-2: SRS Configuration for NR SA FR1 UE transmit timing accuracy for Satellite Access**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Field | SRSConf.1 | SRSConf.2 | Comments |
| SRS- | srs-ResourceSetId | 0 | 0 |  |
| ResourceSet | srs-ResourceIdList | 0 | 0 |  |
|  | resourceType | Periodic | Periodic |  |
|  | Usage | Codebook | Codebook |  |
| SRS-Resource | SRS-ResourceId | 0 | 0 |  |
|  | nrofSRS-Ports | Port1 | Port1 |  |
|  | transmissionComb | n2 | n2 |  |
|  | combOffset-n2 | 0 | 0 |  |
|  | cyclicShift-n2 | 0 | 0 |  |
|  | resourceMapping  startPosition | 0 | 0 |  |
|  | resourceMapping  nrofSymbols | n1 | n1 |  |
|  | resourceMapping  repetitionFactor | n1 | n1 |  |
|  | freqDomainPosition | 0 | 0 |  |
|  | freqDomainShift | 0 | 0 |  |
|  | freqHopping  c-SRS | 14 | 14 | Matches NRB,c |
|  | freqHopping  b-SRS | 0 | 0 |  |
|  | freqHopping  b-hop | 0 | 0 |  |
|  | groupOrSequenceHopping | Neither | Neither |  |
|  | resourceType | Periodic | Periodic |  |
|  | periodicityAndOffset-p | sl1, 0 | sl320, 3 | Offset to align with DRX periodicity |
|  | sequenceId | 0 | 0 | Any 10 bit number |

Table 14.3.1.1.5-3: DRX-Configuration for NR SA FR1 UE transmit timing accuracy for Satellite Access

|  |  |
| --- | --- |
| Field | Test 2 |
| Value |
| drx-onDurationTimer | 6 ms |
| drx-InactivityTimer | 1 ms |
| drx-RetransmissionTimerDL | 1 slot |
| drx-RetransmissionTimerUL | 1 slot |
| longDRX-CycleStartOffset | 320 ms |
| shortDRX | Disabled |
| TimeAlignmentTimer | Infinity |
| Note: The DRX cycle and time alignment timer parameters are specified in clause 6.3.2 in TS 38.331 [13] | |

Table 14.3.1.1.5-4: Te Timing Error Limit for NR SA FR1 UE transmit timing accuracy for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range | SCS of SSB signals (kHz) | SCS of uplink signals (kHz) | Te\_NTN |
| 1 | 15 | 15 | (29+TT)\*64\*Tc |
| Note 1: Tc is the basic timing unit defined in TS 38.211 [7] | | | |

Table 14.3.1.1.5-5: Tq\_NTN Maximum Autonomous Time Adjustment Step and Tp\_NTN Minimum Aggregate Adjustment rate for NR SA FR1 UE transmit timing accuracy for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range | SCS of uplink signals (kHz) | Tq\_NTN | Tp\_NTN |
| 1 | 15 | (5.5+TT)\*64\*Tc | (5.5+TT)\*64\*Tc |
| NOTE: Tc is the basic timing unit defined in TS 38.211 [7] | | | |

## 14.4 Signalling characteristics

FFS

## 14.5 Measurement procedure

### 14.5.1 Intra-frequency Measurements for SAN

#### 14.5.1.0 Minimum conformance requirements

##### 14.5.1.0.1 Minimum conformance requitements for intra-frequency measurements without measurement gaps

14.5.1.0.1.1 Intra-frequency cell identification

The UE shall be able to identify a new detectable intra-frequency cell within Tidentify\_intra\_without\_index if the UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured), or the UE is indicated that the neighbour cell is synchronous with the serving cell (*deriveSSB-IndexFromCell* is enabled). Otherwise, UE shall be able to identify a new detectable intra frequency cell within Tidentify\_intra\_with\_index. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within Tidentify\_intra\_without\_index.

Tidentify\_intra\_without\_index = (TPSS/SSS\_sync\_intra + T SSB\_measurement\_period\_intra) ms

Tidentify\_intra\_with\_index = (TPSS/SSS\_sync\_intra + T SSB\_measurement\_period\_intra + TSSB\_time\_index\_intra) ms

Where:

TPSS/SSS\_sync\_intra: it is the time period used in PSS/SSS detection given in table 14.5.1.0.1.1-1

TSSB\_time\_index\_intra: it is the time period used to acquire the index of the SSB being measured given in table 14.5.1.0.1.1-2

TSSB\_measurement\_period\_intra: equal to a measurement period of SSB based measurement given in table 14.5.1.0.1.2-1

Kmulti\_SMTC is the scaling factor for measurement of multiple SMTCs or multiple satellites, and

if SMTCs do not overlap with each other,

- , if GEO satellites are measured on the carrier;

- , if LEO satellites are measured on the carrier;

if SMTCs partially overlap with each other,

- , if only GEO satellites are measured on the carrier;

- , if only LEO satellites are measured on the carrier;

where

- is the number of LEO satellites to be measured within i-th SMTC,

- is the number of LEO satellites that UE can measure in parallel within an SMTC,

- is the number of SMTCs that partially overlap with each other.

CSSFintra: it is a carrier specific scaling factor and is determined according to CSSFoutside\_gap,i in 38.133 [6] clause 9.1.5.1 for measurement conducted outside measurement gaps, i.e. when intra-frequency SMTC is fully non overlapping or partially overlapping with measurement gaps, or according to CSSFwithin\_gap,i in 38.133 [6] clause 9.1.5.2 for measurement conducted within measurement gaps, i.e. when intra-frequency SMTC is fully overlapping with measurement gaps.

if the high layer in TS 38.331 [13] signalling of *smtc2* is configured, the assumed periodicity of intra-frequency SMTC occasions corresponds to the value of higher layer parameter *smtc2*; Otherwise, the assumed periodicity of intra-frequency SMTC occasions corresponds to the value of higher layer parameter *smtc1*.

Kp is the scaling factor for an SSB frequency layer to be measured without measurement gaps. Kp = Ntotal\_SAN / Navailable\_SAN, where Navailable\_SAN and Ntotal\_SAN are calculated as follows:

- For a window W of duration max(SMTC period, MGRP\_max), where

- If UE supports *parallelMeasurementGap-r17* and is configured with concurrent measurement gaps, MGRP max is the maximum MGRP across all configured per-UE measurement gap. Otherwise, MGRP max is the MGRP of configured measurement gap.

- Starting from the beginning of any SMTC occasion:

- Ntotal\_SAN is the total number of SMTC occasions within the window, including those overlapped and non-overlapped with measurement gap occasions within the window, and

- Navailable\_SAN is the number of SMTC occasions within the window W that don’t collide with any non-dropped MG occasion within or outside the window W, after accounting for measurement gap collisions by applying the measurement gap collision rule in 38.133 [6] section 9.1C.8.3. The collision rule between SMTC occasion and measurement gap occasion is defined in 38.133 [6] section 9.1C.9.1

Kp = [1] when Navailable\_SAN = 0 and measurement gap sharing in 38.133 [6] clause 9.1.2.1a shall apply.

Kp = 1 when intra-frequency SMTC is fully non overlapping with measurement gaps.

For calculation of Kp, if the high layer signalling (TS 38.331 [13]) of *smtc2* is configured, for cells indicated in the *pci-List* parameter in *smtc2*, the SMTC periodicity corresponds to the value of higher layer parameter *smtc2*; for the other cells, the SMTC periodicity corresponds to the value of higher layer parameter *smtc1.*

Klayer1\_measurement: it is scaling factor for sharing between L3 and L1 measurement, and Klayer1\_measurement =1, if GEO satellites are measured on the carrier, or if LEO satellites are measured on the carrier and UE supports *parallelMeasurementWithoutRestriction*, otherwise

Klayer1\_measurement =1,

- if all of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap are not fully overlapped by intra-frequency SMTC occasions, or

- if all of the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped with any of the SSB symbols and the RSSI symbols, and 1 symbol before each consecutive SSB symbols and the RSSI symbols, and 1 symbol after each consecutive SSB symbols and the RSSI symbols, given that *SSB-ToMeasure* and *SS-RSSI-Measurement* are configured, and RSSI symbols are indicated by *SS-RSSI-Measurement*;

Klayer1\_measurement =1.5, otherwise.

If the above-mentioned reference signal configured for L1-RSRP measurement is aperiodic CSI-RS resource, longer cell identification delay would be expected.

If the higher layer signalling in TS38.331 [13] signalling of *smtc2* is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for Tidentify\_intra\_without\_index or Tidentify\_intra\_with\_index.

Table 14.5.1.0.1.1-1: Time period for PSS/SSS detection, (Frequency range FR1)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra |
| No DRX | max( 600ms, ceil( 5 x Kp x Klayer1\_measurement) x Kmulti\_SMTC x SMTC period )Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max( 600ms, ceil(1.5x 5 x Kp x Klayer1\_measurement) x Kmulti\_SMTC x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | ceil(5 x Kp x Klayer1\_measurement) x Kmulti\_SMTC x DRX cycle x CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified | |

Table 14.5.1.0.1.1-2: Time period for time index detection (FR1)

|  |  |
| --- | --- |
| DRX cycle | TSSB\_time\_index\_intra |
| No DRX | max(120ms, ceil( 3 x Kp x Klayer1\_measurement)x Kmulti\_SMTC x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max(120ms, ceil (1.5 x 3 x Kp x Klayer1\_measurement) x Kmulti\_SMTC x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | Ceil(3 x Kp x Klayer1\_measurement) x Kmulti\_SMTC x DRX cycle x CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified | |

The requirements in clause 14.5.1.0.1.1 and 14.5.1.0.1.2 are not applicable when the overall overhead ratio due to scheduling restriction caused by all configured SMTCs (i.e. scheduling restriction overhead of all SMTCs in one SMTC periodicity), is larger than 75%.

The normative reference for this requirement is TS 38.133 [6] clause 9.2C.5.1.

14.5.1.0.1.2 Measurement period

The measurement period for intra-frequency measurements without gaps is as shown in table 14.5.1.0.1.2-1.

If the higher layer signalling in TS38.331 [13] signalling of *smtc2* is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for TSSB\_measurement\_period\_intra.

Table 14.5.1.0.1.2-1: Measurement period for intra-frequency measurements without gaps (FR1)

|  |  |
| --- | --- |
| DRX cycle | T SSB\_measurement\_period\_intra |
| No DRX | max(200ms, ceil( 5 x Kp x Klayer1\_measurement) x Kmulti\_SMTC x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max(200ms, ceil(1.5x 5 x Kp x Klayer1\_measurement) x Kmulti\_SMTC x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | ceil( 5 x Kp x Klayer1\_measurement) x Kmulti\_SMTC x DRX cycle x CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified | |

The normative reference for this requirement is TS 38.133 [6] clause 9.2C.5.2.

14.5.1.0.1.3 Scheduling availability of UE during intra-frequency measurements

When any of the conditions in the following clauses is met, there are restrictions on the scheduling availability; otherwise, there is no scheduling restriction. Note that the SSB symbols indicated by the union set of SSB-ToMeasure from all the configured measurement objects on the same serving carrier which can be merged (in TS 38.331 [13]), if it is configured; otherwise, all *L* SSB symbols within the SMTC window duration defined in clause 4.1 of TS 38.213 [8] are included.

The normative reference for this requirement is TS 38.133 [6] clause 9.2C.5.3.

14.5.1.0.1.3.1 Scheduling availability of UE performing measurements with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UE which do not support *simultaneousRxDataSSB-DiffNumerology* [11] the following restrictions apply due to SS-RSRP/RSRQ/SINR measurement:

- If *deriveSSB\_IndexFromCell* is enabled the UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration. If the high layer signalling of *smtc2*is configured (in TS 38.331 [13]), the SMTC periodicityfollows *smtc2*; Otherwise, the SMTC periodicity follows *smtc1.*

- If *deriveSSB\_IndexFromCell* is not enabled the UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on all symbols within SMTC window duration. If the high layer signalling of *smtc2*is configured in TS 38.331 [13], the SMTC periodicityfollows *smtc2*; Otherwise, the SMTC periodicity follows *smtc1.*

The normative reference for this requirement is TS 38.133 [6] clause 9.2C.5.3.1.

14.5.1.0.1.3.2 Scheduling availability of UE performing measurements on a neighbor cell served by a different satellite in LEO

For UE which do not support *TBD* the following restrictions apply due to SS-RSRP/RSRQ/SINR measurement on a neighbor cell served by a different satellite in LEO.

- If *deriveSSB\_IndexFromCell* is enabled the UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration. If the high layer signalling of *smtc2*is configured (in TS 38.331 [13]), the SMTC periodicityfollows *smtc2*; Otherwise, the SMTC periodicity follows *smtc1.*

- If *deriveSSB\_IndexFromCell* is not enabled the UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on all symbols within SMTC window duration. If the high layer signalling of *smtc2*is configured in TS 38.331 [13], the SMTC periodicityfollows *smtc2*; Otherwise, the SMTC periodicity follows *smtc1.*

- If the following conditions are met:

- The UE has been notified about system information update through paging,

- The gap between the UE’s reception of PDCCH that UE monitors in the Type 2-PDCCH CSS set that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots

- The UE is expected to receive the PDCCH that the UE monitors in the Type0-PDCCH CSS set, and/or the corresponding PDSCH, on SSB symbols to be measured.

The normative reference for this requirement is TS 38.133 [6] clause 9.2C.5.3.2.

##### 14.5.1.0.2 Minimum conformance requitements for intra-frequency measurements with measurement gaps

14.5.1.0.2.1 Intra-frequency cell identification

The UE shall be able to identify a new detectable intra frequency cell within Tidentify\_intra\_without\_index if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured), or the UE has been indicated that the neighbour cell is synchronous with the serving cell (*deriveSSB-IndexFromCell* is enabled). Otherwise, the UE shall be able to identify a new detectable intra frequency cell within Tidentify\_intra\_with\_index. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within Tidentify\_intra\_without\_index

Tidentify\_intra\_without\_index = TPSS/SSS\_sync\_intra + T SSB\_measurement\_period\_intra ms

Tidentify\_intra\_with\_index = TPSS/SSS\_sync\_ntra + T SSB\_measurement\_period\_intra + TSSB\_time\_index\_intra ms

Where:

TPSS/SSS\_sync\_intra: it is the time period used in PSS/SSS detection given in table 14.5.1.0.2.1-1.

TSSB\_time\_index\_intra: it is the time period used to acquire the index of the SSB being measured given in table 14.5.1.0.2.1-2.

T SSB\_measurement\_period\_intra: equal to a measurement period of SSB based measurement given in table 14.5.1.0.2.2-1.

Kgap is the scaling factor for a SSB frequency layer to be measured within an associated measurement gap pattern. Kgap = 1 when the UE is not configured with concurrent measurement gaps. When the UE is configured with concurrent measurement gaps and the two measurement gaps are fully overlapping with MGRP=160ms, Kgap = 2. Otherwise, Kgap = Ntotal / Navailable, where Navailable and Ntotal are calculated as follows:

CSSFintra: it is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in 38.133 [6] clause 9.1.5.2 for measurement conducted within measurement gaps.

Kmulti\_SMTC is the scaling factor for measurement of multiple SMTCs or multiple satellites, and

if SMTCs within a measurement gap do not overlap with each other,

- , if GEO satellites are measured on the carrier;

- , if LEO satellites are measured on the carrier;

if SMTCs within a measurement gap partially overlap with each other,

- , if only GEO satellites are measured on the carrier;

- , if only LEO satellites are measured on the carrier;

where

- is the number of LEO satellites to be measured within i-th SMTC,

- is the number of LEO satellites that UE can measure in parallel within an SMTC,

- is the number of SMTCs that partially overlap with each other.

