# A.7 NR standalone tests with one or more NR cells in FR2

## A.7.1 SA: RRC\_IDLE state mobility

### A.7.1.1 Cell re-selection to NR

#### A.7.1.1.1 Cell reselection to FR2 intra-frequency NR case

##### A.7.1.1.1.1 Test Purpose and Environment

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

##### A.7.1.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.7.1.1.1.2-1, A.7.1.1.1.2-2 and A.7.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.7.1.1.1.2-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 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. | |

Table A.7.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell1 |  |
| T2 end condition | Active cell |  | 1, 2 | Cell2 |  |
|  | Neighbour cell |  | 1, 2 | Cell1 |  |
| Final condition | Active cell |  | 1, 2 | Cell1 |  |
|  | Neighbour cell |  | 1, 2 | Cell2 |  |
| RF Channel Number | |  | 1, 2 | 1 |  |
| Time offset between cells | |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SMTC configuration | |  | 1, 2 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2 | Not configured |  |
| T1 | | s | 1, 2 | >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 | 1, 2 | 135 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 1, 2 | 35 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.7.1.1.1.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| PDSCH RMC |  | 1 | SR.3.1 TDD | | | SR.3.1 TDD | | |
| configuration |  | 2 | SR.3.1 TDD | | | SR.3.1 TDD | | |
| RMSI CORESET |  | 1 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| RMC configuration |  | 2 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| Dedicated CORESET |  | 1 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| RMC configuration |  | 2 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| SSB configuration |  | 1 | SSB.3 FR2 | | | SSB.7 FR2 | | |
|  |  | 2 | SSB.4 FR2 | | | SSB.8 FR2 | | |
| OCNG Pattern |  | 1, 2 | OP.4 | | | OP.4 | | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1, 2 | 66 | | | 66 | | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -138 | | | -138 | | |
|  |  | 2 | -135 | | | -135 | | |
| Pcompensation | dB | 1, 2 | 0 | | | 0 | | |
| Qhysts | dB | 1, 2 | 0 | | | 0 | | |
| Qoffsets, n | dB | 1, 2 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | | | SS-RSRP | | |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
| Beam assumptionNote 4 |  | 1,2 | Rough | | | Rough | | |
| Note 5 | dB | 1 | 7.45 | -3.55 | 0.95 | -infinity | 0.95 | -3.55 |
|  |  | 2 |
| Note2 | dBm/SCS | 1 | -93 | | | | | |
|  |  | 2 | -90 | | | | | |
| Note2 | dBm/15 kHz | 1 | -102 | | | | | |
|  |  | 2 |  | | | | | |
|  | dB | 1 | 8 | -3 | 1.5 | -infinity | 1.5 | -3 |
|  |  | 2 |
| SS-RSRP Note3 | dBm/SCS | 1 | -85 | -96 | -91.5 | -infinity | -91.5 | -96 |
|  |  | 2 | -82 | -93 | -88.5 | -infinity | -88.5 | -93 |
| Io on SSB symbols of each cell | dBm/95.04 MHz | 1 | -60.53 | -67.40 | -65.34 | -69.17 | -65.34 | -67.40 |
| 2 | -57.52 | -64.39 | -62.33 | -66.16 | -62.33 | -64.39 |
| Treselection | s | 1, 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| SintrasearchP | dB | 1, 2 | 50 | | | 50 | | |
| 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: SS-RSRP 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. | | | | | | | | |

##### A.7.1.1.1.3 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration updateon Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 130 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration updateon cell 1.

The cell re-selection delay to an already detected cell shall be less than 27 s.

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

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

Where:

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

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

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 129.28 s, allow 130 s for the cell re-selection delay to a newly detectable cell and 26.88 s for the cell re-selection delay to an already detected cell in the test case, which we allow 27 s.

#### A.7.1.1.2 Cell reselection to FR2 inter-frequency NR case

##### A.7.1.1.2.1 Test Purpose and Environment

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

##### A.7.1.1.2.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.7.1.1.2.2-1, A.7.1.1.2.2-2 and A.7.1.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.7.1.1.2.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description for serving cell | Description for target cell |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 240 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. | | |

Table A.7.1.1.2.2-2: General test parameters for FR2 inter frequency NR cell re-selection test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell2 | The UE camps on cell 2 in the initial phase and during T1 period the UE reselects to cell 1 |
|  | Neighbour cell |  | 1, 2 | Cell1 |  |
| T1 end condition | Active cell |  | 1, 2 | Cell1 | The UE shall perform reselection to cell 1 during T1 |
|  | Neighbour cells |  | 1, 2 | Cell2 |  |
| T3 end condition | Active cell |  | 1, 2 | Cell2 | The UE shall perform reselection to cell 2 with higher priority during T3 |
|  | Neighbour cell |  | 1, 2 | Cell1 |  |
| RF Channel Number | |  | 1, 2 | 1, 2 |  |
| Time offset between cells | |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR2 |  |
|  | |  | 2 | SSB.2 FR2 |  |
| SMTC configuration | |  | 1, 2 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2 | Not configured |  |
| T1 | | s | 1, 2 | 35 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2 | >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 | 95 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.7.1.1.2.2-3: Cell specific test parameters for FR2 inter frequency NR cell re-selection test case in AWGN

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | | **Cell 2** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| PDSCH RMC configuration |  | 1, 2 | SR.3.1 TDD | | | SR.3.1 TDD | | |
| RMSI CORESET parameters |  | 1, 2 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| RMSI CORESET RMC configuration |  | 1, 2 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| OCNG Pattern |  | 1, 2 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -140 | | | -140 | | |
| 2 | -137 | | | -137 | | |
| Pcompensation | dB | 1, 2 | 0 | | | 0 | | |
| Qhysts | dB | 1, 2 | 0 | | | 0 | | |
| Qoffsets, n | dB | 1, 2 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | | | SS-RSRP | | |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
| Beam assumptionNote 4 |  | 1,2 | Rough | | | Rough | | |
| Note 5 | dB | 1 | 9.95 | 9.95 | 7.45 | -11.05 | -infinity | 7.95 |
| 2 |
| Note2 | dBm/SCS | 1 | -93 | | | -93 | | |
| 2 | -90 | | | -90 | | |
| Note2 | dBm/15 kHz | 1 | -102 | | | -102 | | |
| 2 |
|  | dB | 1 | 10.5 | 10.5 | 8 | -10.5 | -infinity | 8.5 |
| 2 |
| SS-RSRP Note3 | dBm/SCS | 1 | —82.5 | -82.5 | -85 | -103.5 | -infinity | -84.5 |
| 2 | -79.5 | -79.5 | -82 | -100.5 | -infinity | -81.5 |
| Io | dBm/95.04 MHz | 1, 2 | -53.11 | -53.11 | -55.34 | -63.61 | -63.98 | -54.91 |
| Treselection | s | 1, 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| SnonintrasearchP | dB | 1, 2 | 50 | | | 50 | | |
| Threshx, highP | dB | 1, 2 | 48 | | | 48 | | |
| Threshserving, lowP | dB | 1, 2 | 44 | | | 44 | | |
| Threshx, lowP | dB | 1, 2 | 50 | | | 50 | | |
| Propagation Condition |  | 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 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. | | | | | | | | |

##### A.7.1.1.2.3 Test Requirements

The cell reselection delay to a higher priority 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 and periodic registration updateon cell 2.

The cell re-selection delay to a higher priority cell shall be less than 87 s.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration updateon cell 1.

The cell re-selection delay to a lower priority cell shall be less than 27 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\_ inter + TSI-NR, and to a lower priority cell can be expressed as: Tevaluate, NR\_ inter + TSI-NR,

Where:

Thigher\_priority\_search See clause 4.2.2.7

Tevaluate, NR\_ inter See Table 4.2.2.4-1 in clause 4.2.2.4

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 86.88 s, allow 87 s for the cell re-selection delay to a higher priority cell and 26.88 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 27 s.

#### A.7.1.1.3 Cell reselection to FR2 intra-frequency NR case for UE fulfilling low mobility relaxed measurement criterion

##### A.7.1.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements for UE configured with relaxed measurement criterion specified in clause 4.2.2.9.2.

##### A.7.1.1.3.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.7.1.1.3.2-1, A.7.1.1.3.2-2 and A.7.1.1.3.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. During T1 and T2, only criteria *lowMobilityEvalutation* is configured andfulfilled, where (SrxlevRef – Srxlev) < SSearchDeltaP.UE has not registered with network for the tracking area containing cell2.

Table A.7.1.1.3.2-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 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. | |

Table A.7.1.1.3.2-2: General test parameters for FR2 intra-frequency NR cell re-selection test case for UE fulfilling low mobility criterion

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell1 | The UE camps on cell 1 in the initial phase |
|  | Neighbour cells |  | 1, 2 | Cell2 |  |
| T1 end condition | Active cell |  | 1, 2 | Cell2 | The UE reselects to cell 2 during T1 period |
|  | Neighbour cells |  | 1, 2 | Cell1 |  |
| Final condition | Active cell |  | 1, 2 | Cell1 | The UE reselects to cell 1 during T2 period |
| Neighbour cells |  | 1,2 | Cell2 |  |
| RF Channel Number | |  | 1, 2 | 1 |  |
| Time offset between cells | |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SMTC configuration | |  | 1, 2 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1, 2 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2 | Not configured |  |
| T1 | | s | 1, 2 | 100 |  |
| T2 | | s | 1, 2 | 100 |  |

Table A.7.1.1.3.2-3: Cell specific test parameters for FR2 intra-frequency NR cell re-selection test case in AWGN for UE fulfilling low mobility criterion

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC |  | 1 | SR.3.1 TDD | | SR.3.1 TDD | |
| configuration |  | 2 | SR.3.1 TDD | | SR.3.1 TDD | |
| RMSI CORESET |  | 1 | CR.3.1 TDD | | CR.3.1 TDD | |
| RMC configuration |  | 2 | CR.3.1 TDD | | CR.3.1 TDD | |
| Dedicated CORESET |  | 1 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| RMC configuration |  | 2 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| SSB configuration |  | 1 | SSB.3 FR2 | | SSB.7 FR2 | |
|  |  | 2 | SSB.4 FR2 | | SSB.8 FR2 | |
| OCNG Pattern |  | 1, 2 | OP.4 | | OP.4 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1, 2 | 66 | | 66 | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | | ULBWP.0.1 | |
| RLM-RS |  | 1, 2 | SSB | | SSB | |
| Qrxlevmin | dBm/SCS | 1 | -140 | | -140 | |
|  |  | 2 | -137 | | -137 | |
| SSearchDeltaP | dB | 1, 2 | 6 | | 6 | |
| TSearchDeltaP | s | 1,2 | 5 | | 5 | |
| Pcompensation | dB | 1, 2 | 0 | | 0 | |
| Qhysts | dB | 1, 2 | 0 | | 0 | |
| Qoffsets, n | dB | 1, 2 | 0 | | 0 | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | | SS-RSRP | |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | Setup 1 defined in A.3.15.1 | |
| Beam assumptionNote 4 |  | 1,2 | Rough | | Rough | |
| Note 5 | dB | 1 | -3.55 | 0.95 | 0.95 | -3.55 |
|  |  | 2 |
| Note2 | dBm/SCS | 1 | -93 | | | |
|  |  | 2 | -90 | | | |
| Note2 | dBm/15 kHz | 1 | -102 | | | |
|  |  | 2 |  | | | |
|  | dB | 1 | -3 | 1.5 | 1.5 | -3 |
|  |  | 2 |
| SS-RSRP Note3 | dBm/SCS | 1 | -96 | -91.5 | -91.5 | -96 |
|  |  | 2 | -93 | -88.5 | -88.5 | -93 |
| Io on SSB symbols of each cell | dBm/95.04 MHz | 1 | -67.40 | -65.34 | -65.34 | -67.40 |
| 2 | -64.40 | -62.34 | -62.34 | -64.40 |
| Treselection | s | 1, 2 | 0 | 0 | 0 | 0 |
| SintrasearchP | dB | 1, 2 | 50 | | 50 | |
| 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: SS-RSRP 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. | | | | | | |

##### A.7.1.1.3.3 Test Requirements

The cell reselection delay to an already detected cell for UE fulfilling low mobility relaxed criterion 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 Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected cell shall be less than 79 s.

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

NOTE: The cell re-selection delay to an already detectable cell can be expressed as: Tevaluate, NR\_Intra + TSI-NR,

Where:

Tevaluate, NR\_Intra See Table 4.2.2.9.2-1 in clause 4.2.2.9,

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 78.08 s, allow 79s for the cell re-selection delay to an already detected cell for UE fulfilling low mobility criterion in the test case.

#### A.7.1.1.4 Cell reselection to FR2 intra-frequency NR case for UE fulfilling not-at-cell edge relaxed measurement criterion

##### A.7.1.1.4.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements for UE configured with relaxed measurement criterion specified in clause 4.2.2.9.3.

##### A.7.1.1.4.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.7.1.1.4.2-1, A.7.1.1.4.2-2 and A.7.1.1.4.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. During T1 and T2, only criteria *cellEdgeEvaluation* is configured andfulfilled, where Srxlev> SSearchThresholdP.UE has not registered with network for the tracking area containing cell2.

Table A.7.1.1.4.2-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 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. | |

Table A.7.1.1.4.2-2: General test parameters for FR2 intra-frequency NR cell re-selection test case for UE fulfilling not-at-cell edge criterion

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell1 | The UE camps on cell 1 in the initial phase |
|  | Neighbour cells |  | 1, 2 | Cell2 |  |
| T1 end condition | Active cell |  | 1, 2 | Cell2 | The UE reselects to cell 2 during T1 period |
|  | Neighbour cells |  | 1, 2 | Cell1 |
| Final condition | Active cell |  | 1, 2 | Cell1 |  |
| Neighbour cells |  | 1,2 | Cell2 |  |
| RF Channel Number | |  | 1, 2 | 1 |  |
| Time offset between cells | |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SMTC configuration | |  | 1, 2 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1, 2 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2 | Not configured |  |
| T1 | | s | 1, 2 | 100 |  |
| T2 | | s | 1, 2 | 100 |  |

Table A.7.1.1.4.2-3: Cell specific test parameters for FR2 intra-frequency NR cell re-selection test case in AWGN for UE fulfilling not-at-cell edge criterion

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC |  | 1 | SR.3.1 TDD | | SR.3.1 TDD | |
| configuration |  | 2 | SR.3.1 TDD | | SR.3.1 TDD | |
| RMSI CORESET |  | 1 | CR.3.1 TDD | | CR.3.1 TDD | |
| RMC configuration |  | 2 | CR.3.1 TDD | | CR.3.1 TDD | |
| Dedicated CORESET |  | 1 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| RMC configuration |  | 2 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| SSB configuration |  | 1 | SSB.3 FR2 | | SSB.7 FR2 | |
|  |  | 2 | SSB.4 FR2 | | SSB.8 FR2 | |
| OCNG Pattern |  | 1, 2 | OP.4 | | OP.4 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1, 2 | 66 | | 66 | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | | ULBWP.0.1 | |
| RLM-RS |  | 1, 2 | SSB | | SSB | |
| Qrxlevmin | dBm/SCS | 1 | -140 | | -140 | |
|  |  | 2 | -137 | | -137 | |
| Pcompensation | dB | 1, 2 | 0 | | 0 | |
| Qhysts | dB | 1, 2 | 0 | | 0 | |
| Qoffsets, n | dB | 1, 2 | 0 | | 0 | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | | SS-RSRP | |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | Setup 1 defined in A.3.15.1 | |
| Beam assumptionNote 4 |  | 1,2 | Rough | | Rough | |
| Note 5 | dB | 1 | -3.55 | 0.95 | 0.95 | -3.55 |
|  |  | 2 |
| Note2 | dBm/SCS | 1 | -93 | | | |
|  |  | 2 | -90 | | | |
| Note2 | dBm/15 kHz | 1 | -102 | | | |
|  |  | 2 |  | | | |
|  | dB | 1 | -3 | 1.5 | 1.5 | -3 |
|  |  | 2 |
| SS-RSRP Note3 | dBm/SCS | 1 | -96 | -91.5 | -91.5 | -96 |
|  |  | 2 | -93 | -88.5 | -88.5 | -93 |
| Io on SSB symbols of each cell | dBm/95.04 MHz | 1 | -67.40 | -65.34 | -65.34 | -67.40 |
| 2 | -64.40 | -62.34 | -62.34 | -64.40 |
| Treselection | s | 1, 2 | 0 | 0 | 0 | 0 |
| SSearchThresholdP |  | 1, 2 | 35 | 35 | 35 | 35 |
| SintrasearchP | dB | 1, 2 | 50 | | 50 | |
| 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: SS-RSRP 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. | | | | | | |

##### A.7.1.1.4.3 Test Requirements

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 79 s.

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

NOTE: The cell re-selection delay to an already detected cell can be expressed as: Tevaluate, NR\_Intra + TSI-NR,

Where:

Tevaluate, NR\_Intra See Table 4.2.2.9.3-1 in clause 4.2.2.9,

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 78.08 s, allow 79s for the cell re-selection delay to an already detected cell for UE fulfilling not-at-cell edge criterion in the test case.

#### A.7.1.1.5 Cell reselection to FR2 inter-frequency NR case for UE fulfilling low mobility relaxed measurement criterion

##### A.7.1.1.5.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements for UE fulfilling low mobility criterion specified in clause 4.2.2.10.2.

##### A.7.1.1.5.2 Test Parameters

The test scenario comprises of 2 cells (Cell 1 and Cell 2) on 2 different NR carriers respectively as given in tables A.7.1.1.5.2-1, A.7.1.1.5.2-2 and A.7.1.1.5.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2. Cell 2 is of higher priority than Cell 1. The UE is configured with l*owMobilityEvalutation* criterion [2].