If the higher layer signaling in TS 38.331 [13] of *smtc2* is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for Tidentify\_intra\_without\_index or Tidentify\_intra\_with\_index.

Table 14.5.1.0.2.1-1: Time period for PSS/SSS detection (FR1)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra |
| No DRX | max(600ms, 5 x Kgap x Kmulti\_SMTC x max(MGRP, SMTC period)) x CSSFintra |
| DRX cycle≤ 320ms | max(600ms, ceil(1.5x 5) x Kgap x Kmulti\_SMTC x max(MGRP, SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | 5 x Kgap x Kmulti\_SMTC x max(MGRP, DRX cycle) x CSSFintra |

Table 14.5.1.0.2.1-2: Time period for time index detection (Frequency range FR1)

|  |  |
| --- | --- |
| DRX cycle | TSSB\_time\_index\_intra |
| No DRX | max(120ms, 3 x Kgap x Kmulti\_SMTC x max(MGRP, SMTC period)) x CSSFintra |
| DRX cycle≤ 320ms | max(120ms, ceil(1.5 x 3) x Kgap x Kmulti\_SMTC x max(MGRP, SMTC period,DRX cycle) x CSSFintra) |
| DRX cycle>320ms | 3 x Kgap x Kmulti\_SMTC x max(MGRP, DRX cycle) x CSSFintra |

The normative reference for this requirement is TS 38.133 [6] clause 9.2C.6.1 and 9.2C.6.2.

14.5.1.0.2.2 Intra-frequency measurement period

The measurement period for FR1 intrafrequency measurements with gaps is as shown in table 14.5.1.0.2.2-1.

Table 14.5.1.0.2.2-1: Measurement period for intra-frequency measurements with gaps (FR1)

|  |  |
| --- | --- |
| DRX cycle | T SSB\_measurement\_period\_intra |
| No DRX | max(200ms, 5 x Kgap x Kmulti\_SMTC x max(MGRP, SMTC period)) x CSSFintra |
| DRX cycle≤ 320ms | max(200ms, ceil(1.5x 5) x Kmulti\_SMTC x Kgap x max(MGRP, SMTC period,DRX cycle))x CSSFintra |
| DRX cycle>320ms | 5 x Kgap x Kmulti\_SMTC x max(MGRP, DRX cycle) x CSSFintra |

The normative reference for this requirement is TS 38.133 [6] clause 9.2C.6.3.

#### 14.5.1.1 NR SA FR1 Event-triggered reporting tests without gap under non-DRX for NR satellite access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability needs to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets

14.5.1.1.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 14.5.1.0.1.1 and 14.5.1.0.1.2.

14.5.1.1.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access.

14.5.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.5.1.0.

The normative reference for this requirement is TS 38.133 [6] clause A.14.5.1.1.

14.5.1.1.4 Test description

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell and neighbour cell are given in Table 14.5.1.1.4.1-1 and 14.5.1.1.4.1-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The UE shall be provided with the valid information about the SAN serving each cell in the test before the start of the test.

UE is configured with 2 non-overlapping SMTCs for the intra-frequency measurement. The SMTC periodicity is 40ms, and SMTC1 is associated with Cell 1 with offset 0, and SMTC2 is associated with Cell 2 with offset 20ms.

14.5.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.5.1.1.4.1-1.

Table 14.5.1.1.4.1-1: Supported test configurations for NR SA FR1 Event-triggered reporting tests without gap under non-DRX for NR satellite access

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 14.5.1.1-1 | GSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 14.5.1.1-2 | NGSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 14.5.1.1.4.1-2.

Table 14.5.1.1.4.1-2: Initial conditions for NR SA FR1 Event-triggered reporting tests without gap under non-DRX for NR satellite access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.12-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.5.1.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.5.1.1.4.1-3.

2. Message contents are defined in clause 14.5.1.1.4.3.

3. Cell 1 and Cell 2 are NR cells (PCell and neighbor cell, respectively) with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

Table 14.5.1.1.4.1-3: General test parameters for NR SA FR1 Event-triggered reporting tests without gap under non-DRX for NR satellite access

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1, 2 | Cell 1 |  |
| Neighbour cell |  | 1, 2 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1, 2 | 1: Cell 1 and Cell 2 |  |
| NTN reference configuration |  | 1 | TBD | For GSO |
| 2 | TBD | For NGSO |
| SMTC1 configuration |  | 1 | TBD | Period: 40ms, offset: 0 |
| SMTC2 configuration |  | 2 | TBD | Period: 40ms, offset: 20ms |
| A3-Offset | dB | 1, 2 | -4.5 |  |
| CP length |  | 1, 2 | Normal |  |
| Hysteresis | dB | 1, 2 | 0 |  |
| Time To Trigger | s | 1, 2 | 0 |  |
| Filter coefficient |  | 1, 2 | 0 | L3 filtering is not used |
| DRX |  | 1, 2 |  | OFF |
| Time offset between serving and neighbour cells |  | 1, 2 | 20 ms | Asynchronous cells.  The timing of Cell 2 is 20ms later than the timing of Cell 1. |
| T1 | s | 1, 2 | 5 |  |
| T2 | s | 1, 2 | 5 |  |

14.5.1.1.4.2 Test procedure

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 UE is not required to read the neighbour cell SSB index in this test.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters *Connectivity NR*, *Connected without release On* and *Test Mode On* according to TS 38.508-1 [14] clause 4.5]. Cell 1 is the active cell.

2. Set the parameters according to T1 in Table 14.5.1.1.5-1.

3. SS shall transmit an *RRCReconfiguration* message configuring a *MeasId* consisting in an intra-frequency measurement object, event A3, and SMTC configuration according to Table 14.5.1.1.4.1-3.

4. The UE shall transmit *RRCReconfigurationComplete* message. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.5.1.1.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by event A3. If the overall delay measured from the beginning of time period T2 is less than [800] ms, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.

8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. Once the connection is released, the SS [shall reset the satellite access channel model and then] switch OFF and then ON the UE and proceed with step 1.

10. Repeat step 2-9 until the confidence level [according to Tables G.2.3-1 in Annex G clause G.2 is achieved].

14.5.1.1.4.3 Message contents

FFS

14.5.1.1.5 Test requirements

Tables 14.5.1.1.4.1-3 and 14.5.1.1.5-1 define the primary level settings including test tolerances for NR SA FR1 Event-triggered reporting tests without gap under non-DRX for NR satellite access.

Table 14.5.1.1.5-1: Cell specific test parameters for NR SA FR1 Event-triggered reporting tests without gap under non-DRX for NR satellite access

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| SSB configuration |  | 1, 2 | SSB.1 FR1 | | TBD | |
| PDSCH RMC configuration |  | 1, 2 | SR.1.1 FDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1, 2 | CR.1.1 FDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1, 2 | CCR.1.1 FDD | | N/A | |
| OCNG Patterns |  | 1, 2 | OP.1 | | OP.1 | |
| TRS Configuration |  | 1, 2 | TRS.1.1 FDD | | N/A | |
| Initial BWP configuration |  | 1, 2 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1, 2 | -98+TT | | | |
| Note 2 | dBm/15 kHz | 1, 2 | -98+TT | | | |
|  | dB | 1, 2 | 4+TT | -1.46+TT | -Infinity | -1.46+TT |
|  | dB | 1, 2 | 4+TT | 4+TT | -Infinity | 4+TT |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 2 | -94+TT | -94+TT | -Infinity | -94+TT |
| Io | dBm/9.36 MHz | 1, 2 | -64.60+TT | -62.25+TT | -64.60+TT | -62.25+TT |
| Propagation Condition |  | 1, 2 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

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

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

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

#### 14.5.1.2 NR SA FR1 Event triggered reporting tests without gap under DRX for NR satellite access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability needs to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets

14.5.1.2.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 14.5.1.0.1.1 and 14.5.1.0.1.2.

14.5.1.2.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access.

14.5.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.5.1.0.

The normative reference for this requirement is TS 38.133 [6] clause A.14.5.1.2.

14.5.1.2.4 Test description

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell and neighbour cell are given in Table 14.5.1.2.4.1-1 and 14.5.1.2.4.1-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The UE shall be provided with the valid information about the SAN serving the each cell in the test before the start of the test.

UE is configured with 1 SMTC for the intra-frequency measurement. Both Cell 1 and Cell 2 are associated with the configured SMTC.

14.5.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.5.1.2.4.1-1.

Table 14.5.1.2.4.1-1: Supported test configurations for NR SA FR1 Event triggered reporting tests without gap under DRX for NR satellite access

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 14.5.1.2-1 | GSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 14.5.1.2-2 | NGSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 14.5.1.2.4.1-2.

Table 14.5.1.2.4.1-2: Initial conditions for NR SA FR1 Event triggered reporting tests without gap under DRX for NR satellite access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.12-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.5.1.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.5.1.2.4.1-3.

2. Message contents are defined in clause 14.5.1.2.4.3.

3. Cell 1 and Cell 2 are NR cells (PCell and neighbor cell, respectively) with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

Table 14.5.1.2.4.1-3: General test parameters for NR SA FR1 Event triggered reporting tests without gap under DRX for NR satellite access

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| Active cell |  | 1, 2 | Cell 1 | |  |
| Neighbour cell |  | 1, 2 | Cell 2 | | Cell to be identified. |
| NTN reference configuration |  | 1 | TBD | | For GSO |
| 2 | TBD | | For NGSO |
| RF Channel Number |  | 1, 2 | 1: Cell 1 and Cell 2 | |  |
| SMTC configuration |  | 1, 2 | SMTC.2 | |  |
| A3-Offset | dB | 1, 2 | -4.5 | |  |
| CP length |  | 1, 2 | Normal | |  |
| Hysteresis | dB | 1, 2 | 0 | |  |
| Time To Trigger | s | 1, 2 | 0 | |  |
| Filter coefficient |  | 1, 2 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2 | DRX.1 | DRX. 7 |  |
| Time offset between serving and neighbour cells |  | 1, 2 | 3 μs | | Synchronous cells |
| T1 | s | 1, 2 | 5 | |  |
| T2 | s | 1, 2 | 5 | 10 |  |

14.5.1.2.4.2 Test procedure

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.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

The UE is not required to read the neighbour cell SSB index in this test.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters *Connectivity NR*, *Connected without release On* and *Test Mode On* according to TS 38.508-1 [14] clause 4.5]. Cell 1 is the active cell.

2. Set the parameters according to T1 in Table 14.5.1.2.5-1.

3. SS shall transmit an *RRCReconfiguration* message configuring a *MeasId* consisting in an intra-frequency measurement object, event A3, and SMTC configuration according to Table 14.5.1.2.4.1-3.

4. The UE shall transmit *RRCReconfigurationComplete* message. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.5.1.2.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delay measured from the beginning of time period T2 is less than [TBD] ms for Test 1, or [TBD] ms for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.

8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. Once the connection is released, the SS [shall reset the satellite access channel model and then] switch OFF and then ON the UE and proceed with step 1.

10. Repeat step 2-9 until the confidence level [according to Tables G.2.3-1 in Annex G clause G.2 is achieved].

11. Repeat step 1-10 for each sub-test in Table 14.5.1.2.4.1-3 as appropriate.

14.5.1.2.4.3 Message contents

FFS

14.5.1.2.5 Test requirements

Tables 14.5.1.2.4.1-3 and 14.5.1.2.5-1 define the primary level settings including test tolerances for NR SA FR1 Event triggered reporting tests without gap under DRX for NR satellite access.

Table 14.5.1.2.5-1: Cell specific test parameters for NR SA FR1 Event triggered reporting tests without gap under DRX for NR satellite access

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| SSB configuration |  | 1, 2 | SSB.1 FR1 | | SSB.1 FR1 | |
| PDSCH RMC configuration |  | 1, 2 | SR.1.1 FDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1, 2 | CR.1.1 FDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1, 2 | CCR.1.1 FDD | | N/A | |
| OCNG Patterns |  | 1, 2 | OP.1 | | OP.1 | |
| TRS configuration |  | 1, 2 | TRS.1.1 FDD | | N/A | |
| Initial BWP configuration |  | 1, 2 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1, 2 | -98+TT | | | |
| Note 2 | dBm/15 kHz | 1, 2 | -98+TT | | | |
|  | dB | 1, 2 | 4+TT | -1.46+TT | -Infinity | -1.46+TT |
|  | dB | 1, 2 | 4+TT | 4+TT | -Infinity | 4+TT |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 2 | -94+TT | -94+TT | -Infinity | -94+TT |
| Io | dBm/9.36 MHz | 1, 2 | -64.60+TT | -62.25+TT | -64.60+TT | -62.25+TT |
| Propagation Condition |  | 1, 2 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than TBD ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than TBD ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

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

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

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

#### 14.5.1.3 NR SA FR1 event triggered reporting tests without gap under non-DRX with FDD PCell with SSB index reading for NR satellite access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability needs to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets

14.5.1.3.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clauses 14.5.1.0.1.1 and 14.5.1.0.1.2.

14.5.1.3.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access.

14.5.1.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.5.1.0.

The normative reference for this requirement is TS 38.133 [6] clause A.14.5.1.3.

14.5.1.3.4 Test description

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for FDD PCell and neighbour cell are given in Table 14.5.1.3.4.1-1 and 14.5.1.3.4.1-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The UE shall be provided with the valid information about the SAN serving each cell in the test before the start of the test.

UE is configured with 2 overlapping SMTC for the intra-frequency measurement. The SMTC periodicity is 40ms, and SMTC1 is associated with Cell 1 with offset 0, and SMTC2 is associated with Cell 2 with offset 3ms.

14.5.1.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.5.1.3.4.1-1.

Table 14.5.1.3.4.1-1: Supported test configurations for NR SA FR1 event triggered reporting tests without gap under non-DRX with FDD PCell with SSB index reading for NR satellite access

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 14.5.1.3-1 | GSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 14.5.1.3-2 | NGSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Configure the test equipment and the DUT according to the parameters in Table 14.5.1.3.4.1-2.

Table 14.5.1.3.4.1-2: Initial conditions for NR SA FR1 event triggered reporting tests without gap under non-DRX with FDD PCell with SSB index reading for NR satellite access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.12-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.5.1.3.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.5.1.3.4.1-3.

2. Message contents are defined in clause 14.5.1.3.4.3.

3. Cell 1 and Cell 2 are NR cells (PCell and neighbor cell, respectively) with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

Table 14.5.1.3.4.1-3: General test parameters for NR SA FR1 event triggered reporting tests without gap under non-DRX with FDD PCell with SSB index reading for NR satellite access

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1, 2 | Cell 1 |  |
| Neighbour cell |  | 1, 2 | Cell 2 | Cell to be identified. |
| NTN reference configuration |  | 1 | TBD | For GSO |
| 2 | TBD | For NGSO |
| RF Channel Number |  | 1, 2 | 1: Cell 1 and Cell 2 |  |
| SSB configuration |  | 1, 2 | SSB.1 FR1 |  |
| SMTC1 configuration |  | 1, 2 | TBD |  |
| SMTC2 configuration |  | 1, 2 | TBD |  |
| A3-Offset | dB | 1, 2 | -4.5 |  |
| CP length |  | 1, 2 | Normal |  |
| Hysteresis | dB | 1, 2 | 0 |  |
| Time To Trigger | s | 1, 2 | 0 |  |
| Filter coefficient |  | 1, 2 | 0 | L3 filtering is not used |
| DRX | ms | 1, 2 |  | OFF |
| Time offset between serving and neighbour cells |  | 1, 2 | 3 ms | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
| T1 | s | 1, 2 | 5 |  |
| T2 | s | 1, 2 | 5 |  |

14.5.1.3.4.2 Test procedure

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.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters *Connectivity NR*, *Connected without release On* and *Test Mode On* according to TS 38.508-1 [14] clause 4.5]. Cell 1 is the active cell.

2. Set the parameters according to T1 in Table 14.5.1.3.5-1.

3. SS shall transmit an *RRCReconfiguration* message configuring a *MeasId* consisting in an intra-frequency measurement object, event A3, and SMTC configuration according to Table 14.5.1.3.4.1-3.

4. The UE shall transmit *RRCReconfigurationComplete* message. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.5.1.3.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by event A3. If the overall delay measured from the beginning of time period T2 is less than [TBD] ms, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.

8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. Once the connection is released, the SS [shall reset the satellite access channel model and then] switch OFF and then ON the UE and proceed with step 1.

10. Repeat step 2-9 until the confidence level [according to Tables G.2.3-1 in Annex G clause G.2 is achieved].

14.5.1.3.4.3 Message contents

FFS

14.5.1.3.5 Test requirements

Tables 14.5.1.3.4.1-3 and 14.5.1.3.5-1 define the primary level settings including test tolerances for NR SA FR1 event triggered reporting tests without gap under non-DRX with FDD PCell with SSB index reading for NR satellite access.

Table 14.5.1.3.5-1: Cell specific test parameters for NR SA FR1 event triggered reporting tests without gap under non-DRX with FDD PCell with SSB index reading for NR satellite access

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| SSB configuration |  | 1, 2 | SSB.1 FR1 | | TBD | |
| PDSCH RMC configuration |  | 1, 2 | SR.1.1 FDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1, 2 | CR.1.1 FDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1, 2 | CCR.1.1 FDD | | N/A | |
| OCNG Patterns |  | 1, 2 | OP.1 | | OP.1 | |
| TRS configuration |  | 1, 2 | TRS.1.1 FDD | | N/A | |
| Initial BWP configuration |  | 1, 2 | DLBWP.0,1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1, 2 | -98+TT | | | |
| Note 2 | dBm/15 kHz | 1, 2 | -98+TT | | | |
|  | dB | 1, 2 | 4+TT | -1.46+TT | -Infinity | -1.46+TT |
|  | dB | 1, 2 | 4+TT | 4+TT | -Infinity | 4+TT |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 2 | -94+TT | -94+TT | -Infinity | -94+TT |
| Io | dBm/9.36 MHz | 1, 2 | -64.60+TT | -62.25+TT | -64.60+TT | -62.25+TT |
| Propagation Condition |  | 1, 2 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than TBD ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

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

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

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

#### 14.5.1.4 NR SA FR1 Event-triggered reporting without SSB time index detection when DRX is not used with single gap for satellite access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability needs to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets or are TBD

14.5.1.4.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA intra-frequency NR cell search requirements in clause 14.5.1.0.2.

14.5.1.4.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access and CSI-RS based RLM.

14.5.1.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.5.1.0.

The normative reference for this requirement is TS 38.133 [6] clause A.14.5.1.4.

14.5.1.4.4 Test description

Two cells are deployed in the test, which are NR FR1 PCell (Cell 1) and a NR FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell and neighbour cell are given in Tables 14.5.1.4.4.1-1, 14.5.1.4.4.1-3 and 14.5.1.4.5-1 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

14.5.1.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.5.1.4.4.1-1.

Table 14.5.1.4.4.1-1: Supported test configurations for NR SA FR1 Event-triggered reporting without SSB time index detection when DRX is not used with single gap for satellite access

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 14.5.1.4-1 | GSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 14.5.1.4-2 | NGSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test equipment and the DUT according to the parameters in Table 14.5.1.4.4.1-2.

Table 14.5.1.4.4.1-2: Initial conditions for NR SA FR1 Event-triggered reporting without SSB time index detection when DRX is not used with single gap for satellite access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.12-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.5.1.4.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.5.1.4.4.1-3.

2. Message contents are defined in clause 14.5.1.4.4.3.

3. Cell 1 and Cell 2 are NR cells (PCell and neighbor cell, respectively) with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

4. The initial test environment conditions are setup according to section 14.0.5.

Table 14.5.1.4.4.1-3: General test parameters for NR SA FR1 Event-triggered reporting without SSB time index detection when DRX is not used with single gap for satellite access

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1, 2 | Cell 1 |  |
| Neighbour cell |  | 1, 2 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1, 2 | 1: Cell 1 and Cell 2 |  |
| NTN reference configuration |  | 1 | TBD | For GSO |
|  |  | 2 | TBD | For NGSO |
| Measurement gap type |  | 1, 2 | Per-UE gaps |  |
| Gap Pattern ID |  | 1, 2 | 0 | As specified in 38.133 [6] clause 9.1.2-1. |
| Measurement gap repetition periodicity | ms | 1, 2 | 40 |  |
| Measurement gap length | ms | 1, 2 | 6 |  |
| Measurement gap offset | ms | 1, 2 | 39 |  |
| A3-Offset | dB | 1, 2 | -4.5 |  |
| CP length |  | 1, 2 | Normal |  |
| Hysteresis | dB | 1, 2 | 0 |  |
| Time To Trigger | s | 1, 2 | 0 |  |
| Filter coefficient |  | 1, 2 | 0 | L3 filtering is not used |
| DRX | ms | 1, 2 |  | OFF |
| Time offset between serving and neighbour cells |  | 1,2 | 3 ms | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
| T1 | s | 1, 2 | 5 |  |
| T2 | s | 1, 2 | 5 |  |

14.5.1.4.4.2 Test procedure

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.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

UE is configured with 1 SMTC for the intra-frequency measurement. Both Cell 1 and Cell 2 are associated with the configured SMTC.

The UE is not required to read the neighbour cell SSB index in this test.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters *Connectivity NR*, *Connected without release On* and *Test Mode On* according to TS 38.508-1 [14] clause 4.5]. Cell 1 is the active cell.

2. Set the parameters according to T1 in Table 14.5.1.4.5-1.

3. SS shall transmit an *RRCReconfiguration* message configuring a *MeasId* consisting in an intra-frequency measurement object, event A3, gap configuration, and SMTC configuration according to Tables 14.5.1.4.4.1-3 and 14.5.1.4.5-1.

4. The UE shall transmit *RRCReconfigurationComplete* message. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.5.1.4.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by event A3. If the overall delay measured from the beginning of time period T2 is less than [802] ms, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.

8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. Once the connection is released, the SS [shall reset the satellite access channel model and then] switch OFF and then ON the UE and proceed with step 1.

10. Repeat step 2-9 until the confidence level [according to Tables G.2.3-1 in Annex G clause G.2 is achieved].

14.5.1.4.4.3 Message contents

FFS

14.5.1.4.5 Test requirements

Tables 14.5.1.4.4.1-3 and 14.5.1.4.5-1 define the primary level settings including test tolerances for NR SA FR1 Event-triggered reporting without SSB time index detection when DRX is not used with single gap for satellite access.

Table 14.5.1.4.5-1: Cell specific test parameters for NR SA FR1 Event-triggered reporting without SSB time index detection when DRX is not used with single gap for satellite access

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| SSB configuration |  | 1, 2 | SSB.1 FR1 | | SSB.1 FR1 | |
| SMTC configuration |  | 1, 2 | SMTC.2 | | SMTC.2 | |
| CSI-RS parameters |  | 1, 2 | CSI-RS.1.2 FDD resource #0 | | N/A | |
| PDSCH RMC configuration |  | 1, 2 | SR.1.1 FDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1, 2 | CR.1.1 FDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1, 2 | CCR.1.2 FDD | | N/A | |
| OCNG Patterns |  | 1, 2 | OP.1 | | OP.1 | |
| TRS configuration |  | 1, 2 | TRS.1.1 FDD | | N/A | |
| Initial BWP configuration |  | 1, 2 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2 | CSI-RS | | SSB | |
| Note 2 | dBm/SCS | 1, 2 | -98+TT | | | |
| Note 2 | dBm/15 kHz | 1, 2 | -98+TT | | | |
|  | dB | 1, 2 | 4+TT | -1.46+TT | -Infinity | -1.46+TT |
|  | dB | 1, 2 | 4+TT | 4+TT | -Infinity | 4+TT |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 2 | -94+TT | -94+TT | -Infinity | -94+TT |
| Io | dBm/9.36 MHz | 1, 2 | -64.60+TT | -62.25+TT | -64.60+TT | -62.25+TT |
| Propagation Condition |  | 1, 2 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

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

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

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

#### 14.5.1.5 NR SA FR1 Event-triggered reporting without SSB time index detection when DRX is used with two concurrent fully non-overlapped (FNO) gaps for satellite access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability needs to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets or TBD

14.5.1.5.1 Test purpose

The purpose of this test is to verify that the multiple gaps capable UE makes correct reporting of an event. This test will partly verify the SA intra-frequency NR cell search requirements in clause 14.5.1.0.2.

14.5.1.5.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access, 2 parallel measurement gaps (*parallelMeasurementGap-r17*, TS 38.306) and CSI-RS based RLM.

14.5.1.5.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.5.1.0.

The normative reference for this requirement is TS 38.133 [6] clause A.14.5.1.5.

14.5.1.5.4 Test description

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell and neighbour cell are given in Tables 14.5.1.5.4.1-1, 14.5.1.5.4.1-3 and 14.5.1.5.5-1 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The UE is configured with 2 concurrent and fully non-overlapping (FNO) measurement gaps for the intra-frequency measurement. Serving Cell 1 is expected to be measured within MeasGapId #0 and Neighbour Cell 2 is expected to be measured within MeasGapId #1.

14.5.1.5.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.5.1.5.4.1-1.

Table 14.5.1.5.4.1-1: Supported test configurations for NR SA FR1 Event-triggered reporting without SSB time index detection when DRX is used with two concurrent fully non-overlapped (FNO) gaps for satellite access

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 14.5.1.5-1 | GSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 14.5.1.5-2 | NGSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test equipment and the DUT according to the parameters in Table 14.5.1.5.4.1-2.

Table 14.5.1.5.4.1-2: Initial conditions for NR SA FR1 Event-triggered reporting without SSB time index detection when DRX is used with two concurrent fully non-overlapped (FNO) gaps for satellite access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.12-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.5.1.5.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.5.1.5.4.1-3.

2. Message contents are defined in clause 14.5.1.5.4.3.

3. Cell 1 and Cell 2 are NR cells (PCell and neighbor cell, respectively) with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

4. The initial test environment conditions are setup according to section 14.0.5.

Table 14.5.1.5.4.1-3: General test parameters for NR SA FR1 Event-triggered reporting without SSB time index detection when DRX is used with two concurrent fully non-overlapped (FNO) gaps for satellite access

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| Active cell |  | 1, 2 | Cell 1 | |  |
| Neighbour cell |  | 1, 2 | Cell 2 | | Cell to be identified. |
| RF Channel Number |  | 1, 2 | 1: Cell 1 and Cell 2 | |  |
| NTN reference configuration |  | 1 | TBD | | For GSO |
|  | 2 | TBD | | For NGSO |
| Measurement gap type |  | 1, 2 | Per-UE gap | |  |
| Gap Pattern ID |  | 1 | 1 | | As specified in 38.133 [6] clause 9.1.2-1. |
| Measurement gap repetition periodicity | ms | 1, 2 | 40 | |  |
| Measurement gap length | ms | 1, 2 | 6 | |  |
| Measurement gap offset | ms | 1, 2 | 19 for MeasGapId #0  4 for MeasGapId #1 | |  |
| A3-Offset | dB | 1, 2 | -4.5 | |  |
| CP length |  | 1, 2 | Normal | |  |
| Hysteresis | dB | 1, 2 | 0 | |  |
| Time To Trigger | s | 1, 2 | 0 | |  |
| Filter coefficient |  | 1, 2 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2 | DRX.1 | DRX. 7 |  |
| Time offset between serving and neighbour cells |  | 1, 2 | 3 ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
| T1 | s | 1, 2 | 5 | |  |
| T2 | s | 1, 2 | 5 | 10 |  |

14.5.1.5.4.2 Test procedure

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.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

The UE is not required to read the neighbour cell SSB index in this test.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters *Connectivity NR*, *Connected without release On* and *Test Mode On* according to TS 38.508-1 [14] clause 4.5]. Cell 1 is the active cell.

2. Set the parameters according to T1 in Table 14.5.1.5.5-1.

3. SS shall transmit an *RRCReconfiguration* message configuring a *MeasId* consisting in an intra-frequency measurement object, event A3, two parallel gap configurations, and SMTC configuration according to Tables 14.5.1.5.4.1-3 and 14.5.1.5.5-1.

4. The UE shall transmit *RRCReconfigurationComplete* message. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.5.1.5.5-1. T2 starts.

6. [UE shall transmit a *MeasurementReport* message triggered by event A3]. If the overall delay measured from the beginning of time period T2 is less than [922] ms for Test 1 or [6402] ms for Test 2, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.

8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. Once the connection is released, the SS [shall reset the satellite access channel model and then] switch OFF and then ON the UE and proceed with step 1.

10. Repeat step 2-9 until the confidence level [according to Tables G.2.3-1 in Annex G clause G.2 is achieved].

11. Repeat step 1-10 for each sub-test in Table 14.5.1.5.4.1-3 as appropriate.

14.5.1.5.4.3 Message contents

FFS

14.5.1.5.5 Test requirements

Tables 14.5.1.5.4.1-3 and 14.5.1.5.5-1 define the primary level settings including test tolerances for NR SA FR1 Event-triggered reporting without SSB time index detection when DRX is used with two concurrent fully non-overlapped (FNO) gaps for satellite access.

Table 14.5.1.5.5-1: Cell specific test parameters for NR SA FR1 Event-triggered reporting without SSB time index detection when DRX is used with two concurrent fully non-overlapped (FNO) gaps for satellite access

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| SSB configuration |  | 1, 2 | SSB.1 FR1 | | SSB.7 FR1 | |
| SMTC configuration |  | 1, 2 | SMTC.2 | | SMTC.Y | |
| CSI-RS parameters |  | 1, 2 | CSI-RS.1.2 FDD resource #0 | | N/A | |
| PDSCH RMC configuration |  | 1, 2 | SR.1.1 FDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1, 2 | CR.1.1 FDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1, 2 | CCR.1.2 FDD | | N/A | |
| OCNG Patterns |  | 1, 2 | OP.1 | | OP.1 | |
| TRS configuration |  | 1, 2 | TRS.1.1 FDD | | N/A | |
| Initial BWP configuration |  | 1, 2 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2 | CSI-RS | | SSB | |
| Note 2 | dBm/SCS | 1, 2 | -98+TT | | | |
| Note 2 | dBm/15 kHz | 1, 2 | -98+TT | | | |
|  | dB | 1, 2 | 4+TT | -1.46+TT | -Infinity | -1.46+TT |
|  | dB | 1, 2 | 4+TT | 4+TT | -Infinity | 4+TT |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 2 | -94+TT | -94+TT | -Infinity | -94+TT |
| Io | dBm/9.36 MHz | 1, 2 | -64.60+TT | -62.25+TT | -64.60+TT | -62.25+TT |
| Propagation Condition |  | 1, 2 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

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

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

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

#### 14.5.1.6 NR SA FR1 Event-triggered reporting with SSB time index detection when DRX is not used with two concurrent partial overlapping (PPO) gaps for satellite access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability needs to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets or TBD

14.5.1.6.1 Test purpose

The purpose of this test is to verify that the multiple gaps capable UE makes correct reporting of an event. This test will partly verify the SA intra-frequency NR cell search requirements in clause 14.5.1.0.2.