Table A.7.1.1.5.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description for serving cell | Description for target cell |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 240 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. | | |

Table A.7.1.1.5.2-2: General test parameters for FR2 inter frequency NR cell re-selection test case for UE fulfilling low mobility criterion

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell2 | The UE camps on cell2 and fulfils low mobility (*lowMobilityEvalutation* [2]) criterion. |
|  | Neighbour cell |  | 1, 2 | Cell1 |
| T1 final condition | Active cell |  | 1, 2 | Cell1 | The UE reselects to low priority cell1 during T1 |
|  | Neighbour cell |  | 1, 2 | Cell2 |
| T2 final condition | Active cell |  | 1, 2 | Cell2 | The UE reselects to high priority cell2 during T2 |
|  | Neighbour cell |  |  | Cell1 |
| RF Channel Number | |  | 1, 2 | 1, 2 |  |
| Time offset between cells | |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR2 |  |
|  | | 2 | SSB.2 FR2 |  |
| SMTC configuration | |  | 1, 2 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1, 2 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2 | Not configured |  |
| T1 | | s | 1, 2 | 85 | T1 needs to be long enough to allow cell re-selection to already known cell1 |
| T2 | | s | 1, 2 | 85 | T2 needs to be long enough to allow cell re-selection to already known cell2 |

Table A.7.1.1.5.2-3: Cell specific test parameters for FR2 inter frequency NR cell re-selection test case in AWGN for UE fulfilling low mobility criterion

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | | |
|  |  |  | T1 | T2 | T1 | | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | | |
| PDSCH RMC configuration |  | 1, 2 | SR.3.1 TDD | | SR.3.1 TDD | | |
| RMSI CORESET parameters |  | 1, 2 | CR.3.1 TDD | | CR.3.1 TDD | | |
| RMSI CORESET RMC configuration |  | 1, 2 | CCR.3.1 TDD | | CCR.3.1 TDD | | |
| OCNG Pattern |  | 1, 2 | OP.1 defined in A.3.2.1 | | OP.1 defined in A.3.2.1 | | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1, 2 | 66 | | 66 | | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2 | SSB | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -140 | | -140 | | |
|  |  | 2 | -137 | | -137 | | |
| Pcompensation | dB | 1, 2 | 0 | | 0 | | |
| Qhysts | dB | 1, 2 | 0 | | 0 | | |
| Qoffsets, n | dB | 1, 2 | 0 | | 0 | | |
| Cell\_selection\_and\_reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | | SS-RSRP | | |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | Setup 1 defined in A.3.15.1 | | |
| Beam assumptionNote 4 |  | 1, 2 | Rough | | | Rough | |
| Note 5 | dB | 1, 2 | 9.95 | 7.45 | -11.05 | | 7.95 |
| Note2 | dBm/SCS | 1 | -93 | | -93 | | |
| 2 | -90 | | -90 | | |
| Note2 | dBm/15 kHz | 1, 2 | -102 | | -102 | | |
|  | dB | 1, 2 | 10.5 | 8 | -10.5 | | 8.5 |
| SS-RSRP Note3 | dBm/SCS | 1 | -82.5 | -85 | -103.5 | | -84.5 |
|  |  | 2 | -79.5 | -82 | -100.5 | | -81.5 |
| Io | dBm/95.04 MHz | 1,2 | -53.14 | -55.37 | -63.64 | | -54.94 |
| TreselectionNR | s | 1, 2 | 0 | | 0 | | |
| SnonintrasearchP | dB | 1, 2 | 50 | | Not sent | | |
| SSearchDeltaP | dB | 1, 2 | 6 | | 6 | | |
| TSearchDeltaP | s | 1, 2 | 5 | | 5 | | |
| Threshx, highP | dB | 1, 2 | 48 | | 48 | | |
| Threshserving, lowP | dB | 1, 2 | 44 | | 44 | | |
| Threshx, lowP | dB | 1, 2 | 50 | | 50 | | |
| Propagation Condition |  | 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 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. | | | | | | | |

##### A.7.1.1.5.3 Test Requirements

The cell reselection delay to an already detected low priority cell (Cell 1) for UE fulfilling low mobility criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected low priority cell, Cell 1, shall be less than 79 s.

The cell reselection delay to an already detected high priority cell (Cell 2) for UE fulfilling low mobility criterion 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 Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected high priority cell, Cell 2, shall be less than 79 s.

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

NOTE 1: The cell re-selection delay to an already detected low priority cell can be expressed as: Tevaluate, NR\_ inter + TSI-NR

NOTE 2: The cell re-selection delay to an already detected higher priority cell can be expressed as: Tevaluate, NR\_ inter + TSI-NR

Where:

Tevaluate, NR\_ inter See Table 4.2.2.10.2-1 in clause 4.2.2.10.2

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 78.08 s, allow 79 s for the cell re-selection delay to an already detected low priority cell for UE fulfilling low mobility criterion in the test case.

This gives a total of 78.08 s, allow 79 s for the cell re-selection delay to an already detected high priority cell for UE fulfilling low mobility criterion in the test case.

#### A.7.1.1.6 Cell reselection to FR2 inter-frequency NR case for UE fulfilling not-at-cell edge relaxed measurement criterion

##### A.7.1.1.6.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements for UE fulfilling not-at-cell edge criterion specified in clause 4.2.2.10.3.

##### A.7.1.1.6.2 Test Parameters

The test scenario comprises of 2 cells (Cell 1 and Cell 2) on 2 different NR carriers respectively as given in tables A.7.1.1.6.2-1, A.7.1.1.6.2-2 and A.7.1.1.6.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2. Cell 2 is of higher priority than Cell 1. The UE is configured with *cellEdgeEvaluation* criterion [2].

Table A.7.1.1.6.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description for serving cell | Description for target cell |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 240 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. | | |

Table A.7.1.1.6.2-2: General test parameters for FR2 inter frequency NR cell re-selection test case for UE fulfilling not-at-cell edge criterion

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell2 | The UE camps on cell2 and fulfils not-at-cell edge (*cellEdgeEvaluation* [2]) criterion. |
|  | Neighbour cell |  | 1, 2 | Cell1 |  |
| T1 final condition | Active cell |  | 1, 2 | Cell1 | The UE reselects to low priority cell1 during T1 |
| Neighbour cell |  | 1, 2 | Cell2 |  |
| T2 final condition | Active cell |  | 1, 2 | Cell2 | The UE reselects to high priority cell2 during T2 |
| Neighbour cell |  | 1, 2 | Cell1 |
| RF Channel Number | |  | 1, 2 | 1, 2 |  |
| Time offset between cells | |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR2 |  |
|  | | 2 | SSB.2 FR2 |  |
| SMTC configuration | |  | 1, 2 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1, 2 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2 | Not configured |  |
| T1 | | s | 1, 2 | 85 | T1 needs to be long enough to allow cell re-selection to already known cell. |
| T2 | | s | 1, 2 | 85 | T2 needs to be long enough to allow cell re-selection to already known cell. |

Table A.7.1.1.6.2-3: Cell specific test parameters for FR2 inter frequency NR cell re-selection test case in AWGN for UE fulfilling not-at-cell edge criterion

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1, 2 | SR.3.1 TDD | | SR.3.1 TDD | |
| RMSI CORESET parameters |  | 1, 2 | CR.3.1 TDD | | CR.3.1 TDD | |
| RMSI CORESET RMC configuration |  | 1, 2 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| OCNG Pattern |  | 1, 2 | OP.1 defined in A.3.2.1 | | OP.1 defined in A.3.2.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1, 2 | 66 | | 66 | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | | ULBWP.0.1 | |
| RLM-RS |  | 1, 2 | SSB | | SSB | |
| Qrxlevmin | dBm/SCS | 1 | -140 | | -140 | |
|  |  | 2 | -137 | | -137 | |
| Pcompensation | dB | 1, 2 | 0 | | 0 | |
| Qhysts | dB | 1, 2 | 0 | | 0 | |
| Qoffsets, n | dB | 1, 2 | 0 | | 0 | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | | SS-RSRP | |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | Setup 1 defined in A.3.15.1 | |
| Beam assumptionNote 4 |  | 1, 2 | Rough | | Rough | |
| Note 5 | dB | 1, 2 | 9.95 | 7.45 | -11.05 | 7.95 |
| Note2 | dBm/SCS | 1 | -93 | | -93 | |
| 2 | -90 | | -90 | |
| Note2 | dBm/15 kHz | 1, 2 | -102 | | -102 | |
|  | dB | 1, 2 | 10.5 | 8 | -10.5 | 8.5 |
| SS-RSRP Note3 | dBm/SCS | 1 | -82.5 | -85 | -103.5 | -84.5 |
|  |  | 2 | -79.5 | -82 | -100.5 | -81.5 |
| Io | dBm/95.04 MHz | 1,2 | -53.14 | -55.37 | -63.64 | -54.94 |
| SSearchThresholdP |  | 1, 2 | 35 | 35 | 29 | 29 |
| TreselectionNR | s | 1, 2 | 0 | | 0 | |
| SnonintrasearchP | dB | 1, 2 | 50 | | Not sent | |
| Threshx, highP | dB | 1, 2 | 48 | | 48 | |
| Threshserving, lowP | dB | 1, 2 | 44 | | 44 | |
| Threshx, lowP | dB | 1, 2 | 50 | | 50 | |
| Propagation Condition |  | 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 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. | | | | | | |

##### A.7.1.1.6.3 Test Requirements

The cell reselection delay to an already detected low priority cell (Cell 1) for UE fulfilling not-at-cell edge criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected low priority cell, Cell 1, shall be less than 79 s.

The cell reselection delay to an already detected high priority cell (Cell 2) for UE fulfilling not-at-cell edge criterion 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 Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected high priority cell, Cell 2, shall be less than 79 s.

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

NOTE 1: The cell re-selection delay to an already detected low priority cell can be expressed as: Tevaluate, NR\_ inter + TSI-NR

NOTE 2: The cell re-selection delay to an already detected higher priority cell can be expressed as: Tevaluate, NR\_ inter + TSI-NR

Where:

Tevaluate, NR\_ inter See Table 4.2.2.10.3-1 in clause 4.2.2.10.3

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.

This gives a total of 78.8 s, allow 79 s for the cell re-selection delay to an already detected low priority cell for UE fulfillingnot-at-cell edge criterion in the test case.

This gives a total of 78.08 s, allow 79 s for the cell re-selection delay to an already detected high priority cell for UE fulfillingnot-at-cell edge criterion in the test case.

#### A.7.1.1.7 Cell reselection to FR2 intra-frequency NR case for FR2 power class 6 UE configured with *highSpeedMeasFlagFR2-r17*

##### A.7.1.1.7.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2.2.3 for FR2 power class 6 UE configured with *highSpeedMeasFlagFR2-r17*.

##### A.7.1.1.7.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.7.1.1.7.2-1, A.7.1.1.7.2-2 and A.7.1.1.7.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.7.1.1.7.2-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 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. | |

Table A.7.1.1.7.2-2: General test parameters for intra frequency NR cell re-selection test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell1 |  |
| T2 end condition | Active cell |  | 1, 2 | Cell2 |  |
|  | Neighbour cell |  | 1, 2 | Cell1 |  |
| Final condition | Active cell |  | 1, 2 | Cell1 |  |
|  | Neighbour cell |  | 1, 2 | Cell2 |  |
| RF Channel Number | |  | 1, 2 | 1 |  |
| Time offset between cells | |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SMTC configuration | |  | 1, 2 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2 | 0.32 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2 | Not configured |  |
| *highSpeedMeasFlagFR2-r17* | |  |  | Set 1 |  |
| T1 | | s | 1, 2 | >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 | 1, 2 | 10 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 1, 2 | 5 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.7.1.1.7.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | | **Cell 2** | | |
|  |  |  | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | | SR.3.1 TDD | | |
|  |  | 2 | SR.3.1 TDD | | | SR.3.1 TDD | | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | | CR.3.1 TDD | | |
|  |  | 2 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
|  |  | 2 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| SSB configuration |  | 1 | SSB.3 FR2 | | | SSB.7 FR2 | | |
|  |  | 2 | SSB.4 FR2 | | | SSB.8 FR2 | | |
| OCNG Pattern |  | 1, 2 | OP.4 | | | OP.4 | | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1, 2 | 66 | | | 66 | | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -138 | | | -138 | | |
|  |  | 2 | -135 | | | -135 | | |
| Pcompensation | dB | 1, 2 | 0 | | | 0 | | |
| Qhysts | dB | 1, 2 | 0 | | | 0 | | |
| Qoffsets, n | dB | 1, 2 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | | | SS-RSRP | | |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
|  | dB | 1 | 8 | -3 | 1.5 | -infinity | 1.5 | -3 |
|  |  | 2 |  |  |  |  |  |  |
| Beam assumptionNote 4 |  | 1,2 | Rough | | | | | |
| Note2 | dBm/SCS | 1 | -93 | | | | | |
|  |  | 2 | -90 | | | | | |
| Note2 | dBm/15 kHz | 1 | -102 | | | | | |
|  |  | 2 |  | | | | | |
|  | dB | 1 | 8 | -3 | 1.5 | -infinity | 1.5 | -3 |
|  |  | 2 |  |  |  |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -85 | -96 | -91.5 | -infinity | -91.5 | -96 |
|  |  | 2 | -82 | -93 | -88.5 | -infinity | -88.5 | -93 |
| Io on SSB symbols | dBm/95.04 MHz | 1 | -59.37 | -63.40 | -62.47 | -64.01 | -62.47 | -63.40 |
| of each cell |  | 2 | -57.18 | -62.86 | -61.67 | -64.01 | -61.67 | -62.86 |
| Treselection | s | 1, 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| SintrasearchP | dB | 1, 2 | 50 | | | 50 | | |
| Propagation Condition |  | 1,2 | AWGN | | | AWGN 19444Hz; | | |
| 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: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

##### A.7.1.1.7.3 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration updateon Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 7 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration updateon cell 1.

The cell re-selection delay to an already detected cell shall be less than 4 s.

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

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

Where:

Tdetect, NR\_Intra See Table 4.2.2.3-3 in clause 4.2.2.3

Tevaluate, NR\_ intra See Table 4.2.2.3-3 in clause 4.2.2.3

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 6.4 s, allow 7 s for the cell re-selection delay to a newly detectable cell and 3.2 s for the cell re-selection delay to an already detected cell in the test case, which we allow 4 s.

## A.7.2 SA: RRC\_INACTIVE state mobility

### A.7.2.1 Small Data Transmission

#### A.7.2.1.1 TA validation for CG-SDT in FR2

##### A.7.2.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly performs TA validation for CG-SDT. This test will partly verify the TA validation requirements in clause 5.5.3.

Supported test configurations are shown in table A.7.2.1.1.1-1. The test parameters are given in Tables A.7.2.1.1.1-2 and A.7.2.1.1.1-3.

There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of 5 successive time periods, with time duration of T1 to T5 respectively. Figure A.7.2.1.1.1-1 shows the variation of the RSRP level in the active cell during the test.

Time duration T1 starts at time point TA and ends at time point TB. During T1 test equipment sets the transmit power to P0.

Time duration T2 starts at time point TB and ends at time point TD. At time point TC which is W1 after time point TB, test equipment sends RRCRelease message with CG-SDT configuration to UE and UE enters RRC\_INACTIVE. During T2 test equipment sets the transmit power to P1.

Time duration T3 starts at time point TD and ends at time point TE. During T3 test equipment sets the transmit power to P0.

Time duration T4 starts at time point TE and ends at time point TI. Test equipment triggers UL data arrival at UE lower layer at time point TF which is W2 after time point TE, and the details to configure UL data arrival is left to RAN5. After time point TF, test equipment observes whether UE transmits with CG-SDT within 640ms + Z after TF. The time point when UE transmits with CG-SDT is denoted as TG. At time point TH (FFS how TH is determined), the second RRCRelease is sent to UE. During T4 test equipment sets the transmit power to P2.

Time duration T5 starts at time point TJ and ends at time point FFS. During T5 test equipment sets the transmit power to P3. Test equipment triggers UL data arrival at UE lower layer at time point TJ, and the details to configure UL data arrival is left to RAN5.

Table A.7.2.1.1.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz |

Table A.7.2.1.1.1-2: General test parameters for TA validation for CG-SDT in FR2

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
|  | |  | Test 1 |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1 |  | TDD |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |
| DL initial BWP configuration | Config 1 |  | DLBWP.0.1 |
| UL initial BWP configuration | Config 1 |  | ULBWP.0.1 |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 DD |
| SSB Configuration | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120 kHz |
| PRACH Configuration | Config 1 |  | Table A.3.8.3.4 |
| OCNG parameters | |  | OP.5 |
| CP length | |  | Normal |
| Correlation Matrix and Antenna Configuration | |  | 2x2 Low |
| DRX | | s | 1.28 |
| cg-SDT-RSRP-ChangeThreshold | | dB | [8] |
| cg-SDT-TimeAlignmentTime | |  | infinity |
| CG-SDT resource period | | ms | 40 |
| T1 | | s | [TBD] |
| T2 | | s | [TBD] |
| T3 | | s | [TBD] |
| T4 | | s | [TBD] |
| T5 | | s | [TBD] |

Table A.7.2.1.1.1-3: Cell specific test parameters TA validation for CG-SDT in FR2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 4 | |  | Rough | | | | |
| 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 |  | | | | |
|  | Config 1 | dBm/15kHz | -100 | | | | |
|  | Config 1 | dBm/SCS | -100 | | | | |
|  | Config 1 | dB | [0] | [10.35] | [0] | [15.25] | [6] |
|  | Config 1 | dB | [0] | [10.35] | [0] | [15.25] | [6] |
| SS-RSRP | Config 1 | dBm/SCS | [-100] | [-89.65] | [-100] | [-84.75] | [-96] |
| Io | Config 1 | dBm/95.04 MHz | [-69.04] | [-61.31] | [-69.04] | [-56.67] | [-65.07] |
| 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.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SS-RSRP 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. | | | | | | | |



Figure A.7.2.1.1.1-1: RSRP variation for TA validation for CG-SDT

##### A.7.2.1.1.2 Test Requirements

The UE behaviour in each test during time durations shall be as follows:

During T4, UE shall transmit UL data with CG-SDT within 640ms + Z after time point TF.

During T5, UE shall not transmit UL data with CG-SDT.