14.5.1.6.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access, 2 parallel measurement gaps (*parallelMeasurementGap-r17*, TS 38.306) and CSI-RS based RLM.

14.5.1.6.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.5.1.0.

The normative reference for this requirement is TS 38.133 [6] clause A.14.5.1.6.

14.5.1.6.4 Test description

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell and neighbour cell are given in Tables 14.5.1.6.4.1-1, 14.5.1.6.4.1-3 and 14.5.1.6.5-1 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The UE is configured with 2 PPO concurrent measurement gaps for the intra-frequency measurement. Serving Cell 1 is expected to be measured within MeasGapId #0 and Neighbour Cell 2 is expected to be measured within MeasGapId #1. And the priority for MeasGapId #1 is higher than the priority for MeasGapId #0.

14.5.1.6.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.5.1.6.4.1-1.

Table 14.5.1.6.4.1-1: Supported test configurations for NR SA FR1 Event-triggered reporting with SSB time index detection when DRX is not used with two concurrent partial overlapping (PPO) gaps for satellite access

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 14.5.1.6-1 | GSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 14.5.1.6-2 | NGSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test equipment and the DUT according to the parameters in Table 14.5.1.6.4.1-2.

Table 14.5.1.6.4.1-2: Initial conditions for NR SA FR1 Event-triggered reporting with SSB time index detection when DRX is not used with two concurrent partial overlapping (PPO) gaps for satellite access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.12-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.5.1.6.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.5.1.6.4.1-3.

2. Message contents are defined in clause 14.5.1.6.4.3.

3. Cell 1 and Cell 2 are NR cells (PCell and neighbor cell, respectively) with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

4. The initial test environment conditions are setup according to section 14.0.5.

Table 14.5.1.6.4.1-3: General test parameters for NR SA FR1 Event-triggered reporting with SSB time index detection when DRX is not used with two concurrent partial overlapping (PPO) gaps for satellite access

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1, 2 | Cell 1 |  |
| Neighbour cell |  | 1, 2 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1, 2 | 1: Cell 1 and Cell 2 |  |
| NTN reference configuration |  | 1 | TBD | For GSO |
|  |  | 2 | TBD | For NGSO |
| Measurement gap type |  | 1, 2 | Per-UE gap |  |
| Gap Pattern ID |  | 1, 2 | 0 for MeasGapId #0  1 for MeasGapId #1 | As specified in 38.133 [6] clause 9.1.2-1. |
| Measurement gap repetition periodicity | ms | 1, 2 | 40ms for MeasGapId #0  80ms for MeasGapId #1 |  |
| Measurement gap length | ms | 1, 2 | 6 |  |
| Measurement gap offset | ms | 1, 2 | 39 for MeasGapId #0  4 for MeasGapId #1 |  |
| A3-Offset | dB | 1, 2 | -4.5 |  |
| CP length |  | 1, 2 | Normal |  |
| Hysteresis | dB | 1, 2 | 0 |  |
| Time To Trigger | s | 1, 2 | 0 |  |
| Filter coefficient |  | 1, 2 | 0 | L3 filtering is not used |
| DRX | ms | 1, 2 |  | OFF |
| Time offset between serving and neighbour cells |  | 1, 2 | 5 ms | Asynchronous cells.  The timing of Cell 2 is 5ms later than the timing of serving Cell 1. |
| T1 | s | 1, 2 | 5 |  |
| T2 | s | 1, 2 | 5 |  |

14.5.1.6.4.2 Test procedure

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.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

The UE is required to report the neighbour cell SSB index in this test.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters *Connectivity NR*, *Connected without release On* and *Test Mode On* according to TS 38.508-1 [14] clause 4.5]. Cell 1 is the active cell.

2. Set the parameters according to T1 in Table 14.5.1.6.5-1.

3. SS shall transmit an *RRCReconfiguration* message configuring a *MeasId* consisting in an intra-frequency measurement object, event A3, two parallel gap configurations, and SMTC configuration according to Tables 14.5.1.6.4.1-3 and 14.5.1.6.5-1.

4. The UE shall transmit *RRCReconfigurationComplete* message. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.5.1.6.5-1. T2 starts.

6. [UE shall transmit a *MeasurementReport* message triggered by event A3]. If the overall delay measured from the beginning of time period T2 is less than [1242] ms, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.

8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. Once the connection is released, the SS [shall reset the satellite access channel model and then] switch OFF and then ON the UE and proceed with step 1.

10. Repeat step 2-9 until the confidence level [according to Tables G.2.3-1 in Annex G clause G.2 is achieved].

14.5.1.6.4.3 Message contents

FFS

14.5.1.6.5 Test requirements

Tables 14.5.1.6.4.1-3 and 14.5.1.6.5-1 define the primary level settings including test tolerances for NR SA FR1 Event-triggered reporting with SSB time index detection when DRX is not used with two concurrent partial overlapping (PPO) gaps for satellite access.

Table 14.5.1.6.5-1: Cell specific test parameters for NR SA FR1 Event-triggered reporting with SSB time index detection when DRX is not used with two concurrent partial overlapping (PPO) gaps for satellite access

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| SSB configuration |  | 1, 2 | SSB.1 FR1 | | SSB.1 FR1 | |
| SMTC configuration |  | 1, 2 | SMTC.2 | | SMTC.Y | |
| CSI-RS parameters |  | 1, 2 | CSI-RS.1.2 FDD resource #0 | | N/A | |
| PDSCH RMC configuration |  | 1, 2 | SR.1.1 FDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1, 2 | CR.1.1 FDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1, 2 | CCR.1.2 FDD | | N/A | |
| OCNG Patterns |  | 1, 2 | OP.1 | | OP.1 | |
| TRS configuration |  | 1, 2 | TRS.1.1 FDD | | N/A | |
| Initial BWP configuration |  | 1, 2 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2 | CSI-RS | | SSB | |
| Note 2 | dBm/SCS | 1, 2 | -98+TT | | | |
| Note 2 | dBm/15 kHz | 1, 2 | -98+TT | | | |
|  | dB | 1, 2 | 4+TT | -1.46+TT | -Infinity | -1.46+TT |
|  | dB | 1, 2 | 4+TT | 4+TT | -Infinity | 4+TT |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 2 | -94+TT | -94+TT | -Infinity | -94+TT |
| Io | dBm/9.36 MHz | 1, 2 | -64.60+TT | -62.25+TT | -64.60+TT | -62.25+TT |
| Propagation Condition |  | 1, 2 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1240 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

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

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

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

### 14.5.2 Inter-frequency Measurements for SAN

#### 14.5.2.0 Minimum conformance requirements

14.5.2.0.1 Minimum conformance requirements for inter-frequency measurements with measurement gaps

When measurement gaps are provided, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable inter frequency cell within Tidentify\_inter\_without\_index if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured). Otherwise UE shall be able to identify a new detectable inter frequency cell within Tidentify\_inter\_with\_index. The UE shall be able to identify a new detectable inter frequency SS block of an already detected cell within Tidentify\_inter\_without\_index.

Tidentify\_inter\_without\_index = (TPSS/SSS\_sync\_inter + T SSB\_measurement\_period\_inter) ms

Tidentify\_inter\_with\_index = (TPSS/SSS\_sync\_inter + T SSB\_measurement\_period\_inter + TSSB\_time\_index\_inter) ms

Where:

TPSS/SSS\_sync\_inter: it is the time period used in PSS/SSS detection given in table 14.5.2.0.1-1.

TSSB\_time\_index\_inter: it is the time period used to acquire the index of the SSB being measured given in table 14.5.2.0.1-2.

TSSB\_measurement\_period\_inter: equal to a measurement period of SSB based measurement given in table 14.5.2.0.1-3.

CSSFinter: it is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in 38.133 [6] clause 9.1D.5.2 for measurement conducted within measurement gaps.

Kgap is the scaling factor for a SSB frequency layer to be measured within an associated measurement gap pattern. Kgap = 1 when the UE is not configured with concurrent measurement gaps. When the UE is configured with concurrent measurement gaps and the two measurement gaps are fully overlapping with MGRP=160ms, Kgap = 2. Otherwise, Kgap = Ntotal / Navailable, where Navailable and Ntotal are calculated as follows:

For a window W of duration max(SMTC period, MGRP\_max), where MGRP max is the maximum MGRP across all configured per-UE measurement gap, and starting from the beginning of any SMTC occasion:

- Ntotal is the total number of SMTC occasions that are covered by instances of the associated measurement gap within the window W, including those overlapped with other measurement gap occasions within the window, and

- Navailable is the number of SMTC occasions that are covered by instances of the non-dropped associated measurement gap within the window W after accounting for measurement gap collisions by applying the measurement gap collision rule in 38.133 [6] section 9.1.8.3.

Kgap is only applicable for UE supporting *parallelMeasurementGap-r17*. When concurrent measurement gaps are configured, requirements in this clause do not apply if Navailable =0, or if one SMTC overlaps more than one MGs associated to the frequency layer.

K\_satellite: it is a statellite specific scaling factor.

* If SMTCs within a measurement gap do not overlap with each other, and if LEO satellite(s) is/are required to be measured within SMTC
  + K\_satellite = 1, if GSO satellites are measured on the carrier
  + , if LEO satellites are measured on the carrier.
* If SMTCs within a measurement gap partially overlap with each other, and if LEO and/or GEO satellite(s) is/are required to be measured within overlapped SMTCs
  + , if only GEO satellites are measured on the carrier
  + , if only LEO satellites are measured on the carrier.

Table 14.5.2.0.1-1: Time period for PSS/SSS detection (Frequency range FR1)

|  |  |
| --- | --- |
| **Condition NOTE1** | **TPSS/SSS\_sync\_inter** |
| No DRX | Max(600ms, Ceil(8 x Kgap) × Max(MGRP, SMTC period **NOTE2**)) × CSSFinter × K\_satellite |
| DRX cycle ≤ 320ms | Max(600ms, Ceil(8\*1.5 x Kgap) × Max(MGRP, SMTC period, DRX cycle)) × CSSFinter × K\_satellite |
| DRX cycle > 320ms | Ceil(8 x Kgap) × DRX cycle × CSSFinter × K\_satellite |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: SMTC period is the SMTC period in SMTC configuration which is associated with the target cell to be measured configured in *SSB-MTC4List-r17*. | |

Table 14.5.2.0.1-2: Time period for time index detection (Frequency range FR1)

|  |  |
| --- | --- |
| **Condition NOTE1** | **TSSB\_time\_index\_inter** |
| No DRX | Max(120ms, Ceil(3 x Kgap) × Max(MGRP, SMTC period **NOTE2**)) × CSSFinter × K\_satellite |
| DRX cycle ≤ 320ms | Max(120ms, Ceil(3 × 1.5 x Kgap) × Max(MGRP, SMTC period, DRX cycle)) × CSSFinter × K\_satellite |
| DRX cycle > 320ms | Ceil(3 x Kgap) × DRX cycle × CSSFinter × K\_satellite |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: SMTC period is the SMTC period in SMTC configuration which is associated with the target cell to be measured configured in *SSB-MTC4List-r17*. | |

When measurement gaps are provided for inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting SS-RSRP, SS-RSRQ and SS-SINR measurements to higher layers with measurement accuracy as specified in 38.133 [6] clauses 10.1C.4, 10.1C.5, 10.1C.9, 10.1C.10, 10.1C.14 and 10.1C.15, respectively, as shown in table 14.5.2.0.1-3.

Table 14.5.2.0.1-3: Measurement period for inter-frequency measurements with gaps (Frequency FR1)

|  |  |
| --- | --- |
| **Condition NOTE1** | **T SSB\_measurement\_period\_inter** |
| No DRX | Max(200ms, Ceil(8 x Kgap) × Max(MGRP, SMTC period **NOTE2**)) × CSSFinter × K\_satellite |
| DRX cycle ≤ 320ms | Max(200ms, Ceil(8 × 1.5 x Kgap) × Max(MGRP, SMTC period, DRX cycle)) × CSSFinter × K\_satellite |
| DRX cycle > 320ms | Ceil(8 x Kgap) × DRX cycle × CSSFinter × K\_satellite |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in 38.133 [6] clause 3.6.1  NOTE 2: SMTC period is the SMTC period in SMTC configuration which is associated with the target cell to be measured configured in *SSB-MTC4List-r17*. | |

The normative reference for this requirement is TS 38.133 [6] clause 9.3C.4 and 9.3C.5.

14.5.2.0.2 Minimum conformance requirements for inter-frequency measurements with measurement gaps

If UE supports *interFrequencyMeas-NoGap-r16* and the flag *interFrequencyConfig-NoGap-r16* is configured by the Network, UE shall be able to identify a new detectable inter frequency cell within Tidentify\_inter\_without\_index if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured). Otherwise UE shall be able to identify a new detectable inter frequency cell within Tidentify\_inter\_with\_index. The UE shall be able to identify a new detectable inter frequency SS block of an already detected cell within Tidentify\_inter\_without\_index. It is assumed that when UE performs inter-frequency measurements without measurement gaps in a TDD bands on FR1, the following conditions are met:

- SFN and frame boundary across serving cell and inter-frequency neighbor cells is aligned, and

- the timing of SSBs across serving cell and inter-frequency neighbor cells are aligned

Tidentify\_inter\_without\_index = (TPSS/SSS\_sync\_inter + T SSB\_measurement\_period\_inter) ms

Tidentify\_inter\_with\_index = (TPSS/SSS\_sync\_inter + T SSB\_measurement\_period\_inter + TSSB\_time\_index\_inter) ms

Where:

TPSS/SSS\_sync\_inter: it is the time period used in PSS/SSS detection given in table 14.5.2.0.2-1.

TSSB\_time\_index\_inter: it is the time period used to acquire the index of the SSB being measured given in table 14.5.2.0.2-2.

T SSB\_measurement\_period\_inter: equal to a measurement period of SSB based measurement given in table 14.5.2.0.2-3.

CSSFinter: it is a carrier specific scaling factor and is determined according to CSSFoutside\_gap,i in 38.133 [6] clause 9.1D.5.1 for measurement conducted outside measurement gaps, i.e. when inter-frequency SMTC is fully non overlapping or partially overlapping with measurement gaps or according to CSSFwithin\_gap,i in 38.133 [6] clause 9.1D.5.2 for measurement conducted within measurement gaps, i.e. when inter-frequency SMTC is fully overlapping with measurement gaps.

Kp is the scaling factor for a SSB frequency layer to be measured without measurement gaps. Kp = Ntotal\_SAN / Navailable\_SAN, where Navailable\_SAN and Ntotal\_SAN are calculated as follows:

- For a window W of duration max(SMTC period, MGRP\_max), where

- If UE supports *parallelMeasurementGap-r17* and is configured with concurrent measurement gaps, MGRP max is the maximum MGRP across all configured per-UE measurement gap. Otherwise, MGRP max is the MGRP of configured measurement gap.

- Starting from the beginning of any SMTC occasion:

- Ntotal\_SAN is the total number of SMTC occasions within the window, including those overlapped and non-overlapped with measurement gap occasions within the window, and

- Navailable\_SAN is the number of SMTC occasions within the window W that don’t collide with any non-dropped MG occasion within or outside the window W, after accounting for measurement gap collisions by applying the measurement gap collision rule in 38.133 [6] section 9.1C.8.3. The collision rule between SMTC occasion and measurement gap occasion is defined in 38.133 [6] section 9.1C.9.1

Kp = [1] when Navailable\_SAN = 0 and measurement gap sharing in 38.133 [6] clause 9.1.2.1a shall apply.

Kp = 1 when inter-frequency SMTC is fully non overlapping with measurement gaps.

Ksatellite: it is a satellite specific scaling factor.

* If SMTCs do not overlap with each other, and if LEO and/or GEO satellite(s) is/are required to be measured within SMTC
  + Ksatellite = 1, if GSO satellite(s) is/are measured on the carrier
  + , if LEO satellite(s) is/are measured on the carrier.
* If SMTCs partially overlap with each other, and if LEO and/or GEO satellite(s) is/are required to be measured within overlapped SMTCs
  + , if only GEO satellite(s) is/are measured on the carrier
  + , if only LEO satellite(s) is/are measured on the carrier.

Table 14.5.2.0.2-1: Time period for PSS/SSS detection, (FR1)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_inter |
| No DRX | max( 600ms, ceil( 5 x Kp) x SMTC period )Note 1 x CSSFinter × Ksatellite |
| DRX cycle≤ 320ms | max( 600ms, ceil(1.5x 5 x Kp) x max(SMTC period,DRX cycle)) x CSSFinter × Ksatellite |
| DRX cycle>320ms | ceil(5 x Kp) x DRX cycle x CSSFinter × Ksatellite |
| NOTE 1: SMTC period is the SMTC period in SMTC configuration which is associated with the target cell to be measured configured in *SSB-MTC4List-r17*. | |

Table 14.5.2.0.2-2: Time period for time index detection (FR1)

|  |  |
| --- | --- |
| DRX cycle | TSSB\_time\_index\_inter |
| No DRX | max(120ms, ceil( 3 x Kp )x SMTC period)Note 1 x CSSFinter × Ksatellite |
| DRX cycle≤ 320ms | max(120ms, ceil (1.5 x 3 x Kp) x max(SMTC period,DRX cycle)) x CSSFinter × Ksatellite |
| DRX cycle>320ms | Ceil(3 x Kp) x DRX cycle x CSSFinter × Ksatellite |
| NOTE 1: SMTC period is the SMTC period in SMTC configuration which is associated with the target cell to be measured configured in *SSB-MTC4List-r17*. | |

The UE physical layer shall be capable of reporting SS-RSRP, SS-RSRQ and SS-SINR measurements to higher layers with measurement accuracy as specified in 38.133 [6] clauses 10.1C.4, 10.1C.5, 10.1C.9, 10.1C.10, 10.1C.14 and 10.1C.15, respectively, as shown in table 14.5.2.0.2-3, if UE supports inter-frequency measurement without measurement gaps:

Table 14.5.2.0.2-3: Measurement period for inter-frequency measurements without gaps ((FR1)

|  |  |
| --- | --- |
| DRX cycle | T SSB\_measurement\_period\_inter |
| No DRX | max(200ms, ceil( 5 x Kp) x SMTC period)Note 1 x CSSFinter × K\_satellite |
| DRX cycle≤ 320ms | max(200ms, ceil(1.5x 5 x Kp) x max(SMTC period,DRX cycle)) x CSSFinter × K\_satellite |
| DRX cycle>320ms | ceil( 5 x Kp ) x DRX cycle x CSSFinter × K\_satellite |
| NOTE 1: SMTC period is the SMTC period in SMTC configuration which is associated with the target cell to be measured configured in *SSB-MTC4List-r17*. | |

The normative reference for this requirement is TS 38.133 [6] clause 9.3C.7.1 and 9.3C.7.2.

#### 14.5.2.1 NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with single gap for satellite access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability needs to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets

14.5.2.1.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 14.5.2.0.1.

14.5.2.1.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access.

14.5.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.5.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.14.5.2.1.

14.5.2.1.4 Test description

Two cells are deployed in the test, which are NR FR1 PCell (Cell 1) on NR RF channel 1 and NR FR1 neighbour cell (Cell 2) on NR RF channel 2. The test parameters for PCell and neighbour cell are given in Tables 14.5.2.1.4.1-1, 14.5.2.1.4.1-3 and 14.5.2.1.5-1 below. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. Measurement gap pattern configuration # 0 is provided to the UE.

14.5.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.5.2.1.4.1-1.

Table 14.5.2.1.4.1-1: Supported test configurations for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with single gap for satellite access

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 14.5.2.1-1 | GSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 14.5.2.1-2 | NGSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note 1: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2.  Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell | |

Configure the test equipment and the DUT according to the parameters in Table 14.5.2.1.4.1-2.

Table 14.5.2.1.4.1-2: Initial conditions for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with single gap for satellite access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.12-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.5.2.1.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.5.2.1.4.1-3.

2. Message contents are defined in clause 14.5.2.1.4.3.

3. Cell 1 and Cell 2 are NR cells (PCell and neighbor cell, respectively) with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

4. The initial test environment conditions are setup according to section 14.0.5.

Table 14.5.2.1.4.1-3: General test parameters for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with single gap for satellite access

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
|  |  |  | Test 1 |  |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | Two FR1 NR carrier frequencies are used. |
| Active cell |  | Config 1,2 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell2 | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2 | 0 | As specified in 38.133 [6] clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 9 |  |
| A3-Offset | dB | Config 1,2 | -6 |  |
| Hysteresis | dB | Config 1,2 | 0 |  |
| CP length |  | Config 1,2 | Normal |  |
| TimeToTrigger | s | Config 1,2 | 0 |  |
| Filter coefficient |  | Config 1,2 | 0 | L3 filtering is not used |
| DRX |  | Config 1,2 | OFF | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3ms | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
| T1 | s | Config 1,2 | 5 |  |
| T2 | s | Config 1,2 | 1 |  |

14.5.2.1.4.2 Test procedure

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 UE is not required to read the neighbour cell SSB index in this test.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters *Connectivity NR*, *Connected without release On* and *Test Mode On* according to TS 38.508-1 [14] clause 4.5]. Cell 1 is the active cell.

2. Set the parameters according to T1 in Table 14.5.2.1.5-1.

3. SS shall transmit an *RRCReconfiguration* message configuring a *MeasId* consisting in an inter-frequency measurement object, event A3, gap configuration, and SMTC configuration according to Tables 14.5.2.1.4.1-3 and 14.5.2.1.5-1.

4. The UE shall transmit *RRCReconfigurationComplete* message. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.5.2.1.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by event A3. If the overall delay measured from the beginning of time period T2 is less than [922] ms, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.

8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. Once the connection is released, the SS [shall reset the satellite access channel model and then] switch OFF and then ON the UE and proceed with step 1.

10. Repeat step 2-9 until the confidence level [according to Tables G.2.3-1 in Annex G clause G.2 is achieved].

14.5.2.1.4.3 Message contents

FFS

14.5.2.1.5 Test requirements

Tables 14.5.2.1.4.1-3 and 14.5.2.1.5-1 define the primary level settings including test tolerances for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with single gap for satellite access.

Table 14.5.2.1.5-1: Cell specific test parameters for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with single gap for satellite access

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| NR RF Channel Number | |  | Config 1,2 | 1 | | 2 | |
| Satellite information | |  | Config 1 | SSC.1 | | NSC.1 | |
|  | |  | Config 2 | SSC.2 | | NSC.2 | |
| Duplex mode | |  | Config 1,2 | FDD | | | |
| BWchannel | | MHz | Config 1,2 | 10: NRB,c = 52 | | | |
| BWP BW | | MHz | Config 1,2 | 10: NRB,c = 52 | | | |
| BWP configuration | Initial DL BWP | Config 1 | Config 1,2 | DLBWP.0.1 | | NA | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | NA | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | NA | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | NA | |
| TRS configuration | |  | Config 1,2 | TRS.1.1 FDD | | NA | |
| OCNG Patterns | |  | Config 1,2 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1,2 | SR.1.1 FDD | |  | |
| RMSI CORESET Reference Channel | |  | Config 1,2 | CR.1.1 FDD | |  | |
| Dedicated CORESET Reference Channel | |  | Config 1,2 | CCR.1.1 FDD | |  | |
| SSB parameters | |  | Config 1,2 | SSB.1 FR1 | | SSB.5 FR1 | |
| SMTC configuration | |  | Config 1,2 | SMTC.2 | | SMTC.5 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | | |
| EPRE ratio of PSS to SSS | |  | Config 1,2 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz | Config 1,2 | -98+TT | | -98+TT | |
| Note2 | | dBm/SCS | Config 1,2 | -98+TT | | -98+TT | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -94+TT | -94+TT | -Infinity | -91+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT |
| IoNote3 | | dBm/9.36MHz | Config 1,2 | -64.59+TT | -64.59+TT | -70.05+TT | -62.26+TT |
| Propagation Condition | |  | Config 1,2 | AWGN | | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | |

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

The UE is not required to report SSB time index.

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

#### 14.5.2.2 NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is used with single gap for satellite access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability needs to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets

14.5.2.2.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 14.5.2.0.1.

14.5.2.2.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access and long DRX cycle.

14.5.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.5.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.14.5.2.2.

14.5.2.2.4 Test description

Two cells are deployed in the test, which are NR FR1 PCell (Cell 1) on NR RF channel 1 and NR FR1 neighbour cell (Cell 2) on NR RF channel 2. The test parameters for PCell and neighbour cell are given in Tables 14.5.2.2.4.1-1, 14.5.2.2.4.1-3, 14.5.2.2.5-1, 14.5.2.2.5-2 and 14.5.2.2.5-3 below. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. Measurement gap pattern configuration # 0 is provided to the UE.

14.5.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.5.2.2.4.1-1.

Table 14.5.2.2.4.1-1: Supported test configurations for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is used with single gap for satellite access

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 14.5.2.2-1 | GSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 14.5.2.2-2 | NGSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note 1: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2.  Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell | |

Configure the test equipment and the DUT according to the parameters in Table 14.5.2.2.4.1-2.

Table 14.5.2.2.4.1-2: Initial conditions for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is used with single gap for satellite access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.12-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.5.2.2.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.5.2.2.4.1-3.

2. Message contents are defined in clause 14.5.2.2.4.3.

3. Cell 1 and Cell 2 are NR cells (PCell and neighbour cell, respectively) with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

4. The initial test environment conditions are setup according to section 14.0.5.

Table 14.5.2.2.4.1-3: General test parameters for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is used with single gap for satellite access

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | | Two FR1 NR carrier frequencies are used. |
| Active cell |  | Config 1,2 | NR cell 1 (Pcell) | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell2 | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2 | 0 | | As specified in 38.133 [6] clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 9 | |  |
| A3-Offset | dB | Config 1,2 | -6 | |  |
| Hysteresis | dB | Config 1,2 | 0 | |  |
| CP length |  | Config 1,2 | Normal | |  |
| TimeToTrigger | s | Config 1,2 | 0 | |  |
| Filter coefficient |  | Config 1,2 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2 | DRX.1 | DRX. 7 | As specified in clause A.5 |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
| T1 | s | Config 1,2 | 5 | |  |
| T2 | s | Config 1,2 | [1.1] | [11] |  |

14.5.2.2.4.2 Test procedure

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 UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

The UE is not required to read the neighbour cell SSB index in this test.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters *Connectivity NR*, *Connected without release On* and *Test Mode On* according to TS 38.508-1 [14] clause 4.5]. Cell 1 is the active cell.

2. Set the parameters according to T1 in Table 14.5.2.2.5-1.

3. SS shall transmit an *RRCReconfiguration* message configuring a *MeasId* consisting in an inter-frequency measurement object, event A3, gap configuration, DRX configuration, and SMTC configuration according to Tables 14.5.2.2.4.1-3 and 14.5.2.2.5-1.

4. The UE shall transmit *RRCReconfigurationComplete* message. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.5.2.2.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by event A3. If the overall delay measured from the beginning of time period T2 is less than [1082] ms for Test 1 or less than [10242] ms for Test 2, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.

8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. Once the connection is released, the SS [shall reset the satellite access channel model and then] switch OFF and then ON the UE and proceed with step 1.

10. Repeat step 2-9 until the confidence level [according to Tables G.2.3-1 in Annex G clause G.2 is achieved].

11. Repeat step 1-10 for each sub-test in Table 14.5.2.2.4.1-3 as appropriate.

14.5.2.2.4.3 Message contents

FFS

14.5.2.2.5 Test requirements

Tables 14.5.2.2.4.1-3, 14.5.2.2.5-1, 14.5.2.2.5-2 and 14.5.2.2.5-3 define the primary level settings including test tolerances for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is used with single gap for satellite access.

Table 14.5.2.2.5-1: Cell specific test parameters for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is used with single gap for satellite access

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| NR RF Channel Number | |  | Config 1,2 | 1 | | 2 | |
| Satellite information | |  | Config 1 | SSC.1 | | NSC.1 | |
|  | |  | Config 2 | SSC.2 | | NSC.2 | |
| Duplex mode | |  | Config 1,2 | FDD | | | |
| BWchannel | | MHz | Config 1,2 | 10: NRB,c = 52 | | | |
| BWP BW | | MHz | Config 1,2 | 10: NRB,c = 52 | | | |
| BWP configuration | Initial DL BWP |  | Config 1,2 | DLBWP.0.1 | | NA | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | NA | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | NA | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | NA | |
| TRS configuration | |  | Config 1,2 | TRS.1.1 FDD | | NA | |
| OCNG Patterns | |  | Config 1,2 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1,2 | SR.1.1 FDD | |  | |
| RMSI CORESET Reference Channel | |  | Config 1,2 | CR.1.1 FDD | |  | |
| Dedicated CORESET Reference Channel | |  | Config 1,2 | CCR.1.1 FDD | |  | |
| SSB parameters | |  | Config 1,2 | SSB.1 FR1 | | SSB.5 FR1 | |
| SMTC configuration | |  | Config 1,2 | SMTC.2 | | SMTC.5 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | | |
| EPRE ratio of PSS to SSS | |  | Config 1,2 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz | Config 1,2 | -98+TT | | -98+TT | |
| Note2 | | dBm/SCS | Config 1,2 | -98+TT | | -98+TT | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -94+TT | -94+TT | -Infinity | -91+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT |
| IoNote3 | | dBm/9.36MHz | Config 1,2 | -64.59+TT | -64.59+TT | -70.05+TT | -62.2+TT |
| Propagation Condition | |  | Config 1,2 | AWGN | | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | |

Table 14.5.2.2.5-2: DRX-Configuration for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is used with single gap for satellite access

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1 | Test2 | Comment |
|  | Value | Value |  |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [13] |
| drx-InactivityTimer | ms1 | ms1 |  |
| drx-RetransmissionTimerDL | sl1 | sl1 |  |
| drx-RetransmissionTimerUL | sl1 | sl1 |  |
| drx-LongCycleStartOffset | ms40 | ms640 |  |
| shortDRX | disable | disable |  |

Table 14.5.2.2.5-3: *TimeAlignmentTimer* configuration for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is used with single gap for satellite access

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [13] |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [1080] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [10240] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

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

#### 14.5.2.3 NR SA FR1-FR1 Event-triggered reporting with SSB time index detection when DRX is not used with single gap for satellite access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability needs to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets

14.5.2.3.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 14.5.2.0.1.

14.5.2.3.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access.

14.5.2.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.5.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.14.5.2.3.