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

## A.7.3 RRC\_CONNECTED state mobility

### A.7.3.1 Handover

#### A.7.3.1.1 Inter-frequency handover from FR1 to FR2; unknown target cell

##### A.7.3.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR2 inter frequency handover requirements specified in clause 6.1.1.5.

##### A.7.3.1.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.1.2-2, and A.7.3.1.1.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.1.2-1: Inter-frequency handover from FR1 to FR2 test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: 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 | |

Table A.7.3.1.1.2-2: General test parameters Inter-frequency handover from FR1 to FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| 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 | ≤10 |  |

Table A.7.3.1.1.2-3: Cell specific test parameters for NR FR1-FR2 Inter frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Cell 1 | | | Cell 2 | | |
|  | | | |  | T1 | T2 | | T1 | | T2 |
| Assumption for UE beamsNote 6 | | | |  | N/A | | | Rough | | |
| AoA setup | | | |  | NA | | | Setup 1  as defined in A.3.15 | | |
| NR RF Channel Number | | | |  | 1 | | | 2 | | |
| Duplex mode | | | Config 1 |  | FDD | | TDD | | | |
|  | | | Config 2,3 |  | TDD | | TDD | | | |
| TDD configuration | | | Config 1 |  | Not Applicable | | TDDConf.3.1 | | | |
|  | | | Config 2 |  | TDDConf.1.1 | | TDDConf.3.1 | | | |
|  | | | Config 3 |  | TDDConf.2.1 | | TDDConf.3.1 | | | |
| BWchannel | | | Config 1 | MHz | 10: NRB,c = 52 | | 100: NRB,c = 66 | | | |
|  | | | Config 2 |  | 10: NRB,c = 52 | | 100: NRB,c = 66 | | | |
|  | | | Config 3 |  | 40: NRB,c = 106 | | 100: NRB,c = 66 | | | |
| BWP BW | | | Config 1 | MHz | 10: NRB,c = 52 | | 100: NRB,c = 66 | | | |
|  | | | Config 2 |  | 10: NRB,c = 52 | | 100: NRB,c = 66 | | | |
|  | | | Config 3 |  | 40: NRB,c = 106 | | 100: NRB,c = 66 | | | |
| Data RBs allocated | | | Config 1 |  | 52 | | 66 | | | |
| Config 2 | 52 | | 66 | | | |
| Config 3 | 106 | | 66 | | | |
| DRx Cycle | | | | ms | Not Applicable | | | | | |
| PDSCH Reference measurement channel | | | Config 1 |  | SR.1.1 FDD | | SR3.1 TDD | | | |
|  | | | Config 2 |  | SR.1.1 TDD | | SR3.1 TDD | | | |
|  | | | Config 3 |  | SR2.1 TDD | | SR3.1 TDD | | | |
| RMSI CORESET Reference Channel | | | Config 1 |  | CR.1.1 FDD | | CR3.1 TDD | | | |
|  | | | Config 2 |  | CR.1.1 TDD | | CR3.1 TDD | | | |
|  | | | Config 3 |  | CR2.1 TDD | | CR3.1 TDD | | | |
| Control Channel RMC | | | Config 1 |  | CCR.1.1 FDD | | CCR.3.1 TDD | | | |
| Config 2 | CCR.1.1 TDD | | CCR.3.1 TDD | | | |
| Config 3 | CCR.2.1 TDD | | CCR.3.1 TDD | | | |
| OCNG Patterns | | | |  | OP 1 | | | | | |
| SSB configuration | | | Config 1,2 |  | SSB.1 FR1 | | SSB. 3 FR2 | | | |
|  | | | Config 3 |  | SSB.2 FR1 | | SSB. 3 FR2 | | | |
| SMTC configuration | | | Config 1,2 |  | SMTC.1 | | SMTC.1 | | | |
|  | | | Config 3 |  | SMTC.2 | | SMTC.1 | | | |
| SMTC configuration | | | Config 1,2 |  | SMTC.1 | | SMTC.1 | | | |
|  | | | Config 3 |  | SMTC.2 | | SMTC.1 | | | |
| PDSCH/PDCCH subcarrier spacing | | | Config 1,2 | kHz | 15 kHz | | 120 kHz | | | |
|  | | | Config 3 |  | 30 kHz | | 120 kHz | | | |
| PUCCH/PUSCH subcarrier spacing | | | Config 1,2 | kHz | 15 kHz | | 120 kHz | | | |
|  | | | Config 3 |  | 30 kHz | | 120 kHz | | | |
| PRACH configuration | | | |  | FR1 PRACH configuration 1 | | FR2 PRACH configuration 1 | | | |
| TRS configuration | | Config 1 | |  | TRS.1.1 FDD | | TRS.2.1 TDD | | | |
|  | | Config 2 | |  | TRS.1.1 TDD | | TRS.2.1 TDD | | | |
|  | | Config 3 | |  | TRS.1.2 TDD | | TRS.2.1 TDD | | | |
| PDSCH/PDCCH TCI state | | | |  | N/A | | TCI.State.2 | | | |
| BWP configuraiton | | | Initial DL BWP |  | DLBWP.0.1 | | DLBWP.0.1 | | | |
|  | | | Dedicated DL BWP |  | DLBWP.1.1 | | DLBWP.1.1 | | | |
|  | | | Initial UL BWP |  | ULBWP.0.1 | | ULBWP.0.1 | | | |
|  | | | Dedicated UL BWP |  | ULBWP.1.1 | | ULBWP.1.1 | | | |
| 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) | | | |  |  | |  | | | |
| Note2 | | | | dBm/15kHz | Link only, see clause A.3.7A | | -104.7 | | | |
| Note2 | Config 1,2 | | | dBm/SCS |  | | -95.7 | | | |
|  | Config 3 | | |  |  | | -95.7 | | | |
|  | | | | dB |  | | -Infinity | | 10 | |
|  | | | | dB |  | | -Infinity | | 10 | |
| IoNote3 | Config 1,2 | | | dBm/  BW |  | | -66.7 | | -56.3 | |
|  | Config 3 | | | dBm/  BW |  | | -66.7 | | -56.3 | |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | | |

##### A.7.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 572 ms from the beginning of time period T2.

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

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

RRC procedure delay = [10] ms and is specified in clause 12 in TS 38.331 [2].

Tinterrupt = 562 ms in the test. Tinterrupt is defined in clause 6.1.1.5.2.

This gives a total of 572 ms.

#### A.7.3.1.2 Intra-frequency handover from FR2 to FR2; unknown target cell

##### A.7.3.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 intra frequency handover requirements specified in clause 6.1.1.4.

##### A.7.3.1.2.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.2.2-2, and A.7.3.1.2.2-3.

The test scenario comprises of carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.2.2-1: Intra-frequency handover from FR2 to FR2 test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.3.1.2.2-2: General test parameters Intra-frequency handover from FR2 to FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| 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 | ≤10 |  |

Table A.7.3.1.2.2-3: Cell specific test parameters for NR FR2-FR2 Intra frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 2 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| Assumption for UE beamsNote 6 | | |  | Rough | | | | Rough | | |
| AoA setup | | |  | Setup 1 as defined in A.3.15 | | | | | | |
| NR RF Channel Number | | |  | **1** | | | | **1** | | |
| Duplex mode | | |  | TDD | | | | | | |
| TDD configuration | | |  | TDDConf.3.1 | | | | | | |
| BWchannel | | | MHz | 100: NRB,c = 66 | | | | | | |
| BWP BW | | | MHz | 100: NRB,c = 66 | | | | | | |
| Data RBs allocated | | |  | 66 | | | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | | |  | SR3.1 TDD | | | | | | |
| RMSI CORESET Reference Channel | | |  | CR3.1 TDD | | | | | | |
| Control Channel RMC | | |  | CCR.3.1 TDD | | | | | | |
| OCNG Patterns | | |  | O P. 1 | | | | | | |
| SMTC Configuration | | |  | SMTC pattern 1 | | | | | | |
| SSB Configuration | | |  | SSB. 3 FR2 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| PRACH configuration | | |  | FR2 PRACH configuration 1 | | | | | | |
| TRS configuration | | |  | TRS.2.1 TDD | | | | | | |
| PDSCH/PDCCH TCI state | | |  | TCI.State.2 | | | | | | |
| BWP configuraiton | | 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 | | | 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 | -104.7 | | | | | | |
| Note2 |  | | dBm/SCS | -95.7 | | | | | | |
|  | | | dB | 6 | -1.8 | | -Infinity | | 0 | |
|  | | | dB | 6 | 6 | | -Infinity | | 7 | |
| IoNote3 |  | | dBm/  BW | -59.7 | -56.7 | | -59.7 | | -56.7 | |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | | |

##### A.7.3.1.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 232 ms from the beginning of time period T2.

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

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

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

Tinterrupt = 222 ms in the test. Tinterrupt is defined in clause 6.1.1.4.2.

This gives a total of 232 ms.

#### A.7.3.1.3 Inter-frequency handover from FR2 to FR2; unknown target cell

##### A.7.3.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 inter frequency handover requirements specified in clause 6.1.1.4.

##### A.7.3.1.3.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.3.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.3.2-2, and A.7.3.1.3.2-3.

The test scenario comprises of carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.3.2-1: Inter-frequency handover from FR2 to FR2 test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.3.1.3.2-2: General test parameters Inter-frequency handover from FR2 to FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| 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 | ≤10 |  |

Table A.7.3.1.3.2-3: Cell specific test parameters for NR FR2-FR2 Inter frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 2 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| Assumption for UE beamsNote 6 | | |  | Rough | | | | Rough | | |
| AoA setup | | |  | Setup 1as defined in A.3.15 | | | | | | |
| NR RF Channel Number | | |  | **1** | | | | **2** | | |
| Duplex mode | | |  | TDD | | | | | | |
| TDD configuration | | |  | TDDConf.3.1 | | | | | | |
| BWchannel | | | MHz | 100: NRB,c = 66 | | | | | | |
| BWP BW | | | MHz | 100: NRB,c = 66 | | | | | | |
| Data RBs allocated | | |  | 66 | | | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | | |  | SR3.1 TDD | | | | | | |
| RMSI CORESET Reference Channel | | |  | CR3.1 TDD | | | | | | |
| Control Channel RMC | | |  | CCR.3.1 TDD | | | | | | |
| OCNG Patterns | | |  | O P. 1 | | | | | | |
| SMTC Configuration | | |  | SMTC pattern 1 | | | | | | |
| SSB Configuration | | |  | SSB. 3 FR2 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| PRACH configuration | | |  | FR2 PRACH configuration 1 | | | | | | |
| TRS configuration | | |  | TRS.2.1 TDD | | | | | | |
| PDSCH/PDCCH TCI state | | |  | TCI.State.2 | | | | | | |
| BWP configuraiton | | 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 | | | 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 | -104.7 | | | -104.7 | | | |
| Note2 |  | | dBm/SCS | -95.7 | | | -95.7 | | | |
|  | | | dB | 5 | 5 | | -Infinity | | 5 | |
|  | | | dB | 5 | 5 | | -Infinity | | 5 | |
| IoNote3 | Config 1,2 | | dBm/  BW | -60.5 | -60.5 | | -66.7 | | -60.5 | |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | | |

##### A.7.3.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 552 ms from the beginning of time period T2.

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

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

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

Tinterrupt = 542 ms in the test. Tinterrupt is defined in clause 6.1.1.4.2.

This gives a total of 552 ms.

#### A.7.3.1.4 Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2

##### A.7.3.1.4.1 Test Purpose and Environment

This test is to verify the requirement for the FR1-to-FR2 Inter-band inter-frequency synchronous DAPS handover requirements specified in clause 6.1.3.4.

##### A.7.3.1.4.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.4.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.4.2-2, A.7.3.1.4.2-3 and A.7.3.1.4.2-4.

The test scenario comprises of two bands each with one cell. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. The UE shall be configured with periodic CSI reporting for cell1. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A4 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A4. After receiving the Event A4, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the test system receives the ACK of the PDSCH corresponding to the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) sent to the UE. During T3, the UE shall be able to perform random access to Cell 2. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perform DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the test system receives the ACK of the PDSCH corresponding to the last TTI containing the RRC message implying source cell release sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stop sending CSI report to the source cell.

Table A.7.3.1.4.2-1: Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2 test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: 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 | |

Table A.7.3.1.4.2-2: General test parameters for Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A4-Threshold | | dBm | -120 |  |
| 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 | | μs | 33 | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | <5 |  |
| T3 | | s | <0.5 |  |
| T4 | | ms | 10+Tinterrupt2 | Tinterrupt2 as defined in Table 6.1.3.4.2-2 for synchronous DAPS HO |
| T5 | | ms | 100 |  |

Table A.7.3.1.4.2-3: Cell specific test parameters for Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2 (Cell 1 in FR1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | |
|  | |  | T1 | T2 - T5 |
| 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 | |
| BWchannel | Config 1 | MHz | 10: NRB,c = 52 | |
|  | Config 2 |  | 10: NRB,c = 52 | |
|  | Config 3 |  | 40: NRB,c = 106 | |
| BWP BW | Config 1 | MHz | 10: NRB,c = 52 | |
|  | Config 2 |  | 10: NRB,c = 52 | |
|  | Config 3 |  | 40: NRB,c = 106 | |
| TRS configuration | Config 1 |  | TRS.1.1 FDD | |
|  | Config 2 |  | TRS.1.1 TDD | |
|  | Config 3 |  | TRS.1.2 TDD | |
| DRx Cycle | | ms | Not Applicable | |
| 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 | |
| OCNG Patterns | |  | OP.1 | |
| CSI-RS configuration for CSI reporting | Config 1 |  | CSI-RS.1.1 FDD | |
| Config 2 |  | CSI-RS.1.1 TDD | |
| Config 3 |  | CSI-RS.2.1 TDD | |
| reportConfigType | |  | periodic | |
| reportQuantity | |  | cri-RI-PMI-CQI | |
| CSI reporting periodicity | Config 1,2 | slot | 5 | |
| Config 3 | 10 | |
| CSI reporting offset | Config 1,2 | slot | 3 | |
| Config 3 | 5 | |
| SSB Configuration | Config 1,2 |  | SSB.1 FR1 | |
|  | Config 3 |  | SSB.2 FR1 | |
| SMTC Configuration | Config 1,2 |  | SMTC.1 | |
|  | Config 3 |  | SMTC.2 | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2 | kHz | 15 kHz | |
| Config 3 | 30 kHz | |
| PUCCH/PUSCH subcarrier spacing | Config 1,2 | kHz | 15 kHz | |
| Config 3 | 30 kHz | |
| PRACH configuration | |  | FR1 PRACH configuration 2 | |
| BWP | Initial DL BWP |  | DLBWP.0.1 | |
|  | Dedicated DL BWP |  | DLBWP.1.3 | |
|  | Initial UL BWP |  | ULBWP.0.1 | |
|  | Dedicated UL BWP |  | ULBWP.1.3 | |
| 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 | NA  Link only, see clause A.3.7A | |
| Note2 | Config 1,2 | dBm/SCS |  | |
|  | Config 3 |  |  | |
|  | | dB |  | |
|  | | dB |  | |
| IoNote3 | Config 1,2 | dBm/  9.36MHz |  | |
|  | Config 3 | dBm/  38.16MHz |  | |
| Propagation condition | | - | AWGN | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

Table A.7.3.1.4.2-4: Cell specific test parameters for Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2 (Cell 2 in FR2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | |
|  | |  | T1 | T2 - T5 |
| Assumption for UE beamsNote 6 | |  | Rough | |
| AoA setup | |  | Setup 1 as defined in A.3.15 | |
| NR RF Channel Number | |  | 2 | |
| Duplex mode | Config 1,2,3 |  | TDD | |
| TDD configuration | Config 1,2,3 |  | TDDConf.3.1 | |
| BWchannel | Config 1,2,3 | MHz | 100: NRB,c = 66 | |
| BWP BW | Config 1,2,3 | MHz | 100: NRB,c = 66 | |
| TRS configuration | Config 1,2,3 |  | TRS.2.1 TDD | |
| DRX Cycle | | ms | Not Applicable | |
| PDSCH Reference measurement channel | Config 1,2,3 |  | SR3.1 TDD | |
| CORESET Reference Channel | Config 1,2,3 |  | CR3.1 TDD | |
| OCNG Patterns | |  | OCNG pattern 1 | |
| CSI-RS configuration for CSI reporting | Config 1,2,3 |  | CSI-RS.3.1 TDD | |
| SSB Configuration | Config 1,2,3 |  | SSB.1 FR2 | |
| SMTC Configuration | |  | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2,3 | kHz | 120 kHz | |
| PUCCH/PUSCH subcarrier spacing | Config 1,2,3 | kHz | 120 kHz | |
| PRACH configuration | |  | FR2 PRACH configuration 2 | |
| TCI configuration | |  | CSI-RS.Config.0 | |
| BWP | Initial DL BWP |  | DLBWP.0.1 | |
|  | Dedicated DL BWP |  | DLBWP.1.3 | |
|  | Initial UL BWP |  | ULBWP.0.1 | |
|  | Dedicated UL BWP |  | ULBWP.1.3 | |
| 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 | -104.7 | -104.7 |
| Note2 | | dBm/SCS | -95.7 | -95.7 |
|  | | dB | -Infinity | 10 |
|  | | dB | -Infinity | 10 |
| IoNote3 | | dBm/  95.04MHz | -66.7 | -55.4 |
| Propagation condition | | - | AWGN | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | |

##### A.7.3.1.4.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 92 ms from the beginning of time period T3. During Dhandover1, the interruption on Cell 1 shall not exceed Tinterrupt1 as defined in Table 6.1.3.4.2-1 for synchronous DAPS HO.

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

NOTE: The handover delay Dhandover1 can be expressed as: TRRC\_procedure + TIU + Tprocessing + T∆ + Tmargin, where:

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

TIU = 20 ms in the test. TIU is defined in clause 6.1.1.2.2.

T∆ = 20 ms in the test. T∆ is defined in clause 6.1.1.2.2.

Tprocessing = 40 ms in the test. Tprocessing is defined in clause 6.1.1.2.2.