14.5.2.3.4 Test description

Two cells are deployed in the test, which are NR FR1 PCell (Cell 1) on NR RF channel 1 and NR FR1 neighbour cell (Cell 2) on NR RF channel 2. The test parameters for PCell and neighbour cell are given in Tables 14.5.2.3.4.1-1, 14.5.2.3.4.1-3 and 14.5.2.3.5-1 below. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. Measurement gap pattern configuration # 0 is provided to the UE.

14.5.2.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.5.2.3.4.1-1.

Table 14.5.2.3.4.1-1: Supported test configurations for NR SA FR1-FR1 Event-triggered reporting with SSB time index detection when DRX is not used with single gap for satellite access

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 14.5.2.3-1 | GSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 14.5.2.3-2 | NGSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note 1: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2.  Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell | |

Configure the test equipment and the DUT according to the parameters in Table 14.5.2.3.4.1-2.

Table 14.5.2.3.4.1-2: Initial conditions for NR SA FR1-FR1 Event-triggered reporting with SSB time index detection when DRX is not used with single gap for satellite access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.12-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.5.2.3.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.5.2.3.4.1-3.

2. Message contents are defined in clause 14.5.2.3.4.3.

3. Cell 1 and Cell 2 are NR cells (PCell and neighbor cell, respectively) with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

4. The initial test environment conditions are setup according to section 14.0.5.

Table 14.5.2.3.4.1-3: General test parameters for NR SA FR1-FR1 Event-triggered reporting with SSB time index detection when DRX is not used with single gap for satellite access

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
|  |  |  | Test 1 |  |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | Two FR1 NR carrier frequencies are used. |
| Active cell |  | Config 1,2 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell2 | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2 | 0 | As specified in 38.133 [6] clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 9 |  |
| A3-Offset | dB | Config 1,2 | -6 |  |
| Hysteresis | dB | Config 1,2 | 0 |  |
| CP length |  | Config 1,2 | Normal |  |
| TimeToTrigger | s | Config 1,2 | 0 |  |
| Filter coefficient |  | Config 1,2 | 0 | L3 filtering is not used |
| DRX |  | Config 1,2 | OFF | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3ms | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
| T1 | s | Config 1,2 | 5 |  |
| T2 | s | Config 1,2 | [1.1] |  |

14.5.2.3.4.2 Test procedure

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 UE is required to report the neighbour cell SSB index in this test.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters *Connectivity NR*, *Connected without release On* and *Test Mode On* according to TS 38.508-1 [14] clause 4.5]. Cell 1 is the active cell.

2. Set the parameters according to T1 in Table 14.5.2.3.5-1.

3. SS shall transmit an *RRCReconfiguration* message configuring a *MeasId* consisting in an inter-frequency measurement object, event A3, gap configuration, and SMTC configuration according to Tables 14.5.2.3.4.1-3 and 14.5.2.3.5-1.

4. The UE shall transmit *RRCReconfigurationComplete* message. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.5.2.3.5-1. T2 starts.

6. UE shall transmit a *MeasurementReport* message triggered by event A3. If the overall delay measured from the beginning of time period T2 is less than [1042] ms, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.

8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. Once the connection is released, the SS [shall reset the satellite access channel model and then] switch OFF and then ON the UE and proceed with step 1.

10. Repeat step 2-9 until the confidence level [according to Tables G.2.3-1 in Annex G clause G.2 is achieved].

14.5.2.3.4.3 Message contents

FFS

14.5.2.3.5 Test requirements

Tables 14.5.2.3.4.1-3 and 14.5.2.3.5-1 define the primary level settings including test tolerances for NR SA FR1-FR1 Event-triggered reporting with SSB time index detection when DRX is not used with single gap for satellite access.

Table 14.5.2.3.5-1: Cell specific test parameters for NR SA FR1-FR1 Event-triggered reporting with SSB time index detection when DRX is not used with single gap for satellite access

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| NR RF Channel Number | |  | Config 1,2 | 1 | | 2 | |
| Duplex mode | |  | Config 1,2 | FDD | | | |
| BWchannel | | MHz | Config 1,2 | 10: NRB,c = 52 | | | |
| BWP BW | | MHz | Config 1,2 | 10: NRB,c = 52 | | | |
| BWP configuration | Initial DL BWP | Config 1 | Config 1,2 | DLBWP.0.1 | | NA | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | NA | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | NA | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | NA | |
| TRS configuration | |  | Config 1,2 | TRS.1.1 FDD | | NA | |
| OCNG Patterns | |  | Config 1,2 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1,2 | SR.1.1 FDD | |  | |
| RMSI CORESET Reference Channel | |  | Config 1,2 | CR.1.1 FDD | |  | |
| Dedicated CORESET Reference Channel | |  | Config 1,2 | CCR.1.1 FDD | |  | |
| SSB parameters | |  | Config 1,2 | SSB.1 FR1 | | SSB.5 FR1 | |
| SMTC configuration | |  | Config 1,2 | SMTC.2 | | SMTC.5 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | | |
| EPRE ratio of PSS to SSS | |  | Config 1,2 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz | Config 1,2 | -98+TT | | -98+TT | |
| Note2 | | dBm/SCS | Config 1,2 | -98+TT | | -98+TT | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -94+TT | -94+TT | -Infinity | -91+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT |
| IoNote3 | | dBm/9.36MHz | Config 1,2 | -64.59+TT | -64.59+TT | -70.05+TT | -62.2+TT |
| Propagation Condition | |  | Config 1,2 | AWGN | | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | |

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [1040] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

The UE is required to report SSB time index.

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

#### 14.5.2.4 NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with two concurrent fully non-overlapped (FNO) gaps for satellite access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability needs to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets

14.5.2.4.1 Test purpose

The purpose of this test is to verify that the multiple gaps capable UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 14.5.2.0.1.

14.5.2.4.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access and 2 parallel measurement gaps (*parallelMeasurementGap-r17*, TS 38.306).

14.5.2.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.5.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.14.5.2.4.

14.5.2.4.4 Test description

Three cells are deployed in the test, which are NR FR1 PCell (Cell 1) on NR RF channel 1, NR FR1 neighbour cell (Cell 2) on NR RF channel 2, and NR FR1 neighbour cell (Cell 3) also on NR RF channel 2. The test parameters for PCell and neighbour cell are given in Tables 14.5.2.4.4.1-1, 14.5.2.4.4.1-3 and 14.5.2.4.5-1 below. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. Two parallel non-overlapping measurement gap pattern configurations, MeasGapId #0 and MeasGapId #1, are provided to the UE.

14.5.2.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.5.2.4.4.1-1.

Table 14.5.2.4.4.1-1: Supported test configurations for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with two concurrent fully non-overlapped (FNO) gaps for satellite access

|  |  |
| --- | --- |
| Configuration | Description |
| 14.5.2.4-1 | GSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 14.5.2.4-2 | NGSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note 1: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2.  Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell | |

Configure the test equipment and the DUT according to the parameters in Table 14.5.2.4.4.1-2.

Table 14.5.2.4.4.1-2: Initial conditions for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with two concurrent fully non-overlapped (FNO) gaps for satellite access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.12-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.5.2.4.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.5.2.4.4.1-3.

2. Message contents are defined in clause 14.5.2.4.4.3.

3. Cell 1, Cell 2 and Cell 3 are NR cells (PCell and two neighbor cells, respectively) with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1, Cell 2 and Cell 3 are satellite access cells].

4. The initial test environment conditions are setup according to section 14.0.5.

Table 14.5.2.4.4.1-3: General test parameters for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with two concurrent fully non-overlapped (FNO) gaps for satellite access

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | Two FR1 NR carrier frequencies are used. |
| Active cell |  | Config 1,2 | NR Cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR Cell2 and NR Cell 3 | NR Cell 2 and NR Cell 3 are on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2 | 0 for MeasGapId #0  0 for MeasGapId #1 | As specified in 38.133 [6] clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 9 for MeasGapId #0  19 for MeasGapId #1 |  |
| A3-Offset | dB | Config 1,2 | -6 |  |
| Hysteresis | dB | Config 1,2 | 0 |  |
| CP length |  | Config 1,2 | Normal |  |
| TimeToTrigger | s | Config 1,2 | 0 |  |
| Filter coefficient |  | Config 1,2 | 0 | L3 filtering is not used |
| DRX |  | Config 1,2 | OFF | DRX is not used |
| Time offset between serving and neighbour cell 2,3 |  | Config 1,2 | 3ms | Asynchronous cells.  The timing of Cell 2 and Cell 3 is 3ms later than the timing of Cell 1. |
| T1 | s | Config 1,2 | 5 |  |
| T2 | s | Config 1,2 | [1] |  |

14.5.2.4.4.2 Test procedure

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 and Cell 3.

The UE is not required to read the neighbour cell SSB index in this test.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters *Connectivity NR*, *Connected without release On* and *Test Mode On* according to TS 38.508-1 [14] clause 4.5]. Cell 1 is the active cell.

2. Set the parameters according to T1 in Table 14.5.2.4.5-1.

3. SS shall transmit an *RRCReconfiguration* message configuring a *MeasId* consisting in an inter-frequency measurement object, event A3, two parallel gap configurations, and two SMTC configurations, respectively, according to Tables 14.5.2.4.4.1-3 and 14.5.2.4.5-1.

4. The UE shall transmit *RRCReconfigurationComplete* message. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.5.2.4.5-1. T2 starts.

6. [UE shall transmit a *MeasurementReport* message triggered by event A3]. If the overall delay measured from the beginning of time period T2 is less than [922] ms, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.

8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. Once the connection is released, the SS [shall reset the satellite access channel model and then] switch OFF and then ON the UE and proceed with step 1.

10. Repeat step 2-9 until the confidence level [according to Tables G.2.3-1 in Annex G clause G.2 is achieved].

14.5.2.4.4.3 Message contents

FFS

14.5.2.4.5 Test requirements

Tables 14.5.2.4.4.1-3 and 14.5.2.4.5-1 define the primary level settings including test tolerances for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with two concurrent fully non-overlapped (FNO) gaps for satellite access.

Table 14.5.2.4.5-1: Cell specific test parameters for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with two concurrent fully non-overlapped (FNO) gaps for satellite access

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | | Cell 3 | | |
|  | |  |  | T1 | T2 | T1 | T2 | T1 | T2 | |
| NR RF Channel Number | |  | Config 1,2 | 1 | | 2 | | 2 | | |
| Satellite information | |  | Config 1 | SSC.1 | | NSC.1 | | | | |
|  | |  | Config 2 | SSC.2 | | NSC.2 | | | | |
| Duplex mode | |  | Config 1,2 | FDD | | | | | | |
| BWchannel | | MHz | Config 1,2 | 10: NRB,c = 52 | | | | | | |
| BWP BW | | MHz | Config 1,2 | 10: NRB,c = 52 | | | | | | |
| BWP configuration | Initial DL BWP |  | Config 1,2 | DLBWP.0.1 | | NA | | NA | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | NA | | NA | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | NA | | NA | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | NA | | NA | | |
| TRS configuration | |  | Config 1,2 | TRS.1.1 FDD | | NA | | NA | | |
| OCNG Patterns | |  | Config 1,2 | OP.1 | | OP.1 | | OP.1 | | |
| PDSCH Reference measurement channel | |  | Config 1,2 | SR.1.1 FDD | |  | |  | | |
| RMSI CORESET Reference Channel | |  | Config 1,2 | CR.1.1 FDD | |  | |  | | |
| Dedicated CORESET Reference Channel | |  | Config 1,2 | CCR.1.1 FDD | |  | |  | | |
| SSB parameters | |  | Config 1,2 | SSB.1 FR1 | | SSB.5 FR1 | | SSB.1 FR1 | | |
| SMTC configuration | |  | Config 1,2 | SMTC.2 | | SMTC.Y | | SMTC.1 | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | | | | | |
| EPRE ratio of PSS to SSS | |  | Config 1,2 | 0 | | 0 | | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |  | | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |  | | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |  | | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  | |  | |  | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |  | | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |  | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |  | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |  | | |
| Note2 | | dBm/15kHz | Config 1,2 | -98+TT | | -98+TT | | -98+TT | | |
| Note2 | | dBm/SCS | Config 1,2 | -98+TT | | -98+TT | | -98+TT | | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -94+TT | -94+TT | -Infinity | -91+TT | -Infinity | | -91+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT | -Infinity | | 7+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT | -Infinity | | 7+TT |
| IoNote3 | | dBm/9.36MHz | Config 1,2 | -64.59+TT | -64.59+TT | -70.05+TT | -62.26+TT | -70.05+TT | | -62.26+TT |
| Propagation Condition | |  | Config 1,2 | AWGN | | AWGN | | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | | | | |

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [920] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 UE is not required to report SSB time index.

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

#### 14.5.2.5 Void

#### 14.5.2.6 NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with two concurrent partial overlapping (PPO) gaps for satellite access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents are FFS
* Call setup and test procedure needs to be updated
* Applicability needs to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets
* Test requirement is TBD in 38.133

14.5.2.6.1 Test purpose

The purpose of this test is to verify that the multiple gaps capable UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 14.5.2.0.1.

14.5.2.6.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access and 2 parallel measurement gaps (*parallelMeasurementGap-r17*, TS 38.306).

14.5.2.6.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.5.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.14.5.2.6.

14.5.2.6.4 Test description

Three cells are deployed in the test, which are NR FR1 PCell (Cell 1) on NR RF channel 1, NR FR1 neighbour cell (Cell 2) on NR RF channel 2, and NR FR1 neighbour cell (Cell 3) also on NR RF channel 2. The test parameters for PCell and neighbour cell are given in Tables 14.5.2.6.4.1-1, 14.5.2.6.4.1-3 and 14.5.2.6.5-1 below. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. Two parallel partially overlapping measurement gap pattern configurations, MeasGapId #0 and MeasGapId #1, are provided to the UE.

14.5.2.6.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.5.2.6.4.1-1.

Table 14.5.2.6.4.1-1: Supported test configurations for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with two concurrent partial overlapping (PPO) gaps for satellite access

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 14.5.2.6-1 | GSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 14.5.2.6-2 | NGSO, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note 1: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2.  Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell | |

Configure the test equipment and the DUT according to the parameters in Table 14.5.2.6.4.1-2.

Table 14.5.2.6.4.1-2: Initial conditions for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with two concurrent partial overlapping (PPO) gaps for satellite access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, table E.12-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.5.2.6.4.1-1. | | |
| Propagation conditions | AWGN | | As specified in clause C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.5.2.6.4.1-3.

2. Message contents are defined in clause 14.5.2.6.4.3.

3. Cell 1, Cell 2 and Cell 3 are NR cells (PCell and two neighbor cells, respectively) with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1, Cell 2 and Cell 3 are satellite access cells].

4. The initial test environment conditions are setup according to section 14.0.5.

Table 14.5.2.6.4.1-3: General test parameters for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with two concurrent partial overlapping (PPO) gaps for satellite access

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | Two FR1 NR carrier frequencies are used. |
| Active cell |  | Config 1,2 | NR Cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR Cell2 and NR Cell 3 | NR Cell 2 and NR Cell 3 are on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2 | 0 for MeasGapId #0  1 for MeasGapId #1 | As specified in 38.133 [6] clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 79 for MeasGapId #0  4 for MeasGapId #1 |  |
| A3-Offset | dB | Config 1,2 | -6 |  |
| Hysteresis | dB | Config 1,2 | 0 |  |
| CP length |  | Config 1,2 | Normal |  |
| TimeToTrigger | s | Config 1,2 | 0 |  |
| Filter coefficient |  | Config 1,2 | 0 | L3 filtering is not used |
| DRX |  | Config 1,2 | OFF | DRX is not used |
| Time offset between serving and neighbour cell 1 |  | Config 1,2 | 3μs | Cell 1 and Cell 2 are synchronous. |
| Time offset between serving and neighbour cell 2 |  | Config 1,2 | 5ms | Cell 1 and Cell 3 are asynchronous.  The timing of Cell 3 is 5ms later than the timing of Cell 1. |
| T1 | s | Config 1,2 | 5 |  |
| T2 | s | Config 1,2 | 1.5 |  |

14.5.2.6.4.2 Test procedure

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 and Cell 3.

The UE is not required to read the neighbour cell SSB index in this test.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters *Connectivity NR*, *Connected without release On* and *Test Mode On* according to TS 38.508-1 [14] clause 4.5]. Cell 1 is the active cell.

2. Set the parameters according to T1 in Table 14.5.2.6.5-1.

3. SS shall transmit an *RRCReconfiguration* message configuring a *MeasId* consisting in an inter-frequency measurement object, event A3, two parallel gap configurations, and two SMTC configurations, respectively, according to Tables 14.5.2.6.4.1-3 and 14.5.2.6.5-1.

4. The UE shall transmit *RRCReconfigurationComplete* message. T1 starts.

5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 14.5.2.6.5-1. T2 starts.

6. [UE shall transmit a *MeasurementReport* message triggered by event A3]. If the overall delay measured from the beginning of time period T2 is less than [TBD] ms, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement, then the number of failure tests is increased by one.

7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.

8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 1008) for next iteration of the test procedure loop.

9. Once the connection is released, the SS [shall reset the satellite access channel model and then] switch OFF and then ON the UE and proceed with step 1.

10. Repeat step 2-9 until the confidence level [according to Tables G.2.3-1 in Annex G clause G.2 is achieved].

14.5.2.6.4.3 Message contents

FFS

14.5.2.6.5 Test requirements

Tables 14.5.2.6.4.1-3 and 14.5.2.6.5-1 define the primary level settings including test tolerances for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with two concurrent partial overlapping (PPO) gaps for satellite access.

Table 14.5.2.6.5-1: Cell specific test parameters for NR SA FR1-FR1 Event-triggered reporting without SSB time index detection when DRX is not used with two concurrent partial overlapping (PPO) gaps for satellite access

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | | Cell 3 | | |
|  | |  |  | T1 | T2 | T1 | T2 | T1 | T2 | |
| NR RF Channel Number | |  | Config 1,2 | 1 | | 2 | | 2 | | |
| Satellite information | |  | Config 1 | SSC.1 | | NSC.1 | | | | |
|  | |  | Config 2 | SSC.2 | | NSC.2 | | | | |
| Duplex mode | |  | Config 1,2 | FDD | | | | | | |
| BWchannel | | MHz | Config 1,2 | 10: NRB,c = 52 | | | | | | |
| BWP BW | | MHz | Config 1,2 | 10: NRB,c = 52 | | | | | | |
| BWP configuration | Initial DL BWP |  | Config 1,2 | DLBWP.0.1 | | NA | | NA | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | NA | | NA | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | NA | | NA | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | NA | | NA | | |
| TRS configuration | |  | Config 1,2 | TRS.1.1 FDD | | NA | | NA | | |
| OCNG Patterns | |  | Config 1,2 | OP.1 | | OP.1 | | OP.1 | | |
| PDSCH Reference measurement channel | |  | Config 1,2 | SR.1.1 FDD | |  | |  | | |
| RMSI CORESET Reference Channel | |  | Config 1,2 | CR.1.1 FDD | |  | |  | | |
| Dedicated CORESET Reference Channel | |  | Config 1,2 | CCR.1.1 FDD | |  | |  | | |
| SSB parameters | |  | Config 1,2 | SSB.1 FR1 | | SSB.1 FR1 | | SSB.1 FR1 | | |
| SMTC configuration | |  | Config 1,2 | SMTC.2 | | SMTC.2 | | SMTC.Y | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | | | | | |
| EPRE ratio of PSS to SSS | |  | Config 1,2 | 0 | | 0 | | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |  | | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |  | | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |  | | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  | |  | |  | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |  | | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |  | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |  | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |  | | |
| Note2 | | dBm/15kHz | Config 1,2 | -98+TT | | -98+TT | | -98+TT | | |
| Note2 | | dBm/SCS | Config 1,2 | -98+TT | | -98+TT | | -98+TT | | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -94+TT | -94+TT | -Infinity | -91+TT | -Infinity | | -91+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT | -Infinity | | 7+TT |
|  | | dB | Config 1,2 | 4+TT | 4+TT | -Infinity | 7+TT | -Infinity | | 7+TT |
| IoNote3 | | dBm/9.36MHz | Config 1,2 | -64.59+TT | -64.59+TT | -70.05+TT | -62.26+TT | -70.05+TT | | -62.26+TT |
| Propagation Condition | |  | Config 1,2 | AWGN | | AWGN | | 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | | | | |

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

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

## 14.6 Measurement Performance Requirements

### 14.6.1

### 14.6.2

### 14.6.3 SS-SINR Requirements for SAN

#### 14.6.3.0 Minimum conformance requirements

##### 14.6.3.0.1 Intra-Frequency SS-SINR accuracy requirements in FR1

14.6.3.0.1.1 Absolute SS-SINR accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-SINR in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 14.6.3.0.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to 38.133 [6] Annex B.2.2 for a corresponding Band.

- Valid information for the SAN serving the target cell has been provided.

Table 14.6.3.0.1.1-1: SS-SINR Intra frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 3 | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±[3] | ±[4] | ≥-3 | NR\_FDD\_SAB\_FR1\_A | -121 | -118 | N/A | -50 |
| ±[3.5] | ±[4] | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: The requirements apply for SSB Ês/Iot ≤ 25 dB under non-HST scenarios.  NOTE 4: NR operating band groups for satellite access in FR1 are as defined in clause 3A.4.1A.  NOTE 5: The requirements apply for SSB Ês/Iot ≤5 dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | |

The normative reference for this requirement is TS 38.133 [6] clause 10.1.12C.1.1.

##### 14.6.3.0.2 Inter-Frequency SS-SINR accuracy requirements in FR1

14.6.3.0.2.1 Absolute SS-SINR accuracy

The requirements for absolute accuracy of SS-SINR in this clause apply to a cell on a frequency in FR1 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 14.6.3.0.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to 38.133 [6] Annex B.2.3 for a corresponding Band.

- Valid information for the SAN serving the target cell has been provided.

Table 14.6.3.0.2.1-1: SS-SINR Inter frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 3 | Io Note 1 range | | | | |
|  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±[3] | ±[4] | ≥-3 | NR\_FDD\_SAB\_FR1\_A | -121 | -118 | N/A | -50 |
| ±[3.5] | ±[4] | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: The requirements apply for SSB Ês/Iot ≤ 25 dB.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3A.4.1A. | | | | | | | |

The normative reference for this requirement is TS 38.133 [6] clause 10.1.14C.1.1.

14.6.3.0.2.2 Relative SS-SINR accuracy

The relative accuracy of SS-SINR in inter frequency case is defined as the SS-SINR measured from one cell on a frequency in FR1 compared to the SS-SINR measured from another cell on a different frequency in FR1.

The accuracy requirements in Table 14.6.3.0.2.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [2] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to 38.133 [6] Annex B.2.3 for a corresponding Band.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

- | Channel 1\_Io ‑Channel 2\_Io | ≤ 20 dB

- Valid information for the SAN serving the target cell has been provided.

Table 14.6.3.0.2.2-1: SS-SINR Inter frequency relative accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 2,4 | NR operating band groups Note 5 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 120 kHz | SCSSSB = 240 kHz |  |  |
| ±[3.5] | ±[4] | ≥-3 | NR\_FDD\_SAB\_FR1\_A | -121 | -118 | N/A | -50 |
| ±[4] | ±[4] | ≥-6 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 4: The requirements apply for SSB Ês/Iot ≤ [25] dB.  NOTE 5: NR operating band groups in FR1 are as defined in clause 3A.4.1A. | | | | | | | |

The normative reference for this requirement is TS 38.133 [6] clause 10.1.14C.1.2.

#### 14.6.3.1 NR SA FR1 SS-SINR Measurement Accuracy for Satellite Access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents may need to be updated
* Call setup and test procedure needs to be updated
* Applicability may need to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets
* Annex E and F need to be updated

14.6.3.1.1 Test purpose

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 14.6.3.0.1.

14.6.3.1.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access, SS-SINR measurements in FR1 and [inter-satellite measurements].

14.6.3.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.6.3.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.14.6.3.1.

14.6.3.1.4 Test description

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table 14.6.3.1.4.1-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table 14.6.3.1.5-1. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

14.6.3.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.6.3.1.4.1-1.

Table 14.6.3.1.4.1-1: Supported test configurations for NR SA FR1 SS-SINR Measurement Accuracy for Satellite Access

|  |  |
| --- | --- |
| Configuration | Description |
| 14.6.3.1-1 | GSO, NR FDD, 15kHz SSB SCS, data SCS 15kHz, 10 MHz BW |
| 14.6.3.1-2 | NGSO, NR FDD, 15kHz SSB SCS, data SCS 15kHz, 10 MHz BW |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test equipment and the DUT according to the parameters in Table 14.6.3.1.4.1-2

Table 14.6.3.1.4.1-2: Initial conditions for NR SA FR1 SS-SINR Measurement Accuracy for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.12-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.6.3.1.4.1-1 | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.6.3.1.4.1-3.

2. Message contents are defined in clause 14.6.3.1.4.3.

3. Cell 1 and Cell 2 are NR cells (PCell and neighbour cell, respectively) with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

4. The initial test environment conditions are setup according to section 14.0.5.

14.6.3.1.4.2 Test procedure

The test scenario comprises of two satellite access NR FDD intra-frequency cells as given in table 14.6.3.1.5-1.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On and Test Mode On according to TS 38.508-1 [14] clause 4.5]. Cell 1 is the active cell.

2. Set the parameters according to Table 14.6.3.1.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message on Cell 1 to configure periodic SS-SINR measurements on the UE.

4. The UE shall transmit an *RRCReconfigurationComplete* message.

5. The UE shall transmit periodic *MeasurementReport* messages.

6. After 10s wait from Step 4, the SS shall check the SS-SINR reported values in the periodic *MeasurementReport*. The SS-SINR value of Cell 2 reported by the UE is compared to the expected SS-SINR. If the value is outside the limits in Table 14.6.3.1.5-2 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to Table G.2.3-1 in Annex G is achieved.

8. Set the parameters according to each sub-test in Table 14.6.3.1.5-1 as appropriate and repeat steps 5-7.

14.6.3.1.4.3 Message contents

Editor’s notes: Message contents need to be updated.

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 14.6.3.1.4.3-1: Common Exception messages for NR SA FR1 SS-SINR Measurement Accuracy for Satellite Access

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2  Table H.3.1-3 with Condition SS-SINR  Table H.3.1-5  Table H.3.1-7 with Condition INTER-FREQ and SINR  Table 7.3.1-3 in TS 38.508-1 [14] with condition SMTC.2 |

Table 14.6.3.1.4.3-2: *ReportConfigNR* for NR SA FR1 SS-SINR Measurement Accuracy for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrp | false |  |  |
| rsrq | false |  |  |
| sinr | true |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

14.6.3.1.5 Test requirements

Table 14.6.3.1.5-1 defines the primary level settings including test tolerances for NR SA FR1 SS-SINR Measurement Accuracy for Satellite Access. Table 14.6.3.1.5-2 defines the requirement that the SS-SINR values contained in the *MeasurementReport* shall meet.

Table 14.6.3.1.5-1: Cell specific parameters for NR SA FR1 SS-SINR Measurement Accuracy for Satellite Access

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | |
|  | | |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN | | |  | freq1 | | freq1 | |
| Duplex mode | | Config 1 |  | FDD | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | |
| Downlink dedicated BWP configuration | | |  | DLBWP.1.1 | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | |
| Uplink dedicated BWP configuration | | |  | ULBWP.1.1 | | | |
| DRX Cycle configuration | | | ms | Not Applicable | | | |
| TRS configuration | | Config 1, 2 |  | TRS.1.1 FDD |  | TRS.1.1 FDD |  |
| PDSCH Reference measurement channel | | Config 1, 2 |  | SR.1.1 FDD | - | SR.1.1 FDD | - |
| RMSI CORESET Reference Channel | | Config 1, 2 |  | CR.1.1 FDD | - | CR.1.1 FDD |  |
| Dedicated CORESET Reference Channel | | Config 1, 2 |  | CCR.1.1 FDD | - | CCR.1.1 FDD | - |
| OCNG Patterns | | |  | OP.1 | | | |
| SS-RSSI-Measurement | | |  | Not Applicable | | | |
| SMTC configuration | | Config 1, 2 |  | SMTC.2 | | | |
| Time offset with Cell 1 | | Config 1, 2 | ms | - | 3 | - | 3 |
| SSB configuration | | Config 1, 2 |  | SSB.1 FR1 | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2 | kHz | 15 | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |  |
| Note2 | | NR\_FDD\_SAB\_FR1\_A, | dBm/15kHz | -93+TT | | -116+TT | |
|  | | NR\_FDD\_SAB\_FR1\_B |  |  | | -115.5+TT | |
|  | | NR\_FDD\_SAB\_FR1\_C |  |  | | -115+TT | |
|  | | NR\_FDD\_SAB\_FR1\_D |  |  | | -114.5+TT | |
|  | | NR\_FDD\_SAB\_FR1\_E |  |  | | -114+TT | |
|  | | NR\_FDD\_SAB\_FR1\_F, |  |  | | -113.5+TT | |
|  | | NR\_FDD\_SAB\_FR1\_G |  |  | | -113+TT | |
|  | | NR\_FDD\_SAB\_FR1\_H |  |  | | -112.5+TT | |
|  | | NR\_FDD\_SAB\_FR1\_I |  |  | | -112+TT | |
|  | | NR\_FDD\_SAB\_FR1\_J |  |  | | -111.5+TT | |
| Note2 | Config 1, 2 | | dBm/SCS | -93+TT | | Same as Noc for 15kHz | |
|  | | | dB | 0+TT | -3.19+TT | -5.46+TT | -5.46+TT |
|  | | | dB | 4.54+TT | 2.66+TT | -4+TT | -4+TT |
| SS-RSRPNote3 | Config 1, 2 | NR\_FDD\_SAB\_FR1\_A, | dBm/SCS | -88.46+TT | -90.34+TT | -120+TT | -120+TT |
|  |  | NR\_FDD\_SAB\_FR1\_B |  |  |  | -119.5+TT | -119.5+TT |
|  |  | NR\_FDD\_SAB\_FR1\_C |  |  |  | -119+TT | -119+TT |
|  |  | NR\_FDD\_SAB\_FR1\_D |  |  |  | -118.5+TT | -118.5+TT |
|  |  | NR\_FDD\_SAB\_FR1\_E |  |  |  | -118+TT | -118+TT |
|  |  | NR\_FDD\_SAB\_FR1\_F, |  |  |  | -117.5+TT | -117.5+TT |
|  |  | NR\_FDD\_SAB\_FR1\_G |  |  |  | -117+TT | -117+TT |
|  |  | NR\_FDD\_SAB\_FR1\_H |  |  |  | -116.5+TT | -116.5+TT |
|  |  | NR\_FDD\_SAB\_FR1\_I |  |  |  | -116+TT | -116+TT |
|  |  | NR\_FDD\_SAB\_FR1\_J |  |  |  | -115.5+TT | -115.5+TT |
| SS-SINR Note3 | | NR\_FDD\_SAB\_FR1\_A, | dB | 0+TT | -3.19+TT | -5.46+TT | -5.46+TT |
|  | | NR\_FDD\_SAB\_FR1\_B |  |  |  |  |  |
|  | | NR\_FDD\_SAB\_FR1\_C |  |  |  |  |  |
|  | | NR\_FDD\_SAB\_FR1\_D |  |  |  |  |  |
|  | | NR\_FDD\_SAB\_FR1\_E |  |  |  |  |  |
|  | | NR\_FDD\_SAB\_FR1\_F, |  |  |  |  |  |
|  | | NR\_FDD\_SAB\_FR1\_G |  |  |  |  |  |
|  | | NR\_FDD\_SAB\_FR1\_H |  |  |  |  |  |
|  | | NR\_FDD\_SAB\_FR1\_I |  |  |  |  |  |
|  | | NR\_FDD\_SAB\_FR1\_J |  |  |  |  |  |
| IoNote3 | Config 1, 2 | NR\_FDD\_SAB\_FR1\_A, | dBm/  9.36MHz | -57.5+TT | | -85.51+TT | |
|  |  | NR\_FDD\_SAB\_FR1\_B |  |  | | -85.01+TT | |
|  |  | NR\_FDD\_SAB\_FR1\_C |  |  | | -84.51+TT | |
|  |  | NR\_FDD\_SAB\_FR1\_D |  |  | | -84.01+TT | |
|  |  | NR\_FDD\_SAB\_FR1\_E |  |  | | -83.51+TT | |
|  |  | NR\_FDD\_SAB\_FR1\_F, |  |  | | -83.01+TT | |
|  |  | NR\_FDD\_SAB\_FR1\_G |  |  | | -82.51+TT | |
|  |  | NR\_FDD\_SAB\_FR1\_H |  |  | | -82.01+TT | |
|  |  | NR\_FDD\_SAB\_FR1\_I |  |  | | -81.51+TT | |
|  |  | NR\_FDD\_SAB\_FR1\_J |  |  | | -81.01+TT | |
| 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: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3A.4.1A. | | | | | | | |