Tmargin = 2 ms in the test. Tmargin is defined in clause 6.1.1.2.2.

This gives a total of 92 ms.

The UE shall complete to release Cell 1 less than (10 ms + Tinterrupt2) from the beginning of time period T4. During Dhandover2, the interruptionon Cell 2 shall not exceed Tinterrupt2 as defined in Table 6.1.3.4.2-2 for synchronous DAPS HO.

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

NOTE: The handover delay Dhandover2 can be expressed as: TRRC\_procedure + Tinterrupt2, where:

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

#### A.7.3.1.5 Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2

##### A.7.3.1.5.1 Test Purpose and Environment

This test is to verify the requirement for the FR1-to-FR2 Inter-band inter-frequency asynchronous DAPS handover requirements specified in clause 6.1.3.4.

##### A.7.3.1.5.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.5.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.5.2-2, A.7.3.1.5.2-3 and A.7.3.1.5.2-4.

The test scenario comprises of two bands each with one cell. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. The UE shall be configured with periodic CSI reporting for cell1. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A4 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A4. After receiving the Event A4, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the test system receives the ACK of the PDSCH corresponding to the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) sent to the UE. During T3, the UE shall be able to perform random access to Cell 2. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perform DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the the test system receives the ACK of the PDSCH corresponding to last TTI containing the RRC message implying source cell release sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stop sending CSI report to the source cell.

Table A.7.3.1.5.2-1: Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2 test configurations

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: 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 | |

Table A.7.3.1.5.2-2: General test parameters for Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A4-Threshold | | dBm | -120 |  |
| 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 | | μs | 62.5 | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | <5 |  |
| T3 | | s | <0.5 |  |
| T4 | | ms | 10+Tinterrupt2 | Tinterrupt2 as defined in Table 6.1.3.4.2-2 for asynchronous DAPS HO. |
| T5 | | ms | 100 |  |

Table A.7.3.1.5.2-3: Cell specific test parameters for Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2 (Cell 1 in FR1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | |
|  | | |  | T1 | T2 - T5 |
| 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 | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | |
|  | | Config 2 |  | 10: NRB,c = 52 | |
|  | | Config 3 |  | 40: NRB,c = 106 | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | |
|  | | Config 2 |  | 10: NRB,c = 52 | |
|  | | Config 3 |  | 40: NRB,c = 106 | |
| TRS configuration | | Config 1 |  | TRS.1.1 FDD | |
|  | | Config 2 |  | TRS.1.1 TDD | |
|  | | Config 3 |  | TRS.1.2 TDD | |
| DRx Cycle | | | ms | Not Applicable | |
| 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 | |
| OCNG Patterns | | |  | OP.1 | |
| CSI-RS configuration for CSI reporting | | Config 1 |  | CSI-RS.1.1 FDD | |
|  | | Config 2 |  | CSI-RS.1.1 TDD | |
|  | | Config 3 |  | CSI-RS.2.1 TDD | |
| reportConfigType | | |  | periodic | |
| reportQuantity | | |  | cri-RI-PMI-CQI | |
| CSI reporting periodicity | | Config 1,2 | slot | 5 | |
| Config 3 | 10 | |
| CSI reporting offset | | Config 1,2 | slot | 3 | |
| Config 3 | 5 | |
| SSB Configuration | | Config 1,2 |  | SSB.1 FR1 | |
|  | | Config 3 |  | SSB.2 FR1 | |
| SMTC Configuration | | Config 1,2 |  | SMTC.1 | |
|  | | Config 3 |  | SMTC.2 | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | |
|  | | Config 3 |  | 30 kHz | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | |
|  | | Config 3 |  | 30 kHz | |
| PRACH configuration | | |  | FR1 PRACH configuration 2 | |
| BWP | | Initial DL BWP |  | DLBWP.0.1 | |
|  | | Dedicated DL BWP |  | DLBWP.1.3 | |
|  | | Initial UL BWP |  | ULBWP.0.1 | |
|  | | Dedicated UL BWP |  | ULBWP.1.3 | |
| 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 | NA  Link only, see clause A.3.7A | |
| Note2 | Config 1,2 | | dBm/SCS |  | |
|  | Config 3 | |  |  | |
|  | | | dB |  | |
|  | | | dB |  | |
| IoNote3 | Config 1,2 | | dBm/  9.36MHz |  | |
|  | Config 3 | | dBm/  38.16MHz |  | |
| Propagation condition | | | - | AWGN | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

Table A.7.3.1.5.2-4: Cell specific test parameters for Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2 (Cell 2 in FR2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | |
|  | |  | T1 | T2 - T5 |
| Assumption for UE beamsNote 6 | |  | Rough | |
| AoA setup | |  | Setup 1 as defined in A.3.15 | |
| NR RF Channel Number | |  | 2 | |
| Duplex mode | Config 1,2,3 |  | TDD | |
| TDD configuration | Config 1,2,3 |  | TDDConf.3.1 | |
| BWchannel | Config 1,2,3 | MHz | 100: NRB,c = 66 | |
| BWP BW | Config 1,2,3 | MHz | 100: NRB,c = 66 | |
| TRS configuration | Config 1,2,3 |  | TRS.2.1 TDD | |
| DRX Cycle | | ms | Not Applicable | |
| PDSCH Reference measurement channel | Config 1,2,3 |  | SR.3.1 TDD | |
| CORESET Reference Channel | Config 1,2,3 |  | CR.3.1 TDD | |
| OCNG Patterns | |  | OP.1 | |
| CSI-RS configuration for CSI reporting | Config 1,2,3 |  | CSI-RS.3.1 TDD | |
| SSB Configuration | Config 1,2,3 |  | SSB.1 FR2 | |
| SMTC Configuration | |  | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2,3 | kHz | 120 kHz | |
| PUCCH/PUSCH subcarrier spacing | Config 1,2,3 | kHz | 120 kHz | |
| PRACH configuration | |  | FR2 PRACH configuration 2 | |
| TCI configuration | |  | CSI-RS.Config.0 | |
| BWP | Initial DL BWP |  | DLBWP.0.1 | |
|  | Dedicated DL BWP |  | DLBWP.1.3 | |
|  | Initial UL BWP |  | ULBWP.0.1 | |
|  | Dedicated UL BWP |  | ULBWP.1.3 | |
| 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 | -104.7 | -104.7 |
| Note2 | | dBm/SCS | -95.7 | -95.7 |
|  | | dB | -Infinity | 10 |
|  | | dB | -Infinity | 10 |
| IoNote3 | | dBm/  95.04MHz | -66.7 | -55.4 |
| Propagation condition | | - | AWGN | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | |

##### A.7.3.1.5.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 92 ms from the beginning of time period T3. During Dhandover1, the interruption on Cell 1 shall not exceed Tinterrupt1 as defined in Table 6.1.3.4.2-1 for asynchronous DAPS HO.

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

NOTE: The handover delay Dhandover1 can be expressed as: TRRC\_procedure + TIU + Tprocessing + T∆ + Tmargin, where:

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

TIU = 20 ms in the test. TIU is defined in clause 6.1.1.2.2.

T∆ = 20 ms in the test. T∆ is defined in clause 6.1.1.2.2.

Tprocessing = 40 ms in the test. Tprocessing is defined in clause 6.1.1.2.2.

Tmargin = 2 ms in the test. Tmargin is defined in clause 6.1.1.2.2.

This gives a total of 792 ms.

The UE shall complete to release Cell 1 less than (10 ms + Tinterrupt2) from the beginning of time period T4. During Dhandover2, the interruptionon Cell 2 shall not exceed Tinterrupt2 as defined in Table 6.1.3.4.2-2 for asynchronous DAPS HO.

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

NOTE: The handover delay Dhandover2 can be expressed as: TRRC\_procedure + Tinterrupt2, where:

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

#### A.7.3.1.6 Handover with PSCell from SA to EN-DC; unknown FR2 target cell

##### A.7.3.1.6.1 Test Purpose and Environment

This test is to verify the PSCell addition delay requirements specified in clause 6.1.5.2 for handover with PSCell from NR SA to EN-DC with sequential processing when the SMTC of target unknown PSCell is present in RRCConnectionReconfiguration and the target PSCell is in FR2.

##### A.7.3.1.6.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.6.21. The PSCell addition delay are tested by using the parameters in table A.7.3.1.6.2-2-6.

The test scenario comprises of three carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2 and cell 3. Starting T2, cell 2 and cell 3 become detectable and the UE receives a RRC signalling including handover with PSCell command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover with PSCell is sent to the UE.

The test system shall send a RRC message to the UE to trigger HO (Cell 2) with PSCell (Cell 3) during period T2, after UE has reported Event B2. The point in time at which the RRC message implying HO (Cell 2) with PSCell (Cell 3) is received at the UE antenna connector defines the start of period T3. The test system shall observe the UE sends PRACH to the PSCell (Cell 3) during period T3.

Table A.7.3.1.6.2-1: Handover with PSCell from NR SA to EN-DC test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target PCell: LTE FDD  Target PSCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target PCell: LTE TDD  Target PSCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target PCell: LTE FDD  Target PSCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 4 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target PCell: LTE TDD  Target PSCell: 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 | |

Table A.7.3.1.6.2-2: General test parameters for handover with PSCell from NR SA to EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | |  | 1, 2, 3 | Three radio channels are used for this test. One for FR1 source PCell, second for E-UTRA target PCell and third for target NR PSCell |
| Initial | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Neighbour cell |  | Cell2, Cell3 | Neighbour cell on RF channel number 2 and 3. |
| Final  Condition | Active PCell |  | Cell2 | E-UTRA PCell on RF channel number 2. |
| Active PSCell |  | Cell3 | PSCell on RF channel number 3. |
| Neighbour Cell |  | Cell1 | RF channel number 1 |
| NR measurement quantity | |  | SS-RSRP |  |
| E-UTRAN measurement quantity | |  | RSRP |  |
| b2-Threshold1 | | dBm | As specified in Table A.6.3.1.4-3 | Absolute NR SS-RSRP threshold for event B2 |
| b2-Threshold2EUTRAN | | dBm | -98 | Absolute E-UTRAN 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 |
| PRACH configuration on cell3 | |  | FR2 configuration 2 | Captured in A.3.8.3.2 |
| Time offset between cell 1 and 2 | |  | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | |  | 0 | As specified in Table 9.1.2-1 started before T2 starts |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on carrier frequency of cell3. |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 | During this time the cell 2 and cell 3 shall be known. |
| T3 | | s | 1 | During this time the UE perform HO with PSCell addition. |

Table A.7.3.1.6.2-3: Cell specific test parameters for Cell 1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Configuration | Cell 1 | | |
|  | |  |  | T1 | T2 | T3 |
| RF channel number | |  | 1, 2 | 1 | | |
| Duplex mode | |  | 1, 2 | FDD | | |
| BWchannel | | MHz | 1, 2 | 10: NRB,c = 52 (FDD) | | |
| PDSCH reference measurement channel | |  | 1, 2 | SR.1.1 FDD | | |
| CORSET reference channel | |  | 1, 2 | CR.1.1 FDD | | |
| TRS configuration | |  | 1, 2 | TRS.1.1 FDD | | |
| OCNG patternNote1 | |  | 1, 2 | OP.1 | | |
| BWP | Initial DL BWP |  | 1, 2 | 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 | SMTC.1 | | |
| SSB configuration | |  | 1, 2 | SSB.1 FR1 | | |
| b2-Threshold1 | | dBm | 1, 2 | -96 | | |
| EPRE ratio of PSS to SSS | | dB | 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\_DMRS | |  |  |  | | |
| EPRE ratio of OCNG DMRS to SSS | |  |  |  | | |
| EPRE ratio of OCNG to OCNG DMRS | |  |  |  | | |
| *Noc*Note2 | | dBm/15 KHz | 1, 2 | -100 | -104 | -100 |
| *Noc*Note2 | | dBm/SCS | 1, 2 | -100 | -104 | -100 |
| Ês/Noc | | dB | 1, 2 | 12 | 0 | -4 |
| Ês/IotNote3 | | dB | 1, 2 | 12 | 0 | -4 |
| SS-RSRPNote3 | | dBm/SCS | 1, 2 | -88 | -104 | -104 |
| IoNote3 | | dBm/9.36 MHz | 1, 2 | -59.78 | -73.04 | -70.59 |
| Propagation condition | |  | 1, 2 | AWGN | | |
| Antenna Configuration and Correlation Matrix | |  | 1, 2 | 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. | | | | | | |

Table A.7.3.1.6.2-4: Cell specific test parameters for Cell 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 2 | | |
|  |  |  | T1 | T2 | T3 |
| RF channel number |  | 1, 2 | 2 | | |
| Duplex mode |  | 1, 2 | FDD | | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | | |
| BWchannel | MHz | 1, 2 | 10 MHz: NRB,c = 50 | | |
| PRACH ConfigurationNote2 |  | 1, 2 | 4 | | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2 | 10 MHz: R.3 FDD | | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2 | 10 MHz: R.6 FDD | | |
| OCNG PatternsNote3 |  | 1, 2 | 10 MHz: OP.10 FDD | | |
| 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\_RANote4 |  |  |  | | |
| OCNG\_RBNote4 |  |  |  | | |
| NocNote5 | dBm/15kHz | 1, 2 | -98 | | |
| Ês/Noc | dB | 1, 2 | -Infinity | 8 | 78 |
| Ês/IotNote6 | dB | 1, 2 | -Infinity | 78 | 78 |
| RSRPNote6 | dBm/15kHz | 1, 2 | -Infinity | -90 | -90 |
| SCH\_RPNote6 | dBm/15kHz | 1, 2 | -Infinity | -90 | -90 |
| IoNote6 | dBm/9MHz | 1, 2 | -67.21  +10log(NRB,c/100) | -58.57  +10log(NRB,c/100) | -58.57  +10log(NRB,c/100) |
| Propagation Condition |  | 1, 2 | AWGN | | |
| Antenna Configuration and Correlation Matrix Note7 |  | 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: 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 [25]. | | | | | |

Table A.7.3.1.6.2-5: Cell specific test parameters for Cell 3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test | | |
|  |  |  | T1 | T2 | T3 |
| E-UTRA Channel Number |  | 1,2 | 1 | | |
| NR Channel Number |  | 1,2 | 2 | | |
| Duplex Mode |  | 1,2 | TDD | | |
| TDD configuration |  | 1,2 | TDDConf.3.1 | | |
| BWchannel | MHz | 1,2 | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1,2 | 48 | | |
| Initial BWP Configuration |  | 1,2 | DLBWP.0.1  ULBWP.0.1 | | |
| Dedicated BWP Configuration |  | 1,2 | DLBWP.1.1  ULBWP.1.1 | | |
| TRS Configuration |  | 1,2 | TRS.2.1 TDD | | |
| PDSCH/PDCCH TCI state |  | 1,2 | TCI.State.2 | | |
| PDSCH Reference measurement channel |  | 1,2 | SR.3.3 TDD | | |
| RMSI CORESET Reference Channel |  | 1,2 | CR.3.2 TDD | | |
| Dedicated CORESET Reference Channel |  | 1,2 | CCR.3.7 TDD | | |
| OCNG Patterns |  | 1,2 | OP.3 | | |
| SSB configuration |  | 1,2 | SSB.2 FR2 | | |
| SMTC configuration |  | 1,2 | SMTC.2 | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2 | 120 | | |
| TRS Configuration |  | 1,2 | TRS.2.1 TDD | | |
| CSI-RS configuration for CSI reporting |  | 1,2 | CSI-RS.3.1 TDD | | |
| reportConfigType |  | 1,2 | periodic | | |
| reportQuantity |  | 1,2 | cri-RI-PMI-CQI | | |
| CSI reporting periodicity | slot | 1,2 | 40 | | |
| CSI reporting offset | slot | 1,2 | 4 | | |
| EPRE ratio of PSS to SSS | dB | 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) |  |  |  | | |
| Propagation condition |  | 1,2 | AWGN | | |

Table A.7.3.1.6.2-6: OTA related test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 3 | | |
| T1 | T2 | T3 |
| Angle of arrival configuration |  | Setup 2a according to clause A.3.15.2.1 | | |
| Assumption for UE beamsNote 6 |  | Rough | | |
| Ês Note2 | dBm/SCS | -Infinity | -81 | |
| SSB\_RPNote2, Note 4 | dBm/SCS | -Infinity | -81 | |
| BB Note 2, Note 7 | dB | -Infinity | 4.88 | |
| IoNote 2, Note 4 | dBm/95.04 MHz | N/A | -56.41 | |
| Note 1: Void  Note 2: Es/Iot, SSB\_RP 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: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  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 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | |

##### A.7.3.1.6.3 Test Requirements

The UE shall start to transmit the PRACH to PSCell less than 692 ms into T3.

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

NOTE: The handover delay can be expressed as: DHOwithPSCell\_PSCell = TRRC\_delay + Tprocessing + Tsearch\_HO + Tsearch\_PSCell + T∆ + TPSCell\_ DU + 2 ms, where:

RRC procedure delay = 50 ms and is specified in clause 12 in TS 38.331 [2].

Tprocessing is as defined as 50ms in the test.

Tsearch\_HO is as defined as 80ms in the test.

Tsearch\_PSCell is as defined as 480ms in the test.

T∆ is defined as 20ms in the test.

TPSCell\_ DU is defined as 10ms in the test.

This gives a total of 692 ms.

#### A.7.3.1.7 HO with PSCell from FR1 NR-SA to EN-DC with known E-UTRA PCell and known FR2 PSCell

##### A.7.3.1.7.1 Test purpose and environment

The purpose of this test is to verify that the delay of HO with PSCell from FR1 NR-SA to EN-DC with known E-UTRA PCell and known FR2 PSCell are within the requirements stated in clause 6.1.5.2.2 of TS 36.133 [15] for the case when the E-UTRA PCell and FR2 PSCell are known by the UE at the time of handover with PSCell.