Table 14.6.3.1.5-2: SS-SINR Intra frequency absolute accuracy requirements for the reported values

|  |  |  |
| --- | --- | --- |
|  | Test 1 | Test 2 |
|  | All bands | [All bands] |
| Normal Conditions | | |
| Lowest reported value (Cell 2) | FFS | FFS |
| Highest reported value (Cell 2) | FFS | FFS |
| Extreme Conditions | | |
| Lowest reported value (Cell 2) | FFS | FFS |
| Highest reported value (Cell 2) | FFS | FFS |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 14.6.3.2 NR SA FR1-FR1 SS-SINR Measurement Accuracy for Satellite Access

Editor's Note:

* MU and TT analysis is incomplete
* Message contents may need to be updated
* Call setup and test procedure needs to be updated
* Applicability may need to be updated
* Exceptions to connection diagram may need to be updated
* Several sections are in brackets
* Several test parameters and configuration are still in brackets
* Annex E and F need to be updated

14.6.3.2.1 Test purpose

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 14.6.3.0.2.

14.6.3.2.2 Test applicability

This test applies to all types of NR UE release 17 and forward supporting satellite access, SS-SINR measurements in FR1 and [inter-satellite measurements].

14.6.3.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 14.6.3.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.14.6.3.2.

14.6.3.2.4 Test description

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table 14.6.3.2.4.1-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table 14.6.3.2.5-1. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

14.6.3.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 14.6.3.2.4.1-1.

Table 14.6.3.2.4.1-1: Supported test configurations for NR SA FR1-FR1 SS-SINR Measurement Accuracy for Satellite Access

|  |  |
| --- | --- |
| Configuration | Description |
| 14.6.3.2-1 | GSO, NR FDD, 15kHz SSB SCS, data SCS 15kHz, 10 MHz BW |
| 14.6.3.2-2 | NGSO, NR FDD, 15kHz SSB SCS, data SCS 15kHz, 10 MHz BW |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Configure the test equipment and the DUT according to the parameters in Table 14.6.3.2.4.1-2

Table 14.6.3.2.4.1-2: Initial conditions for NR SA FR1-FR1 SS-SINR Measurement Accuracy for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Comment |
| Test environment | NC | | As specified in TS 38.508-1 [14] clause 4.1. |
| Test frequencies | As specified in Annex E, Table E.12-1 and TS 38.508-1 [14] clause 4.3.1. | | |
| Channel bandwidth | As specified by the test configuration selected from Table 14.6.3.2.4.1-1 | | |
| Propagation conditions | AWGN | | As specified in Annex C.2.2. |
| Connection Diagram | TE Part | A.3.1.7.1 | As specified in TS 38.508-1 [14] Annex A. |
| DUT Part | A.3.2.3.4 |
| Exceptions to connection diagram | [For 4Rx capable UEs without any 2 Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE Part] | | [4Rx support is FFS, exceptions may need to be removed] |

1. The general test parameter settings are set up according to Table 14.6.3.2.4.1-3.

2. Message contents are defined in clause 14.6.3.2.4.3.

3. Cell 1 and Cell 2 are NR cells (PCell and neighbour cell, respectively) with the power level set according to clauses [C.1.2 and C.1.3] for this test. [Both Cell 1 and Cell 2 are satellite access cells].

4. The initial test environment conditions are setup according to section 14.0.5.

14.6.3.2.4.2 Test procedure

The test scenario comprises of two satellite access NR FDD inter-frequency cells as given in table 14.6.3.2.5-1.

1. Ensure the UE is in [state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On and Test Mode On according to TS 38.508-1 [14] clause 4.5]. Cell 1 is the active cell.

2. Set the parameters according to Table 14.6.3.2.5-1 as appropriate.

3. The SS shall transmit an *RRCReconfiguration* message on Cell 1 to configure periodic SS-SINR measurements on the UE.

4. The UE shall transmit an *RRCReconfigurationComplete* message.

5. The UE shall transmit periodic *MeasurementReport* messages.

6. After 10s wait from Step 4, the SS shall check the SS-SINR reported values in the periodic *MeasurementReport*. The SS-SINR value of Cell 2 reported by the UE is compared to the expected SS-SINR. If the value is outside the limits in Table 14.6.3.2.5-2 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.

7. The SS shall continue checking the *MeasurementReport* messages transmitted by the UE until the confidence level according to Table G.2.3-1 in Annex G is achieved.

8. Set the parameters according to each sub-test in Table 14.6.3.2.5-1 as appropriate and repeat steps 5-7.

14.6.3.2.4.3 Message contents

Editor’s notes: Message contents need to be updated.

Message contents are according to TS 38.508-1 [14] clause 7.3 with the following exceptions:

Table 14.6.3.2.4.3-1: Common Exception messages for NR SA FR1-FR1 SS-SINR Measurement Accuracy for Satellite Access

|  |  |
| --- | --- |
| Default Message Contents | |
| Common contents of system information blocks exceptions |  |
| Default RRC messages and information elements contents exceptions | Table H.3.1-1  Table H.3.1-2 with Condition INTER-FREQ and GAP NEEDED  Table H.3.1-3 with Condition SS-SINR  Table H.3.1-5  Table H.3.1-6 with Condition Pattern #0  Table H.3.1-7 with Condition INTER-FREQ and SINR  Table 7.3.1-3 in TS 38.508-1 [14] with condition SMTC.2 |

Table 14.6.3.2.4.3-2: *ReportConfigNR* for NR SA FR1-FR1 SS-SINR Measurement Accuracy for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [14] Table 4.6.3-142 with condition PERIODICAL | | | |
| Information Element | Value/remark | Comment | Condition |
| ReportConfigNR::= SEQUENCE { |  |  |  |
| reportType CHOICE { |  |  |  |
| periodical SEQUENCE { |  |  | PERIODICAL |
| reportQuantityCell SEQUENCE { |  |  |  |
| rsrp | false |  |  |
| rsrq | false |  |  |
| sinr | true |  |  |
| } |  |  |  |
| maxReportCells | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

14.6.3.2.5 Test requirements

Table 14.6.3.2.5-1 defines the primary level settings including test tolerances for NR SA FR1-FR1 SS-SINR Measurement Accuracy for Satellite Access. Table 14.6.3.2.5-2 and 14.6.3.2.5-3 define the absolute and relative requirements, correspondingly, that the SS-SINR values contained in the *MeasurementReport* shall meet.

Table 14.6.3.2.5-1: Cell specific parameters for NR SA FR1-FR1 SS-SINR Measurement Accuracy for Satellite Access

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | | | Test 3 | | |
|  | | |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 | | Cell 1 | | Cell 2 |
| SSB ARFCN | | |  | freq1 | freq2 | freq1 | freq2 | | freq1 | | freq2 |
| Duplex mode | | Config 1 |  | FDD | | | | | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | | | | | |
| Downlink dedicated BWP configuration | | |  | DLBWP.1.1 | | | | | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | | | | | |
| Uplink dedicated BWP configuration | | |  | ULBWP.1.1 | | | | | | | |
| DRX Cycle configuration | | | ms | Not Applicable | | | | | | | |
| Gap pattern ID | | |  | 0 | - | 0 | - | 0 | | - | |
| TRS configuration | | Config 1, 2 |  | TRS.1.1 FDD |  | TRS.1.1 FDD |  | | TRS.1.1 FDD | |  |
| PDSCH Reference measurement channel | | Config 1, 2 |  | SR.1.1 FDD | - | SR.1.1 FDD | - | | SR.1.1 FDD | | - |
| RMSI CORESET Reference Channel | | Config 1, 2 |  | CR.1.1 FDD | - | CR.1.1 FDD | - | | CR.1.1 FDD | |  |
| Dedicated CORESET Reference Channel | | Config 1, 2 |  | CCR.1.1 FDD | - | CCR.1.1 FDD | - | | CCR.1.1 FDD | | - |
| OCNG Patterns | | |  | OP.1 | | | | | | | |
| SS-RSSI-Measurement | | |  | Not Applicable | | | | | | | |
| Time offset with Cell 1 | | Config 1, 2 | ms | - | 3 | - | 3 | - | | 3 | |
| SMTC configuration | | Config 1, 2 |  | SMTC pattern 2 | | | | | | | |
| SSB configuration | | Config 1, 2 |  | SSB.1 FR1 | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2 | kHz | 15 | | | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 | | 0 | | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |  | |  | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |  | |  | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |  | |  | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |  | |  | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |  | |  | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |  | |  | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |  | |  | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |  | |  | |  |
| Note2 | Config 1, 2 | NR\_FDD\_SAB\_FR1\_A, | dBm/15kHz | -88+TT | | -108.5+TT | | | -119.5+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_B |  |  | |  | | | -119+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_C |  |  | |  | | | -118.5+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_D |  |  | |  | | | -118+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_E |  |  | |  | | | -117.5+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_F, |  |  | |  | | | -117+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_G |  |  | |  | | | -116.5+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_H |  |  | |  | | | -116+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_I |  |  | |  | | | -115.5+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_J |  |  | |  | | | -115+TT | | |
| Note2 | Config 1, 2 | | dBm/SCS | -88 | | -108.5+TT | | | Same as Noc for 15kHz | | |
|  |  | |  |  | |  | | |  | | |
|  |  | |  |  | |  | | |  | | |
|  |  | |  |  | |  | | |  | | |
|  |  | |  |  | |  | | |  | | |
|  |  | |  |  | |  | | |  | | |
|  |  | |  |  | |  | | |  | | |
|  |  | |  |  | |  | | |  | | |
|  | | | dB | -1.75+TT | -1.75+TT | 20+TT | 20+TT | | -4.0+TT | | -4.0+TT |
|  | | | dB | -1.75+TT | | 20+TT | | | -4.0+TT | | |
| SS-RSRP Note3 | Config 1, 2 | NR\_FDD\_SAB\_FR1\_A, | dBm/SCS | -89.75+TT | | -88.5+TT | | | -123.5+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_B |  |  | |  | | | -123+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_C |  |  | |  | | | -122.5+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_D |  |  | |  | | | -122+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_E |  |  | |  | | | -121.5+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_F, |  |  | |  | | | -121+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_G |  |  | |  | | | -120.5+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_H |  |  | |  | | | -120+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_I |  |  | |  | | | -119.5+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_J |  |  | |  | | | -119+TT | | |
| SS-SINRNote3 | | NR\_FDD\_SAB\_FR1\_A, | dB | -1.75+TT | | 20+TT | | | -4.0+TT | | |
|  | | NR\_FDD\_SAB\_FR1\_B |  |  | |  | | |  | | |
|  | | NR\_FDD\_SAB\_FR1\_C |  |  | |  | | |  | | |
|  | | NR\_FDD\_SAB\_FR1\_D |  |  | |  | | |  | | |
|  | | NR\_FDD\_SAB\_FR1\_E |  |  | |  | | |  | | |
|  | | NR\_FDD\_SAB\_FR1\_F, |  |  | |  | | |  | | |
|  | | NR\_FDD\_SAB\_FR1\_G |  |  | |  | | |  | | |
|  | | NR\_FDD\_SAB\_FR1\_H |  |  | |  | | |  | | |
|  | | NR\_FDD\_SAB\_FR1\_I |  |  | |  | | |  | | |
|  | | NR\_FDD\_SAB\_FR1\_J |  |  | |  | | |  | | |
| IoNote3 | Config 1, 2 | NR\_FDD\_SAB\_FR1\_A, | dBm/  9.36MHz | -57.83+TT | | -60.5+TT | | | -90.09+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_B |  |  | |  | | | -89.59+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_C |  |  | |  | | | -89.09+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_D |  |  | |  | | | -88.59+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_E |  |  | |  | | | -88.09+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_F, |  |  | |  | | | -87.59+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_G |  |  | |  | | | -87.09+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_H |  |  | |  | | | -86.59+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_I |  |  | |  | | | -86.09+TT | | |
|  |  | NR\_FDD\_SAB\_FR1\_J |  |  | |  | | | -85.59+TT | | |
| 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: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3A.4.1A. | | | | | | | | | | | |

Table 14.6.3.2.5-2: Reported SS-SINR Intra frequency absolute accuracy requirements for NR SA FR1-FR1 SS-SINR Measurement Accuracy for Satellite Access

|  |  |  |
| --- | --- | --- |
|  | Test 1 | Test 2 |
|  | All bands | [All bands] |
| Normal Conditions | | |
| Lowest reported value (Cell 2) | FFS | FFS |
| Highest reported value (Cell 2) | FFS | FFS |
| Extreme Conditions | | |
| Lowest reported value (Cell 2) | FFS | FFS |
| Highest reported value (Cell 2) | FFS | FFS |

Table 14.6.3.2.5-3: Reported SS-SINR Intra frequency relative accuracy requirements for NR SA FR1-FR1 SS-SINR Measurement Accuracy for Satellite Access

|  |  |  |
| --- | --- | --- |
|  | Test 1 | Test 2 |
|  | All bands | [All bands] |
| Normal Conditions | | |
| Lowest reported value (Cell 2) | SS-SINR\_x - FFS | SS-SINR\_x - FFS |
| Highest reported value (Cell 2) | SS-SINR\_x + FFS | SS-SINR\_x + FFS |
| Extreme Conditions | | |
| Lowest reported value (Cell 2) | SS-SINR\_x - FFS | SS-SINR\_x - FFS |
| Highest reported value (Cell 2) | SS-SINR\_x + FFS | SS-SINR\_x + FFS |

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

# 15 FFS