Supported test configurations are shown in A.7.3.1.7.11. The test parameters for the E-UTRA cell are given in Table A.3.7.2.2-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.7.3.1.7.1-2, cell-specific parameters in A.7.3.1.7.1-3, A.7.3.1.7.1-4, A.7.3.1.7.1-5 and OTA parameters in A.7.3.1.7.1-6 below. The test consists of three successive time periods with duration of T1, T2, and T3. There are three carriers each with one cell. Before the test starts the UE is connected to Cell 1 (source FR1 PCell) on radio channel 1 (FR1 PCC) and is aware of Cell 2 (target E-UTRA PCell) on radio channel 2 and Cell 3 (FR2 target PSCell) on radio channel 3. The UE is monitoring both cell 2 and cell 3 before receives a RRC message implying handover with PSCell. At the start of time duration T1, the UE does not have any timing information of Cell 2 and Cell 3. Starting T2, Cell 2 and Cell 3 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 9.1.2-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

The test system shall send a RRC message to the UE to trigger HO (Cell 2) with PSCell (Cell 3) during period T2, after UE has reported Event B2. The point in time at which the RRC message implying HO (Cell 2) with PSCell (Cell 3) is received at the UE antenna connector defines the start of period T3. The test system shall observe the UE sends PRACH to the PSCell (Cell 3) during period T3.

Table A.7.3.1.7.1-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | Source FR1 PCell: NR FDD, SSB SCS 15kHz, data SCS 15 kHz, 10 MHz bandwidth  Target PCell: LTE FDD,  Target PSCell: NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | Source FR1 PCell: NR FDD, SSB SCS 15kHz, data SCS 15 kHz, 10 MHz bandwidth  Target PCell: LTE TDD,  Target PSCell: NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.3.1.7.1-2: General Test Parameters for HO with PSCell

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | |  | 1, 2, 3 | Three radio channels are used for this test. One for FR1 source PCell, second for E-UTRA target PCell and third for target NR PSCell |
| Initial | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Neighbour cell |  | Cell2, Cell3 | Neighbour cell on RF channel number 2 and 3. |
| Final  Condition | Active PCell |  | Cell2 | E-UTRA PCell on RF channel number 2. |
| Active PSCell |  | Cell3 | PSCell on RF channel number 3. |
| Neighbour Cell |  | Cell1 | RF channel number 1 |
| NR measurement quantity | |  | SS-RSRP |  |
| E-UTRAN measurement quantity | |  | RSRP |  |
| b2-Threshold1 | | dBm | As specified in Table A.6.3.1.4-3 | Absolute NR SS-RSRP threshold for event B2 |
| b2-Threshold2EUTRAN | | dBm | -98 | Absolute E-UTRAN 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 |
| PRACH configuration on cell3 | |  | FR2 configuration 2 | Captured in A.3.8.3.2 |
| Time offset between cell 1 and 2 | |  | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | |  | 0 | As specified in Table 9.1.2-1 started before T2 starts |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on carrier frequency of cell3. |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 | During this time the cell 2 and cell 3 shall be known. |
| T3 | | s | 1 | During this time the UE perform HO with PSCell addition. |

Table A.7.3.1.7.1-3: Cell specific test parameters for Cell 1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Configuration | Cell 1 | | |
|  | |  |  | T1 | T2 | T3 |
| RF channel number | |  | 1, 2 | 1 | | |
| Duplex mode | |  | 1, 2 | FDD | | |
| BWchannel | | MHz | 1, 2 | 10: NRB,c = 52 (FDD) | | |
| PDSCH reference measurement channel | |  | 1, 2 | SR.1.1 FDD | | |
| CORSET reference channel | |  | 1, 2 | CR.1.1 FDD | | |
| TRS configuration | |  | 1, 2 | TRS.1.1 FDD | | |
| OCNG patternNote1 | |  | 1, 2 | OP.1 | | |
| BWP | Initial DL BWP |  | 1, 2 | 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 | SMTC.1 | | |
| SSB configuration | |  | 1, 2 | SSB.1 FR1 | | |
| b2-Threshold1 | | dBm | 1, 2 | -96 | | |
| EPRE ratio of PSS to SSS | | dB | 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\_DMRS | |  |  |  | | |
| EPRE ratio of OCNG DMRS to SSS | |  |  |  | | |
| EPRE ratio of OCNG to OCNG DMRS | |  |  |  | | |
| *Noc*Note2 | | dBm/15 KHz | 1, 2 | -100 | -104 | -100 |
| *Noc*Note2 | | dBm/SCS | 1, 2 | -100 | -104 | -100 |
| Ês/Noc | | dB | 1, 2 | 12 | 0 | -4 |
| Ês/IotNote3 | | dB | 1, 2 | 12 | 0 | -4 |
| SS-RSRPNote3 | | dBm/SCS | 1, 2 | -88 | -104 | -104 |
| IoNote3 | | dBm/9.36 MHz | 1, 2 | -59.78 | -73.04 | -70.59 |
| Propagation condition | |  | 1, 2 | AWGN | | |
| Antenna Configuration and Correlation Matrix | |  | 1, 2 | 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. | | | | | | |

Table A.7.3.1.7.1-4: Cell specific test parameters for Cell 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 2 | | |
|  |  |  | T1 | T2 | T3 |
| RF channel number |  | 1, 2 | 2 | | |
| Duplex mode |  | 1, 2 | FDD | | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | | |
| BWchannel | MHz | 1, 2 | 10 MHz: NRB,c = 50 | | |
| PRACH ConfigurationNote2 |  | 1, 2 | 4 | | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2 | 10 MHz: R.3 FDD | | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2 | 10 MHz: R.6 FDD | | |
| OCNG PatternsNote3 |  | 1, 2 | 10 MHz: OP.10 FDD | | |
| 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\_RANote4 |  |  |  | | |
| OCNG\_RBNote4 |  |  |  | | |
| NocNote5 | dBm/15kHz | 1, 2 | -98 | | |
| Ês/Noc | dB | 1, 2 | -Infinity | 8 | 78 |
| Ês/IotNote6 | dB | 1, 2 | -Infinity | 78 | 78 |
| RSRPNote6 | dBm/15kHz | 1, 2 | -Infinity | -90 | -90 |
| SCH\_RPNote6 | dBm/15kHz | 1, 2 | -Infinity | -90 | -90 |
| IoNote6 | dBm/9MHz | 1, 2 | -67.21  +10log(NRB,c/100) | -58.57  +10log(NRB,c/100) | -58.57  +10log(NRB,c/100) |
| Propagation Condition |  | 1, 2 | AWGN | | |
| Antenna Configuration and Correlation Matrix Note7 |  | 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: 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 [25]. | | | | | |

Table A.7.3.1.7.1-5: Cell specific test parameters for Cell 3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test | | |
|  |  |  | T1 | T2 | T3 |
| E-UTRA Channel Number |  | 1,2 | 1 | | |
| NR Channel Number |  | 1,2 | 2 | | |
| Duplex Mode |  | 1,2 | TDD | | |
| TDD configuration |  | 1,2 | TDDConf.3.1 | | |
| BWchannel | MHz | 1,2 | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1,2 | 48 | | |
| Initial BWP Configuration |  | 1,2 | DLBWP.0.1  ULBWP.0.1 | | |
| Dedicated BWP Configuration |  | 1,2 | DLBWP.1.1  ULBWP.1.1 | | |
| TRS Configuration |  | 1,2 | TRS.2.1 TDD | | |
| PDSCH/PDCCH TCI state |  | 1,2 | TCI.State.2 | | |
| PDSCH Reference measurement channel |  | 1,2 | SR.3.3 TDD | | |
| RMSI CORESET Reference Channel |  | 1,2 | CR.3.2 TDD | | |
| Dedicated CORESET Reference Channel |  | 1,2 | CCR.3.7 TDD | | |
| OCNG Patterns |  | 1,2 | OP.3 | | |
| SSB configuration |  | 1,2 | SSB.2 FR2 | | |
| SMTC configuration |  | 1,2 | SMTC.2 | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2 | 120 | | |
| TRS Configuration |  | 1,2 | TRS.2.1 TDD | | |
| CSI-RS configuration for CSI reporting |  | 1,2 | CSI-RS.3.1 TDD | | |
| reportConfigType |  | 1,2 | periodic | | |
| reportQuantity |  | 1,2 | cri-RI-PMI-CQI | | |
| CSI reporting periodicity | slot | 1,2 | 40 | | |
| CSI reporting offset | slot | 1,2 | 4 | | |
| EPRE ratio of PSS to SSS | dB | 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) |  |  |  | | |
| Propagation condition |  | 1,2 | AWGN | | |

Table A.7.3.1.7.1-6: OTA related test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 3 | | |
| T1 | T2 | T3 |
| Angle of arrival configuration |  | Setup 2a according to clause A.3.15.2.1 | | |
| Assumption for UE beamsNote 6 |  | Rough | | |
| Ês Note2 | dBm/SCS | -Infinity | -81 | |
| SSB\_RPNote2, Note 4 | dBm/SCS | -Infinity | -81 | |
| BB Note 2, Note 7 | dB | -Infinity | 4.88 | |
| IoNote 2, Note 4 | dBm/95.04 MHz | N/A | -56.41 | |
| Note 1: Void  Note 2: Es/Iot, SSB\_RP 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: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  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 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | |

##### A.7.3.1.7.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 137 msNote1 into T3.

The rate of correct observed PSCell addition delay in HO with PSCell during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 6.1.5.2:

DHOwithPSCell\_PSCell = TRRC\_delay + Tprocessing + Tsearch\_HO + Tsearch\_PSCell + T∆ + TPSCell\_ DU + 2 ms

Where:

TRRC\_delay = 50ms

Tprocessing = 45ms

Tsearch\_HO = 0 ms

Tsearch\_PSCell = 0 ms

T∆ = 20ms

TPSCell\_ DU = 1\*10+10 = 20 ms

#### A.7.3.1.8 NR PSCell change delay in HO with PSCell from NR-DC to NR-DC

##### A.7.3.1.8.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell change delay requirements in HO with PSCell from NR-DC to NR-DC defined in clauses 6.1.5.4.2. The requirements are applicable to NR FR1-FR1 inter-frequency PCell handover and NR FR2-FR2 intra-frequency PSCell change.

The supported test configurations are given in Table A.7.3.1.8.1-1. The test scenario comprises four NR cells, source PCell(Cell 1) and source PSCell(Cell 2), target PCell(Cell 3), target PSCell(Cell 4).

Cell 1 and Cell 3 are on radio channel 1 in FR1.Cell 2 and Cell 4 are on radio channel 2 in FR2. Test parameters are given in Tables A.7.3.1.8.1-2, A.7.3.1.8.1-3, A.7.3.1.8.1-4 and A.7.3.1.8.1-5 below. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of T1, the UE shall be connected to Cell 1 on radio channel 1 and Cell 2 on radio channel 2. UE is not aware of Cell 3 and Cell 4. Starting T2, cell 3 and Cell 4 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.8.1-1: Supported test configurations for HO with PSCell from NR-DC to NR-DC

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Source PSCell: FR2 NR 120kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Target PSCell: FR2 NR 120kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | Source PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Source PSCell: FR2 NR 120kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Target PSCell: FR2 NR 120kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 3 | Source PCell: FR1 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target PCell: FR1 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Source PSCell: FR2 NR 120kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Target PSCell: FR2 NR 120kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.3.1.8.1-2: General test parameters for PCell FR1-FR1 Inter frequency handover

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 3 |  |
| Final condition | Active cell |  | Cell 3 |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |

Table A.7.3.1.8.1-3: Cell specific test parameters for PCell FR1-FR1 Inter frequency handover

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 3 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| NR RF Channel Number | | |  | 1 | | | | 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 | | | | | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | | | |
| TRS configuration | | Config 1 |  | TRS.1.1 FDD | | | | | | |
|  | | Config 2 |  | TRS.1.1 TDD | | | | | | |
|  | | Config 3 |  | TRS.1.2 TDD | | | | | | |
| 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 | | | | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD | | | | | | |
|  | | Config 2 |  | CR.1.1 TDD | | | | | | |
|  | | Config 3 |  | CR2.1 TDD | | | | | | |
| OCNG Patterns | | |  | OP.1 | | | | | | |
| SMTC Configuration | | |  | SMTC.1 | | | | | | |
| SSB Configuration | | Config 1,2 |  | SSB.1 FR1 | | | | | | |
|  | | Config 3 |  | SSB.2 FR1 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | | | | |
|  | | Config 3 |  | 30 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | | | | |
|  | | Config 3 |  | 30 kHz | | | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | | | | |
| BWP | | 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 | | | -98 | | | |
| Note2 | Config 1,2 | | dBm/SCS | -98 | | | -98 | | | |
|  | Config 3 | |  | -95 | | | -95 | | | |
|  | | | dB | 4 | 4 | | -Infinity | | 5 | |
|  | | | dB | 4 | 4 | | -Infinity | | 5 | |
| SSB\_RP | Config 1,2 | | dBm/SCS | -94 | -94 | | -Infinity | | -93 | |
|  | Config 3 | | dBm/SCS | -91 | -91 | | -Infinity | | -90 | |
| IoNote3 | Config 1,2 | | dBm/  9.36MHz | -64.59 | -64.59 | | -70.05 | | -63.85 | |
|  | Config 3 | | dBm/  38.16MHz | -58.49 | -58.49 | | -63.94 | | -57.75 | |
| 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. | | | | | | | | | | |

Table A.7.3.1.8.1-4: General test parameters Intra-frequency FR2-FR2 PSCell change

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 2 |  |
|  | Neighbouring cell |  | Cell 4 |  |
| Final condition | Active cell |  | Cell 4 |  |
| A4-Offset | | dBm | -120 |  |
| 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 | ≤10 |  |

Table A.7.3.1.8.1-5: Cell specific test parameters for Intra-frequency FR2-FR2 PSCell change

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 | | | | Cell 4 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| Assumption for UE beamsNote 6 | | |  | Rough | | | | Rough | | |
| AoA setup | | |  | Setup 1 as defined in A.3.15 | | | | | | |
| NR RF Channel Number | | |  | **1** | | | | **1** | | |
| Duplex mode | | |  | TDD | | | | | | |
| TDD configuration | | |  | TDDConf.3.1 | | | | | | |
| BWchannel | | | MHz | 100: NRB,c = 66 | | | | | | |
| BWP BW | | | MHz | 100: NRB,c = 66 | | | | | | |
| Data RBs allocated | | |  | 66 | | | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | | |  | SR3.1 TDD | | | | | | |
| RMSI CORESET Reference Channel | | |  | CR3.1 TDD | | | | | | |
| Control Channel RMC | | |  | CCR.3.1 TDD | | | | | | |
| OCNG Patterns | | |  | O P. 1 | | | | | | |
| SMTC Configuration | | |  | SMTC pattern 1 | | | | | | |
| SSB Configuration | | |  | SSB. 3 FR2 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| PRACH configuration | | |  | FR2 PRACH configuration 1 | | | | | | |
| TRS configuration | | |  | TRS.2.1 TDD | | | | | | |
| PDSCH/PDCCH TCI state | | |  | TCI.State.2 | | | | | | |
| BWP configuraiton | | 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 | | | 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 | -104.7 | | | | | | |
| Note2 |  | | dBm/SCS | -95.7 | | | | | | |
|  | | | dB | 6 | -1.8 | | -Infinity | | 0 | |
|  | | | dB | 6 | 6 | | -Infinity | | 7 | |
| IoNote3 |  | | dBm/  BW | -59.7 | -56.7 | | -59.7 | | -56.7 | |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | | |

##### A.7.3.1.8.2 Test Requirements

The UE shall start to transmit the PRACH to target PSCell (Cell 4) less than 83 ms from the beginning of time period T2.

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

#### A.7.3.1.9 Intra-frequency handover from FR2-2 to FR2-2; unknown target cell

##### A.7.3.1.9.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-2-NR FR2-2 intra frequency handover requirements specified in clause 6.1.1.4.

##### A.7.3.1.9.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.9.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.9.2-2, and A.7.3.1.9.2-3.

The test scenario comprises of carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.9.2-1: Intra-frequency handover from FR2-2 to FR2-2 test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.3.1.9.2-2: General test parameters Intra-frequency handover from FR2-2 to FR2-2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A4-Offset | | dBm | -120 |  |
| 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 | ≤10 |  |

Table A.7.3.1.9.2-3: Cell specific test parameters for NR FR2-2-FR2-2 Intra frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Config | Cell 1 | | | | Cell 2 | | |
|  | |  | T1 | | T2 | | T1 | | T2 |
| Assumption for UE beamsNote 6 | |  | 1,2,3 | Rough | | | | Rough | | |
| AoA setup | |  | 1,2,3 | Setup 1 as defined in A.3.15 | | | | | | |
| NR RF Channel Number | |  | 1,2,3 | **1** | | | | **1** | | |
| Duplex mode | |  | 1,2,3 | TDD | | | | | | |
| TDD configuration | |  | 1 | TBD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| BWchannel | | MHz | 1 | 100: NRB,c = 66 | | | | | | |
| 2 | 400: NRB,c = 66 | | | | | | |
| 3 | 400: NRB,c = 33 | | | | | | |
| Data RBs allocated | |  | 1 | 66 | | | | | | |
|  | 2 | 66 | | | | | | |
|  | 3 | 33 | | | | | | |
| DRx Cycle | | ms | 1,2,3 | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | |  | 1 | SR3.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| RMSI CORESET Reference Channel | |  | 1 | CR3.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| Control Channel RMC | |  | 1 | CCR.3.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| OCNG Patterns | |  | 1,2,3 | O P. 1 | | | | | | |
| SMTC Configuration | |  | 1,2,3 | SMTC pattern 1 | | | | | | |
| SSB Configuration | |  | 1 | SSB. 3 FR2 | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 1 | 120 | | | | | | |
| 2 | 480 | | | | | | |
| 3 | 960 | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | kHz | 1 | 120 | | | | | | |
| 2 | 480 | | | | | | |
| 3 | 960 | | | | | | |
| PRACH configuration | |  | 1,2,3 | FR2 PRACH configuration 1 | | | | | | |
| TRS configuration | |  | 1 | TRS.2.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| PDSCH/PDCCH TCI state | |  | 1,2,3 | TCI.State.2 | | | | | | |
| BWP configuraiton | Initial DL BWP |  | 1,2,3 | DLBWP.0.1 | | | | | | |
| Dedicated DL BWP |  | 1,2,3 | DLBWP.1.1 | | | | | | |
| Initial UL BWP |  | 1,2,3 | ULBWP.0.1 | | | | | | |
| Dedicated UL BWP |  | 1,2,3 | ULBWP.1.1 | | | | | | |
| 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) | |  |  |  | | |  | | | |
| Note2 | | dBm/15kHz |  | -104.7 | | | | | | |
| Note2 | | dBm/SCS | 1 | -95.7 | | | | | | |
| 2 | -89.7 | | | | | | |
| 3 | -86.7 | | | | | | |
|  | | dB |  | 6 | -1.8 | | -Infinity | | 0 | |
|  | | dB |  | 6 | 6 | | -Infinity | | 7 | |
| IoNote3 | | dBm/95.04 MHz Note4 |  | -59.7 | -56.7 | | -59.7 | | -56.7 | |
| dBm/380.16 MHz Note4 |  | -53.7 | -50.7 | | -53.7 | | -50.7 | |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | | |

##### A.7.3.1.9.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 772 ms from the beginning of time period T2.

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

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

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

Tinterrupt = 762 ms in the test. Tinterrupt is defined in clause 6.1.1.4.2.

This gives a total of 772 ms.

#### A.7.3.1.10 Inter-frequency handover from FR2-2 to FR2-2; unknown target cell

##### A.7.3.1.10.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-2-NR FR2-2 Inter frequency handover requirements specified in clause 6.1.1.4.

##### A.7.3.1.10.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.10.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.10.2-2, and A.7.3.1.10.2-3.

The test scenario comprises of carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.10.2-1: Inter-frequency handover from FR2-2 to FR2-2 test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.3.1.10.2-2: General test parameters Inter-frequency handover from FR2-2 to FR2-2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A4-Offset | | dBm | -120 |  |
| 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 | ≤10 |  |

Table A.7.3.1.10.2-3: Cell specific test parameters for NR FR2-2-FR2-2 Inter frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Config | Cell 1 | | | | Cell 2 | | |
|  | |  | T1 | | T2 | | T1 | | T2 |
| Assumption for UE beamsNote 6 | |  | 1,2,3 | Rough | | | | Rough | | |
| AoA setup | |  | 1,2,3 | Setup 1 as defined in A.3.15 | | | | | | |
| NR RF Channel Number | |  | 1,2,3 | **1** | | | | **2** | | |
| Duplex mode | |  | 1,2,3 | TDD | | | | | | |
| TDD configuration | |  | 1 | TBD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| BWchannel | | MHz | 1 | 100: NRB,c = 66 | | | | | | |
| 2 | 400: NRB,c = 66 | | | | | | |
| 3 | 400: NRB,c = 33 | | | | | | |
| Data RBs allocated | |  | 1 | 66 | | | | | | |
|  | 2 | 66 | | | | | | |
|  | 3 | 33 | | | | | | |
| DRx Cycle | | ms | 1,2,3 | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | |  | 1 | SR3.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| RMSI CORESET Reference Channel | |  | 1 | CR3.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| Control Channel RMC | |  | 1 | CCR.3.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| OCNG Patterns | |  | 1,2,3 | O P. 1 | | | | | | |
| SMTC Configuration | |  | 1,2,3 | SMTC pattern 1 | | | | | | |
| SSB Configuration | |  | 1 | SSB. 3 FR2 | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 1 | 120 | | | | | | |
| 2 | 480 | | | | | | |
| 3 | 960 | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | kHz | 1 | 120 | | | | | | |
| 2 | 480 | | | | | | |
| 3 | 960 | | | | | | |
| PRACH configuration | |  | 1,2,3 | FR2 PRACH configuration 1 | | | | | | |
| TRS configuration | |  | 1 | TRS.2.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| PDSCH/PDCCH TCI state | |  | 1,2,3 | TCI.State.2 | | | | | | |
| BWP configuraiton | Initial DL BWP |  | 1,2,3 | DLBWP.0.1 | | | | | | |
| Dedicated DL BWP |  | 1,2,3 | DLBWP.1.1 | | | | | | |
| Initial UL BWP |  | 1,2,3 | ULBWP.0.1 | | | | | | |
| Dedicated UL BWP |  | 1,2,3 | ULBWP.1.1 | | | | | | |
| 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) | |  |  |  | | |  | | | |
| Note2 | | dBm/15kHz |  | -104.7 | | | | | | |
| Note2 | | dBm/SCS | 1 | -95.7 | | | | | | |
| 2 | -89.7 | | | | | | |
| 3 | -86.7 | | | | | | |
|  | | dB |  | 6 | 6 | | -Infinity | | 7 | |
|  | | dB |  | 6 | 6 | | -Infinity | | 7 | |
| IoNote3 | | dBm/95.04 MHz Note4 |  | -59.7 | -59.7 | | -58.9 | | -58.9 | |
| dBm/380.16 MHz Note4 |  | -53.7 | -53.7 | | -52.9 | | -52.9 | |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | | |

##### A.7.3.1.10.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 772 ms from the beginning of time period T2.

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

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

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

Tinterrupt = 762 ms in the test. Tinterrupt is defined in clause 6.1.1.4.2.

This gives a total of 772 ms.

#### A.7.3.1.11 Inter-frequency handover from FR1 to FR2-2; unknown target cell

##### A.7.3.1.11.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR2-2 Inter frequency handover requirements specified in clause 6.1.1.4.

##### A.7.3.1.11.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.11.2-1 and A.7.3.1.11.2-1A, and the configuration for NR Cell1 and NR Cell2 are chosen independently. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.11.2-2, and A.7.3.1.11.2-3.

The test scenario comprises of carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.11.2-1: Inter-frequency handover from FR1 to FR2-2 test configurations for Cell1

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

**Table A.7.3.1.11.2-1A: Inter-frequency handover from FR1 to FR2-2 test configurations for Cell2**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode |
| 3 | NR 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  Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BWchannel) defined in each test configuration | |

Table A.7.3.1.11.2-2: General test parameters Inter-frequency handover from FR1 to FR2-2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A4-Offset | | dBm | -120 |  |
| 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 | ≤10 |  |

Table A.7.3.1.11.2-3: Cell specific test parameters for NR FR1-FR2-2 Inter frequency handover test case

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Config | Cell 1 | | Cell 2 | | |
|  | |  | T1 | T2 | T1 | | T2 |
| Assumption for UE beamsNote 6 | |  | 1,2,3 | - | | Rough | | |
| AoA setup | |  | 1,2,3 | - | | Setup 1 as defined in A.3.15 | | |
| NR RF Channel Number | |  | 1,2,3 | **1** | | **2** | | |
| Duplex mode | |  | 1 | FDD | | TDD | | |
|  | 2,3 | TDD | | TDD | | |
| TDD configuration | |  | 1 | - | | TBD | | |
|  | 2 | TDDConf.1.1 | | TBD | | |
|  | 3 | TDDConf.2.1 | | TBD | | |
| BWchannel | | MHz | 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | | |
| 2 | 10: NRB,c = 52 | | 400: NRB,c = 66 | | |
| 3 | 40: NRB,c = 106 | | 400: NRB,c = 33 | | |
| Data RBs allocated | |  | 1 | 52 | | 66 | | |
|  | 2 | 52 | | 66 | | |
|  | 3 | 106 | | 33 | | |
| DRx Cycle | | ms | 1,2,3 | Not Applicable | | Not Applicable | | |
| PDSCH Reference measurement channel | |  | 1 | SR.1.1 FDD | | SR3.1 TDD | | |
|  | 2 | SR.1.1 TDD | | TBD | | |
|  | 3 | SR2.1 TDD | | TBD | | |
| RMSI CORESET Reference Channel | |  | 1 | CR.1.1 FDD | | CR3.1 TDD | | |
|  | 2 | CR.1.1 TDD | | TBD | | |
|  | 3 | CR2.1 TDD | | TBD | | |
| Control Channel RMC | |  | 1 | CCR.1.1 FDD | | CCR.3.1 TDD | | |
|  | 2 | CCR.1.1 TDD | | TBD | | |
|  | 3 | CCR.2.1 TDD | | TBD | | |
| OCNG Patterns | |  | 1,2,3 | O P. 1 | | O P. 1 | | |
| SMTC Configuration | |  | 1 | SMTC.1 | | SMTC pattern 1 | | |
|  | |  | 2,3 | SMTC.2 | | SMTC pattern 1 | | |
| SSB Configuration | |  | 1 | SSB.1 FR1 | | SSB. 3 FR2 | | |
|  | 2 | SSB.2 FR1 | | TBD | | |
|  | 3 | SSB.2 FR1 | | TBD | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 1 | 15 | | 120 | | |
| 2 | 30 | | 480 | | |
| 3 | 30 | | 960 | | |
| PUCCH/PUSCH subcarrier spacing | | kHz | 1 | 15 | | 120 | | |
| 2 | 30 | | 480 | | |
| 3 | 30 | | 960 | | |
| PRACH configuration | |  | 1,2,3 | FR1 PRACH configuration 1 | | FR2 PRACH configuration 1 | | |
| TRS configuration | |  | 1 | TRS.1.1 FDD | | TRS.2.1 TDD | | |
|  | 2 | TRS.1.1 TDD | | TBD | | |
|  | 3 | TRS.1.2 TDD | | TBD | | |
| PDSCH/PDCCH TCI state | |  | 1,2,3 | - | | TCI.State.2 | | |
| BWP configuraiton | Initial DL BWP |  | 1,2,3 | DLBWP.0.1 | | DLBWP.0.1 | | |
| Dedicated DL BWP |  | 1,2,3 | LBWP.1.1 | | DLBWP.1.1 | | |
| Initial UL BWP |  | 1,2,3 | ULBWP.0.1 | | ULBWP.0.1 | | |
| Dedicated UL BWP |  | 1,2,3 | ULBWP.1.1 | | ULBWP.1.1 | | |
| 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) | |  |  |  | |  | | |
| Note2 | | dBm/15kHz |  | Link only, see clause A.3.7A | | -104.7 | | |
| Note2 | | dBm/SCS | 1 | -95.7 | | |
| 2 | -89.7 | | |
| 3 | -86.7 | | |
|  | | dB |  | -Infinity | 7 | |
|  | | dB |  | -Infinity | 7 | |
| IoNote3 | | dBm/95.04 MHz Note4 |  | -58.9 | -58.9 | |
| dBm/380.16 MHz Note4 |  | -52.9 | -52.9 | |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

##### A.7.3.1.11.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 772 ms from the beginning of time period T2.

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

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

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

Tinterrupt = 762 ms in the test. Tinterrupt is defined in clause 6.1.1.4.2.

This gives a total of 772 ms.

### A.7.3.2 RRC Connection Mobility Control

#### A.7.3.2.1 SA: RRC Re-establishment

##### A.7.3.2.1.1 Intra-frequency RRC Re-establishment in FR2

A.7.3.2.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.1.1-1, table A.7.3.2.1.1.1-2 and table A.7.3.2.1.1.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1 | Cell1 |  |
|  | Neighbour cells |  | 1 | Cell2 |  |
| Final condition | Active cell |  | 1 | Cell2 |  |
| RF Channel Number | |  | 1 | 1 |  |
| Time offset between cells | |  | 1 | 3 μs | Synchronous cells |
| N310 | | - | 1 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1 | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 1 | 5000 | RRC re-establishment timer |
| Access Barring Information | | - | 1 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR2 |  |
| SMTC configuration | |  | 1 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1 | OFF |  |
| PRACH configuration | |  | 1 | FR2 PRACH configuration 1 | Table A.3.8.3.1-1 |
| T1 | | s | 1 | 5 |  |
| T2 | | s | 1 | 4.84 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1 in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1.5 in TS 38.133 ) |
| T3 | | s | 1 | 5 |  |

Table A.7.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Assumption for UE beamsNote 4 |  |  | Rough | | | Rough | | |
| TDD configuration |  | 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1 | 24 | | | 24 | | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | | N/A | | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | | | N/A | | |
| OCNG Pattern |  | 1 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1 | SSB | | | SSB | | |
| AoA setup |  | 1 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
|  | dB | 1 | -0.12 | -infinity | -infinity | -3.46 | 2 | 2 |
| Note2 | dBm/15 kHz | 1 | -104.7 | | | | | |
| Note2 | dBm/SCS | 1 | -95.7 | | | | | |
|  | dB | 1 | 4 | -infinity | -infinity | 2 | 2 | 2 |
| SS-RSRP Note3 | dBm/SCS | 1 | -91.7 | -infinity | -infinity | -93.7 | -93.7 | -93.7 |
| Io | dBm/95.04 MHz | 1 | -59.64 | -62.59 | -62.59 | -59.94 | -62.59 | -62.59 |
| Propagation Condition |  | 1 | 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.  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 | | | | | | | | |

A.7.3.2.1.1.2 Test Requirements

he RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell shall be less than 5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

Nfreq = 1

Tidentify\_intra\_NR = 3520 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 4865 ms, allow 5 s in the test case.

##### A.7.3.2.1.2 Inter-frequency RRC Re-establishment in FR2

A.7.3.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.2.1-1, table A.7.3.2.1.2.1-2 and table A.7.3.2.1.2.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

Table A.7.3.2.1.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.3.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Value** | **Comment** |
| Initial condition | Active cell |  | 1 | Cell1 |  |
|  | Neighbour cells |  | 1 | Cell2 |  |
| Final condition | Active cell |  | 1 | Cell2 |  |
| RF Channel Number | |  | 1 | 1, 2 |  |
| Time offset between cells | |  | 1 | 3 μs | Synchronous cells |
| N310 | | - | 1 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1 | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 1 | 5000 | RRC re-establishment timer |
| Access Barring Information | | - | 1 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR2 |  |
| SMTC configuration | |  | 1 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1 | OFF |  |
| PRACH configuration | |  | 1 | FR2 PRACH configuration 1 | Table A.3.8.3.1-1 |
| T1 | | s | 1 | 5 |  |
| T2 | | s | 1 | 4.84 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1 in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1.5 in TS 38.133 ) |
| T3 | | s | 1 | 6 |  |

Table A.7.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Assumption for UE beamsNote 4 |  |  | Rough | | | Rough | | |
| AoA setup |  | 1 | Setup 3 as specified in clause A.3.15 | | | | | |
|  |  |  | AoA1 | | | AoA2 | | |
| TDD configuration |  | 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1 | 24 | | | 24 | | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | | N/A | | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | | | N/A | | |
| OCNG Pattern |  | 1 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1 | SSB | | | SSB | | |
| Note2 | dBm/15 kHz | 1 | -92.1 | | | -92.1 | | |
| Note2 | dBm/SCS | 1 | -83.1 | | | -83.1 | | |
|  | dB | 1 | 0 | -infinity | -infinity | -infinity | -infinity | 0 |
| BB Note 5 | dB | 1 | -1.01 | -infinity | -infinity | -infinity | -infinity | -1.01 |
| SSB\_RP Note3 | dBm/SCS | 1 | -83.1 | -infinity | -infinity | -infinity | -infinity | -83.1 |
| Io | dBm/95.04 MHz | 1 | -55.46 | -58.51 | -58.51 | -58.51 | -58.51 | -55.46 |
| Propagation Condition |  | 1 | AWGN | | | AWGN | | |
| Note 1: OCNG shall be used such that a constant total transmitted power is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Es/Iot, SSB\_RP and Io 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | |

A.7.3.2.1.2.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than 6 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

Nfreq = 2

Tidentify\_intra\_NR = 1600 ms

Tidentify\_inter\_NR = 2080 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 5025 ms, allow 6 s in the test case.

##### A.7.3.2.1.3 Intra-frequency RRC Re-establishment in FR2 without serving cell timing

###### A.7.3.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.3.1-1, table A.7.3.2.1.3.1-2 and table A.7.3.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.3.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1 | Cell1 |  |
|  | Neighbour cells |  | 1 | Cell2 |  |
| Final condition | Active cell |  | 1 | Cell2 |  |
| RF Channel Number | |  | 1 | 1 |  |
| Time offset between cells | |  | 1 | 3 μs | Synchronous cells |
| N310 | | - | 1 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1 | 6000 | Radio link failure timer configured by *RLF-TimersAndConstants* |
| T311 | | ms | 1 | 5000 | RRC re-establishment timer |
| Access Barring Information | | - | 1 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR2 |  |
| SMTC configuration | |  | 1 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1 | OFF |  |
| PRACH configuration | |  | 1 | FR2 PRACH configuration 1 | Table A.3.8.3.1-1 |
| T1 | | s | 1 | 5 |  |
| T2 | | s | 1 | 10.84 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1 in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1.5 in TS 38.133 ) |
| T3 | | s | 1 | 5 |  |

Table A.7.3.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Assumption for UE beamsNote 4 |  |  | Rough | | | Rough | | |
| TDD configuration |  | 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 FDD | | | CR.3.1 FDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 FDD | | | CCR.3.1 FDD | | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | | N/A | | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | | | N/A | | |
| OCNG Pattern |  | 1 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1 | SSB | | | SSB | | |
| AoA setup |  | 1 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
|  | dB | 1 | 5 | -infinity | -infinity | -infinity | -infinity | 5 |
| Note2 | dBm/15 kHz | 1 | -104.7 | | | | | |
| Note2 | dBm/SCS | 1 | -95.7 | | | | | |
|  | dB | 1 | 5 | -infinity | -infinity | -infinity | -infinity | 5 |
| SS-RSRP Note3 | dBm/SCS | 1 | -90.7 | -infinity | -infinity | -infinity | -infinity | -90.7 |
| Io | dBm/95.04 MHz | 1 | -60.52 | -66.71 | -60.52 | -60.52 | -66.71 | -60.52 |
| Propagation Condition |  | 1 | 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.  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 | | | | | | | | |

###### A.7.3.2.1.3.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

Nfreq = 1

Tidentify\_intra\_NR = 3520 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 4865 ms, allow 5 s in the test case.

##### A.7.3.2.1.4 Intra-frequency RRC Re-establishment in FR2-2

###### A.7.3.2.1.4.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2-2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.4.1-1, table A.7.3.2.1.4.1-2 and table A.7.3.2.1.4.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 480 kHz SSB SCS, 400MHz bandwidth, TDD duplex mode |
| 3 | NR 960 kHz SSB SCS, 400MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.3.2.1.4.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2-2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1,2,3 | Cell1 |  |
|  | Neighbour cells |  | 1,2,3 | Cell2 |  |
| Final condition | Active cell |  | 1,2,3 | Cell2 |  |
| RF Channel Number | |  | 1,2,3 | 1 |  |
| Time offset between cells | |  | 1,2,3 | 3 μs | Synchronous cells |
| N310 | | - | 1,2,3 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1,2,3 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1,2,3 | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 1,2,3 | 5000 | RRC re-establishment timer |
| Access Barring Information | | - | 1,2,3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1,2,3 | SSB.1 FR2 |  |
| SMTC configuration | |  | 1,2,3 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1,2,3 | OFF |  |
| PRACH configuration | |  | 1,2,3 | FR2 PRACH configuration 1 | Table A.3.8.3.1-1 |
| T1 | | s | 1,2,3 | 5 |  |
| T2 | | s | 1,2,3 | 4.84 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1 in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1.5 in TS 38.133 ) |
| T3 | | s | 1,2,3 | 5 |  |

Table A.7.3.2.1.4.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2-2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Assumption for UE beamsNote 4 |  | 1,2,3 | Rough | | | Rough | | |
| TDD configuration |  | 1,2,3 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1 | 24 | | | 24 | | |
| PDSCH RMC configuration |  | 1,2,3 | SR.3.1 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1,2,3 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1,2,3 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| TRS configuration |  | 1,2,3 | TRS.2.1 TDD | | | N/A | | |
| PDSCH/PDCCH TCI state |  | 1,2,3 | TCI.State.2 | | | N/A | | |
| OCNG Pattern |  | 1,2,3 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1,2,3 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1,2,3 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1,2,3 | SSB | | | SSB | | |
| AoA setup |  | 1,2,3 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
|  | dB | 1,2,3 | -0.12 | -infinity | -infinity | -3.46 | 2 | 2 |
| Note2 | dBm/15 kHz | 1,2,3 | -104.7 | | | | | |
| Note2 | dBm/SCS | 1 | -95.7 | | | | | |
| 2 | -95.7 | | | | | |
| 3 | -92.7 | | | | | |
|  | dB | 1,2,3 | 4 | -infinity | -infinity | 2 | 2 | 2 |
| SS-RSRP Note3 | dBm/SCS | 1 | -91.7 | -infinity | -infinity | -93.7 | -93.7 | -93.7 |
| 2 | TBD | TBD | TBD | TBD | TBD | TBD |
| 3 | TBD | TBD | TBD | TBD | TBD | TBD |
| Io | dBm/95.04 MHz | 1 | -59.64 | -62.59 | -62.59 | -59.94 | -62.59 | -62.59 |
| dBm/380.16 MHz | 2 | TBD | TBD | TBD | TBD | TBD | TBD |
| dBm/380.16 MHz | 3 | TBD | TBD | TBD | TBD | TBD | TBD |
| Propagation Condition |  | 1,2,3 | 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.  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 | | | | | | | | |

###### A.7.3.2.1.4.2 Test Requirements

he RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell shall be less than 5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

Nfreq = 1

Tidentify\_intra\_NR = 3520 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 4865 ms, allow 5 s in the test case.

##### A.7.3.2.1.5 Inter-frequency RRC Re-establishment in FR2-2

###### A.7.3.2.1.5.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR2-2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.5.1-1, table A.7.3.2.1.5.1-2 and table A.7.3.2.1.5.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

Table A.7.3.2.1.5.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 480 kHz SSB SCS, 400MHz bandwidth, TDD duplex mode |
| 3 | NR 960 kHz SSB SCS, 400MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.3.2.1.5.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR2-2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1,2,3 | Cell1 |  |
|  | Neighbour cells |  | 1,2,3 | Cell2 |  |
| Final condition | Active cell |  | 1,2,3 | Cell2 |  |
| RF Channel Number | |  | 1,2,3 | 1, 2 |  |
| Time offset between cells | |  | 1,2,3 | 3 μs | Synchronous cells |
| N310 | | - | 1,2,3 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1,2,3 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1,2,3 | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 1,2,3 | 5000 | RRC re-establishment timer |
| Access Barring Information | | - | 1,2,3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1,2,3 | SSB.1 FR2 |  |
| SMTC configuration | |  | 1,2,3 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1,2,3 | OFF |  |
| PRACH configuration | |  | 1,2,3 | FR2 PRACH configuration 1 | Table A.3.8.3.1-1 |
| T1 | | s | 1,2,3 | 5 |  |
| T2 | | s | 1,2,3 | 4.84 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1 in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1.5 in TS 38.133 ) |
| T3 | | s | 1,2,3 | 6 |  |

Table A.7.3.2.1.5.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR2-2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Assumption for UE beamsNote 4 |  |  | Rough | | | Rough | | |
| AoA setup |  | 1,2,3 | Setup 3 as specified in clause A.3.15 | | | | | |
|  |  |  | AoA1 | | | AoA2 | | |
| TDD configuration |  | 1,2,3 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1 | 24 | | | 24 | | |
| PDSCH RMC configuration |  | 1,2,3 | SR.3.1 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1,2,3 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1,2,3 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| TRS configuration |  | 1,2,3 | TRS.2.1 TDD | | | N/A | | |
| PDSCH/PDCCH TCI state |  | 1,2,3 | TCI.State.2 | | | N/A | | |
| OCNG Pattern |  | 1,2,3 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1,2,3 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1,2,3 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1,2,3 | SSB | | | SSB | | |
| Note2 | dBm/15 kHz | 1,2,3 | -92.1 | | | -92.1 | | |
| Note2 | dBm/SCS | 1 | -83.1 | | | -83.1 | | |
| 2 | TBD | | | TBD | | |
| 3 | TBD | | | TBD | | |
|  | dB | 1,2,3 | 0 | -infinity | -infinity | -infinity | -infinity | 0 |
| BB Note 5 | dB | 1,2,3 | -1.01 | -infinity | -infinity | -infinity | -infinity | -1.01 |
| SSB\_RP Note3 | dBm/SCS | 1 | -83.1 | -infinity | -infinity | -infinity | -infinity | -83.1 |
| 2 | TBD | TBD | TBD | TBD | TBD | TBD |
| 3 | TBD | TBD | TBD | TBD | TBD | TBD |
| Io | dBm/95.04 MHz | 1 | -55.46 | -58.51 | -58.51 | -58.51 | -58.51 | -55.46 |
| dBm/380.16 MHz | 2 | TBD | TBD | TBD | TBD | TBD | TBD |
| dBm/380.16 MHz | 3 | TBD | TBD | TBD | TBD | TBD | TBD |
| Propagation Condition |  | 1,2,3 | AWGN | | | AWGN | | |
| Note 1: OCNG shall be used such that a constant total transmitted power is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Es/Iot, SSB\_RP and Io 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | |

###### A.7.3.2.1.5.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than 6 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

Nfreq = 2

Tidentify\_intra\_NR = 1600 ms

Tidentify\_inter\_NR = 2080 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 5025 ms, allow 6 s in the test case.

##### A.7.3.2.1.6 Intra-frequency RRC Re-establishment in FR2-2 without serving cell timing

###### A.7.3.2.1.6.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2-2 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.6.1-1, table A.7.3.2.1.6.1-2 and table A.7.3.2.1.6.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.7.3.2.1.6.1-1: Supported test configurations**

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 480 kHz SSB SCS, 400MHz bandwidth, TDD duplex mode |
| 3 | NR 960 kHz SSB SCS, 400MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.3.2.1.6.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2-2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1,2,3 | Cell1 |  |
|  | Neighbour cells |  | 1,2,3 | Cell2 |  |
| Final condition | Active cell |  | 1,2,3 | Cell2 |  |
| RF Channel Number | |  | 1,2,3 | 1 |  |
| Time offset between cells | |  | 1,2,3 | 3 μs | Synchronous cells |
| N310 | | - | 1,2,3 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1,2,3 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1,2,3 | 6000 | Radio link failure timer configured by *RLF-TimersAndConstants* |
| T311 | | ms | 1,2,3 | 5000 | RRC re-establishment timer |
| Access Barring Information | | - | 1,2,3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1,2,3 | SSB.1 FR2 |  |
| SMTC configuration | |  | 1,2,3 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1,2,3 | OFF |  |
| PRACH configuration | |  | 1,2,3 | FR2 PRACH configuration 1 | Table A.3.8.3.1-1 |
| T1 | | s | 1,2,3 | 5 |  |
| T2 | | s | 1,2,3 | 10.84 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1 in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1.5 in TS 38.133 ) |
| T3 | | s | 1,2,3 | 5 |  |

Table A.7.3.2.1.6.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2-2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Assumption for UE beamsNote 4 |  |  | Rough | | | Rough | | |
| TDD configuration |  | 1,2,3 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| PDSCH RMC configuration |  | 1,2,3 | SR.3.1 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1,2,3 | CR.3.1 FDD | | | CR.3.1 FDD | | |
| Dedicated CORESET RMC configuration |  | 1,2,3 | CCR.3.1 FDD | | | CCR.3.1 FDD | | |
| TRS configuration |  | 1,2,3 | TRS.2.1 TDD | | | N/A | | |
| PDSCH/PDCCH TCI state |  | 1,2,3 | TCI.State.2 | | | N/A | | |
| OCNG Pattern |  | 1,2,3 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1,2,3 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1,2,3 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1,2,3 | SSB | | | SSB | | |
| AoA setup |  | 1,2,3 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
|  | dB | 1,2,3 | 5 | -infinity | -infinity | -infinity | -infinity | 5 |
| Note2 | dBm/15 kHz | 1,2,3 | -104.7 | | | | | |
| Note2 | dBm/SCS | 1 | -95.7 | | | | | |
| 2 | -95.7 | | | | | |
| 3 | -92.7 | | | | | |
|  | dB | 1,2,3 | 5 | -infinity | -infinity | -infinity | -infinity | 5 |
| SS-RSRP Note3 | dBm/SCS | 1 | -90.7 | -infinity | -infinity | -infinity | -infinity | -90.7 |
| 2 | TBD | TBD | TBD | TBD | TBD | TBD |
| 3 | TBD | TBD | TBD | TBD | TBD | TBD |
| Io | dBm/95.04 MHz | 1 | -60.52 | -66.71 | -60.52 | -60.52 | -66.71 | -60.52 |
| dBm/380.16 MHz | 2 | TBD | TBD | TBD | TBD | TBD | TBD |
| dBm/380.16 MHz | 3 | TBD | TBD | TBD | TBD | TBD | TBD |
| Propagation Condition |  | 1,2,3 | 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.  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 | | | | | | | | |

###### A.7.3.2.1.6.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

Nfreq = 1

Tidentify\_intra\_NR = 3520 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 4865 ms, allow 5 s in the test case.

#### A.7.3.2.2 Random Access

##### A.7.3.2.2.1 4-step RA type c ontention based random access test in FR2 for NR Standalone

A.7.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.1.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.1.1-2 and Table A.7.3.2.2.1.1-3.

Table A.7.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR2 for NR Standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for NR Standalone

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Comments |
| SSB Configuration | Config 1 |  | SSB.1 FR2 | As defined in A.3.10 |
| CSI-RS for tracking | Config 1 |  | TRS.2.1 TDD |  |
| Duplex Mode for Cell 1 | Config 1 |  | TDD |  |
| TDD Configuration | Config 1 |  | TDDConf.3.1 | As defined in A.3.1.4 |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |  |
| Data RBs allocated | Config 1 |  | 24 |  |
| OCNG Pattern Note 1 | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH Reference Channel Note 2 | Config 1 |  | SR.3.1 TDD | As defined in A.3.1.1. |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD | As defined in A.3.1.2 |
| NR RF Channel Number | |  | 1 |  |
| EPRE ratio of PSS to SSS | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | dB |  |  |
| ss-PBCH-BlockPower | | dBm/ SCS | +20 +ΔUL | As defined in TS 38.331 [2].  ΔUL is derived from the uplink calibration process Note 3 |
| Configured UE transmitted power () | | dBm | maximum value configurable for certain power class | As defined in clause 6.2.4 in TS 38.101-2 [19] |
| PRACH Configuration | |  | FR2 PRACH configuration 1 | As defined in A.3.8.3, with exceptions as defined below |
| rsrp-ThresholdSSB | | dBm | RSRP\_69 +ΔDL | RSRP\_69 corresponds to -88dBm. ΔDL is derived from the downlink calibration process Note 4 |
| preambleReceivedTargetPower | | dBm | -100 | As defined in TS 38.331 [2] |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: The ΔUL value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, *preambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.  Note 4: The ΔDL value is calculated as (RSRP\_REP – RSRP\_76), where RSRP\_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP\_x, x is treated as a positive integer value. | | | | |

Table A.7.3.2.2.1.1-3: OTA-related test parameters for contention based random access test in FR2 for NR Standalone

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Comments |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Assumption for UE beamsNote 3 | |  | Rough |  |
| SSB with index 0 | Es Note1 | dBm/SCS | -80.6 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
| SSB\_RP | dBm/SCS | -80.6 |
|  | Es/IotBB | dB | 21.09 |  |
| Io | dBm/95.04 MHz | -56.01 | Io in symbols containing SSB index 0 |
| SSB with index 1 | Es Note1 | dBm/SCS | -95.0 | Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB* |
| SSB\_RP | dBm/SCS | -95.0 |
|  | Es/IotBB | dB | 6.69 |  |
| Io | dBm/95.04 MHz | -70.41 | Io in symbols containing SSB index 1 |
| Propagation Condition | | - | AWGN |  |
| Note 1: No articial noise is applied in this test.  Note 2: Void.  Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

A.7.3.2.2.1.2 Test Requirements

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

A.7.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

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

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.7.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.7.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

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

A.7.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

##### A.7.3.2.2.2 4-step RA type n on-contention based random access test in FR2 for NR Standalone

A.7.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.2.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.2.1-2 and Table A.7.3.2.2.2.1-3 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2). Test 2 is only applicable to UE which supports csi-RSRP-AndRSRQ-MeasWithSSB or csi-RSRP-AndRSRQ-MeasWithoutSSB.

Table A.7.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR2 for NR Standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR2 for NR Standalone

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | | Test-1 | | Test-2 | | Comments | |
| SSB Configuration | Config 1 | |  | | SSB.1 FR2 | | SSB.1 FR2 | | As defined in A.3.10 | |
| CSI-RS for tracking | | Config 1 | |  | | TRS.2.1 TDD | | TRS.2.1 TDD | |  | |
| CSI-RS Configuration | Config 1 | |  | | N/A | | CSI-RS.3.1 TDD | | As defined in A.3.1.4 | |
| Duplex Mode for Cell 2 | Config 1 | |  | | TDD | | TDD | |  | |
| TDD Configuration | Config 1 | |  | | TDDConf.3.1 | | TDDConf.3.1 | |  | |
| BWchannel | Config 1 | | MHz | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |  | |
| Data RBs allocated | Config 1 | |  | | 24 | | 24 | |  | |
| OCNG Pattern Note 1 | | |  | | OP.3 | | OP.3 | | As defined in A.3.2.1. | |
| PDSCH Reference Channel Note 2 | Config 1 | |  | | SR3.1 TDD | | SR3.1 TDD | | As defined in A.3.1.1. | |
| NR RF Channel Number | | |  | | 1 | | 1 | |  | |
| EPRE ratio of PSS to SSS | | | dB | | 0 | | 0 | |  | |
| EPRE ratio of PBCH\_DMRS to SSS | | | dB | |  | |  | |  | |
| EPRE ratio of PBCH to PBCH\_DMRS | | | dB | |  | |  | |  | |
| EPRE ratio of PDCCH\_DMRS to SSS | | | dB | |  | |  | |  | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | dB | |  | |  | |  | |
| EPRE ratio of PDSCH\_DMRS to SSS | | | dB | |  | |  | |  | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | dB | |  | |  | |  | |
| ss-PBCH-BlockPower | | | dBm/ SCS | | +20 +ΔUL | | +20 +ΔUL | | As defined in TS 38.331 [2].  ΔUL is derived from the uplink calibration process Note 3 | |
| Configured UE transmitted power () | | | dBm | | maximum value configurable for certain power class | | maximum value configurable for certain power class | | As defined in clause 6.2.4 in TS 38.101-2 [19] | |
| PRACH Configuration | | |  | | FR2 PRACH configuration 2 | | FR2 PRACH configuration 3 | | As defined in A.3.8.3, with exceptions as defined below. | |
| rsrp-ThresholdSSB | | | dBm | | RSRP\_69 +ΔDL | | RSRP\_69 +ΔDL | | RSRP\_69 corresponds to -88dBm. ΔDL is derived from the downlink calibration process Note 4 | |
| preambleReceivedTargetPower | | | dBm | | -100 | | -100 | | As defined in TS 38.331 [2] | |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: The ΔUL value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, *preambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.  Note 4: The ΔDL value is calculated as (RSRP\_REP – RSRP\_76), where RSRP\_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP\_x, x is treated as a positive integer value. | | | | | | | | | | |

**Table A.7.3.2.2.2.1-3: OTA-related test parameters for non-contention based random access test in FR2 for NR Standalone**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test-1** | **Test-2** | **Comments** |
| AoA setup | |  | Setup 1 | Setup 1 | As defined in A.3.15.1 |
| Assumption for UE beamsNote 3 | |  | Rough | Rough |  |
| SSB with index 0 | Es Note1 | dBm/SCS | -80.6 | -80.6 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
|  | SSB\_RP | dBm/SCS | -80.6 | -80.6 |  |
|  | Es/IotBB | dB | 21.09 | 21.09 |  |
|  | Io | dBm/95.04 MHz | -56.01 | -56.01 | Io in symbols containing SSB index 0 |
| SSB with index 1 | Es Note1 | dBm/SCS | -95.0 | -95.0 | Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB* |
|  | SSB\_RP | dBm/SCS | -95.0 | -95.0 |  |
|  | Es/IotBB | dB | 6.69 | 6.69 |  |
|  | Io | dBm/95.04 MHz | -70.41 | -70.41 | Io in symbols containing SSB index 1 |
| Propagation Condition | | - | AWGN | AWGN |  |
| Note 1: No articial noise is applied in this test.  Note 2: void.  Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.7.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.7.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble tranmsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occassions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble tranmsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occassions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

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

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

##### A.7.3.2.2.3 2-step RA type contention based random access test in FR2 for NR Standalone

A.7.3.2.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the 2-step RA type random access procedure is according to the requirements and that the MsgA PRACH, MsgA PUSCH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.3 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.3.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.3.1-2 and Table A.7.3.2.2.3.1-3.

Table A.7.3.2.2.3.1-1: Supported test configurations for 2-step RA type contention based random access test in FR2 for NR Standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.3.2.2.3.1-2: General test parameters for 2-step RA type contention based random access test in FR2 for NR Standalone

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Comments |
| SSB Configuration | Config 1 |  | SSB.1 FR2 | As defined in A.3.10 |
| Duplex Mode for Cell 1 | Config 1 |  | TDD |  |
| TDD Configuration | Config 1 |  | TDDConf.3.1 | As defined in A.3.1.4 |
| BWchannel | Config 1 | MHz | 100: NRB,c = 24 |  |
| OCNG Pattern Note 1 | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH Reference Channel Note 2 | Config 1 |  | SR.3.1 TDD | As defined in A.3.1.1. |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD | As defined in A.3.1.2 |
| NR RF Channel Number | |  | 1 |  |
| EPRE ratio of PSS to SSS | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | dB |  |  |
| ss-PBCH-BlockPower | | dBm/ SCS | +20 +ΔUL | As defined in TS 38.331 [2].  ΔUL is derived from the uplink calibration process Note 3 |
| Configured UE transmitted power () | | dBm | maximum value configurable for certain power class | As defined in clause 6.2.4 in TS 38.101-2 [19] |
| MsgA Configuration | |  | FR2 MsgA configuration 1 | As defined in A.3.20.3, with exceptions as defined below |
| *msgA-RSRP-ThresholdSSB* | | dBm | RSRP\_69 +ΔDL | RSRP\_69 corresponds to -88dBm. ΔDL is derived from the downlink calibration process Note 4 |
| preambleReceivedTargetPower | | dBm | -100 | As defined in TS 38.331 [2] |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: The ΔUL value is calculated as -ROUND(PMsgA0 -1), where PMsgA0 is the measured first MsgA PRACH power with -80.6dBm/SCS applied, *msgA-PreambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send MsgA.  Note 4: The ΔDL value is calculated as (RSRP\_REP – RSRP\_76), where RSRP\_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP\_x, x is treated as a positive integer value. | | | | |

Table A.7.3.2.2.3.1-3: OTA-related test parameters for 2-step RA type contention based random access test in FR2 for NR Standalone

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Comments |
| AoA setup | |  | Setup 2b | As defined in A.3.15.1 |
| Assumption for UE beamsNote 2 | |  | Rough |  |
| SSB with index 0 | Es Note1 | dBm/SCS | -80.6 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  | SSB\_RP | dBm/SCS | -80.6 |
|  | Es/IotBB | dB | 21.09 |  |
|  | Io | dBm/95.04 MHz | -56.01 | Io in symbols containing SSB index 0 |
| SSB with index 1 | Es Note1 | dBm/SCS | -95.0 | Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB* |
|  | SSB\_RP | dBm/SCS | -95.0 |
|  | Es/IotBB | dB | 6.69 |  |
|  | Io | dBm/95.04 MHz | -70.41 | Io in symbols containing SSB index 1 |
| Propagation Condition | | - | AWGN |  |
| Note 1: No articial noise is applied in this test.  Note 2: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

A.7.3.2.2.3.2 Test Requirements

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

A.7.3.2.2.3.2.1 MsgA Transmission

To test the UE behavior specified in Clause 6.2.2.3.1.1 the System Simulator shall receive the MsgA with a preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *msgA-RSRP-ThresholdSSB*.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first MsgA preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.3.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2.3.1.2 the System Simulator shall transmit a MsgB containing a fallbackRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble.

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

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit MsgA with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if all received MsgB’s contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first MsgA PRACH shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.3.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.1.3 the System Simulator shall transmit a MsgB containing a fallbackRAR message and Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first MsgA PRACH shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be  dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

##### A.7.3.2.2.4 2-step RA type n on-contention based random access test in FR2 for NR Standalone

A.7.3.2.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the MsgA PRACH, MsgA PUSCH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.3 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.4.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.4.1-2 and Table A.7.3.2.2.4.1-3.

Table A.7.3.2.2.4.1-1: Supported test configurations for non-contention based random access test for 2-step RA type in FR2 for NR Standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.3.2.2.4.1-2: General test parameters for non-contention based random access test for 2-step RA type in FR2 for NR Standalone

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Comments |
| SSB Configuration | Config 1 |  | SSB.1 FR2 | As defined in A.3.10 |
| Duplex Mode for Cell 2 | Config 1 |  | TDD |  |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |  |
| BWchannel | Config 1 | MHz | 100: NRB,c = 24 |  |
| OCNG Pattern Note 1 | |  | OP.3 | As defined in A.3.2.1. |
| PDSCH Reference Channel Note 2 | Config 1 |  | SR3.1 TDD | As defined in A.3.1.1. |
| NR RF Channel Number | |  | 1 |  |
| EPRE ratio of PSS to SSS | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | dB |  |  |
| ss-PBCH-BlockPower | | dBm/ SCS | +20 +ΔUL | As defined in TS 38.331 [2].  ΔUL is derived from the uplink calibration process Note 3 |
| Configured UE transmitted power (PCMAX,f,c) | | dBm | maximum value configurable for certain power class | As defined in clause 6.2.4 in TS 38.101-2 [19] |
| MsgA Configuration | |  | FR2 MsgA configuration 2 | As defined in A.3.20.3, with exceptions as defined below. |
| msgA-RSRP-ThresholdSSB | | dBm | RSRP\_69 +ΔDL | RSRP\_69 corresponds to -88dBm. ΔDL is derived from the downlink calibration process Note 4 |
| msgA-PreambleReceivedTargetPower | | dBm | -100 | As defined in TS 38.331 [2] |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: The ΔUL value is calculated as -ROUND(PMsgA0 -1), where PMsgA0 is the measured first MsgA PRACH power with -80.6dBm/SCS applied, *msgA-PreambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send MsgA.  Note 4: The ΔDL value is calculated as (RSRP\_REP – RSRP\_76), where RSRP\_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP\_x, x is treated as a positive integer value. | | | | |

Table A.7.3.2.2.4.1-3: OTA-related test parameters for non-contention based random access test for 2-step RA type in FR2 for NR Standalone

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Comments |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Assumption for UE beams Note 2 | |  | Rough |  |
| SSB with index 0 | Es Note1 | dBm/SCS | -80.6 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  | SSB\_RP | dBm/SCS | -80.6 |
|  | Es/IotBB | dB | 21.09 |  |
|  | Io | dBm/95.04 MHz | -56.01 | Io in symbols containing SSB index 0 |
| SSB with index 1 | Es Note1 | dBm/SCS | -95.0 | Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB* |
|  | SSB\_RP | dBm/SCS | -95.0 |
|  | Es/IotBB | dB | 6.69 |  |
|  | Io | dBm/95.04 MHz | -70.41 | Io in symbols containing SSB index 1 |
| Propagation Condition | | - | AWGN |  |
| Note 1: No artificial noise is applied in this test.  Note 2: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

A.7.3.2.2.4.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.7.3.2.2.4.2.1 MsgA Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.3.2.1 for MsgA transmission, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the MsgA which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the MsgA on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given first by the *msgA-SSB-SharedRO-MaskIndex* if configured, or next by the *ra-ssb-OccasionMaskIndex* if configured.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.4.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2.3.2.2 the System Simulator shall transmit a MsgB containing a successRAR MAC subPDU corresponding to the transmitted Random Access Preamble after 3 MsgA transmissions have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for MsgB if the MsgB contains a successRAR MAC subPDU corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA transmission power if all received Random Access Response Reception has not been considered as successful.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.4.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.2.3 the System Simulator shall transmit a MsgB corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA transmission power when the backoff time expires if no MsgB is received within the MsgB Response window configured in *RACH-ConfigGenericTwoStepRA*.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.7.3.2.3 SA: RRC Connection Release with Redirection

##### A.7.3.2.3.1 Redirection from NR in FR2 to NR in FR2

A.7.3.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3.2.1.

A.7.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.7.3.2.3.1.2-2, and A.7.3.2.3.1.2-3.

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.

Table A.7.3.2.3.1.2-1: Redirection from NR to NR test configurations

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.3.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| 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 | 3.2 |  |

Table A.7.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 2 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| Assumption for UE beamsNote 6 | | |  | Rough | | | | Rough | | |
| AoA setup | | |  | Setup 1as defined in A.3.15 | | | | | | |
| NR RF Channel Number | | |  | 1 | | | | 2 | | |
| Duplex mode | | |  | TDD | | | | | | |
| TDD configuration | | |  | TDDConf.3.1 | | | | | | |
| BWchannel | | | MHz | 100: NRB,c = 66 | | | | | | |
| BWP BW | | | MHz | 100: NRB,c = 66 | | | | | | |
| Data RBs allocated | | |  | 66 | | | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | | |  | SR3.1 TDD | | | | | | |
| RMSI CORESET Reference Channel | | |  | CR3.1 TDD | | | | | | |
| Control Channel RMC | | |  | CCR.3.1 TDD | | | | | | |
| OCNG Patterns | | |  | O P. 1 | | | | | | |
| SMTC configuration | | |  | SMTC.1 FR2 | | | | | | |
| SSB Configuration | | |  | SSB.3 FR2 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| PRACH configuration | | |  | FR2 PRACH configuration 1 | | | | | | |
| TRS configuration | | |  | TRS.2.1 TDD | | | | | | |
| PDSCH/PDCCH TCI state | | |  | TCI.State.2 | | | | | | |
| 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 | | | 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 | -104.7 | | | -104.7 | | | |
| Note2 |  | | dBm/SCS | -95.7 | | | -95.7 | | | |
|  | | | dB | 5 | 5 | | -Infinity | | 5 | |
|  | | | dB | 5 | 5 | | -Infinity | | 5 | |
| IoNote3 |  | | dBm/  BW | -60.5 | -60.5 | | -66.7 | | -60.5 | |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | | |

A.7.3.2.3.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 3160 ms from the beginning of time period T2.

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 = TRRC\_procedure\_delay + Tidentify-NR + TSI-NR + TRACH,

where:

TRRC\_procedure\_delay = 110 ms in the test.

Tidentify-NR = 1760 ms in the test.

TSI-NR = 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 = 10 ms in the test.

This gives a total of 3160 ms.

### A.7.3.3 Conditional Handover

#### A.7.3.3.1 Intra-frequency conditional handover from FR2 to FR2

##### A.7.3.3.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 intra frequency conditional handover requirements specified in clause 6.1.4.4.

##### A.7.3.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.3.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.3.2.2-2, and A.7.3.3.2.2-3.

The test scenario comprises of two cells. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. NR shall configure a condition implying handover to cell 2 during T1, at a time earlier than TRRC before the beginning of T2. Starting T2, cell 2 becomes detectable.

Table A.7.3.3.1.2-1: Intra-frequency conditional handover from FR2 to FR2 test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.3.3.1.2-2: General test parameters for conditional Intra-frequency handover from FR2 to FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A3-Offset for condition | | dBm | -1 | Trigger HO to cell which may be measured as -1dB relative to cell 1. Actual SS-RSRP is 5dB stronger. |
| 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 |  |

Table A.7.3.3.1.2-3: Cell specific test parameters for NR FR2-FR2 conditional Intra frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 2 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| NR RF Channel Number | | |  | 1 | | | | 1 | | |
| AoA setup | | |  | Setup 1 as defined in A.3.15 | | | | | | |
| Assumption for UE beamsNote 6 | | |  | Rough | | | | | | |
| Duplex mode | | |  | TDD | | | | | | |
| TDD configuration | | |  | TDDConf.3.1 | | | | | | |
| BWchannel | | | MHz | 100: NRB,c = 66 | | | | | | |
| BWP BW | | | MHz | 100: NRB,c = 66 | | | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | | |  | SR3.1 TDD | | | | | | |
| CORESET Reference Channel | | |  | CR3.1 TDD | | | | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | | | |
| SMTC Configuration | | |  | SMTC pattern 1 | | | | | | |
| SSB Configuration | | |  | SSB.1 FR2 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| PRACH configuration | | |  | FR2 PRACH configuration 1 | | | | | | |
| TRS configuration | | |  | TRS.2.1 TDD | | | | | | |
| TCI configuration | | |  | CSI-RS.Config.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 | | | | | | |
| 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) | | |  |  | | |  | | | |
| Note2 | | | dBm/15kHz | -104.7 | | | -104.7 | | | |
| Note2 | Config 1 | | dBm/SCS | -95.7 | | | -95.7 | | | |
| Note 8 | | | dB | 5.03 | -5.41 | | -Infinity | | 3.81 | |
|  | | | dB | 6 | 6 | | -Infinity | | 11 | |
| IoNote3 | Config 1 | | dBm/  BW | -59.7 | -54.2 | | -59.7 | | -54.2 | |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 7: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for infomation purposes. They are not settable parameters themseleves.  Note 8: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated REFSENS requirement in TS 38.101-2 [19] clause 7.3.2, and an allowance of 1dB for UE multi-band relaxation factor ΔMBS specified in TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | | | |

##### A.7.3.3.1.2.3 Test Requirements

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

The UE shall start to transmit the PRACH to Cell 2 less than Tmeasure + Tinterrupt + TCHO\_execution =1600+62+10=1672 ms (power class 1) or 1080+62+10 =1152 (PC2/3/4) 62 ms=1152 ms (power classes 2,3 and 4) from the start of T2 and the interruption during T2 shall not exceeed Tinterrupt=Tprocessing + TIU + T∆ + Tmargin =40+20+2 = 62ms excluding any transmissions which do not occur due to scheduling restrictions.

#### A.7.3.3.2 Inter-frequency conditional handover from FR2 to FR2; unknown target cell

##### A.7.3.3.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 inter frequency conditional handover requirements specified in clause 6.1.4.4.

##### A.7.3.3.2.2 Test Parameters

Supported test configurations are shown in table A.7.3.3.3.2-1. Both conditional handover delay and interruption length are tested by using the parameters in table A.7.3.3.3.2-2, and A.7.3.3.3.2-3.

The test scenario comprises of two carriers and one cell on each carrier. Gap pattern ID gp0 is configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. NR shall configure a condition implying handover to cell 2 during T1, at a time earlier than TRRC before the beginning of T2. At the start of T2, cell 2 becomes detectable and meets the handover condition.

Table A.7.3.3.2.2-1: Inter-frequency conditional handover from FR2 to FR2 test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.3.3.2.2-2: General test parameters Inter-frequency conditional handover from FR2 to FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A3-Offset for handovercondition | | dB | FFS |  |
| 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 | ≤7 |  |

Table A.7.3.3.2.2-3: Cell specific test parameters for NR FR2-FR2 Inter frequency conditional handover test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 2 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| NR RF Channel Number | | |  | 1 | | | | 2 | | |
| AoA setup | | |  | Setup 1 as defined in A.3.15 | | | | | | |
| Assumption for UE beamsNote 6 | | |  | Rough | | | | | | |
| Duplex mode | | |  | TDD | | | | | | |
| TDD configuration | | |  | TDDConf.3.1 | | | | | | |
| BWchannel | | | MHz | 100: NRB,c = 66 | | | | | | |
| BWP BW | | | MHz | 100: NRB,c = 66 | | | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | | | |
| Gap pattern ID | | |  | gp0 | | | | | | |
| PDSCH Reference measurement channel | | |  | SR3.1 TDD | | | | | | |
| CORESET Reference Channel | | |  | CR3.1 TDD | | | | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | | | |
| SMTC Configuration | | |  | SMTC pattern 1 | | | | | | |
| SSB Configuration | | |  | SSB.1 FR2 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| PRACH configuration | | |  | FR2 PRACH configuration 1 | | | | | | |
| TRS configuration | | |  | TRS.2.1 TDD | | | | | | |
| TCI configuration | | |  | CSI-RS.Config.0 | | | | | | |
| BWP configuraiton | | 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 | | | 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 | -104.7 | | | -104.7 | | | |
| Note2 | Config 1,2 | | dBm/SCS | -95.7 | | | -95.7 | | | |
|  | Config 3 | |  | -95.7 | | | -95.7 | | | |
|  | | | dB | 5 | 5 | | -Infinity | | 5 | |
|  | | | dB | 5 | 5 | | -Infinity | | 5 | |
| IoNote3 | Config 1,2 | | dBm/  BW | -60.5 | -60.5 | | -66.7 | | -60.5 | |
|  | Config 3 | | dBm/  BW | -60.5 | -60.5 | | -66.7 | | -60.5 | |
| Propagation condition | | | - | AWGN | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | | |

##### A.7.3.3.2.3 Test Requirements

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

The UE shall start to transmit the PRACH to Cell 2 less than Tmeasure + Tinterrupt + TCHO\_execution = 6720+62+10ms=6792 ms (power class 1) or 4160+62+10ms =4232ms (power classes 2,3 and 4) from the start of T2 and the interruption during T2 shall not exceeed Tinterrupt=Tprocessing + TIU + T∆ + Tmargin =40+20+2 = 62ms excluding any transmissions which do not occur due to scheduling restrictions. excluding any transmissions which do not occur due to scheduling restrictions.

## A.7.4 Timing

### A.7.4.1 UE transmit timing

#### A.7.4.1.1 NR UE Transmit Timing Test for FR2

##### A.7.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb 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. *highSpeedMeasFlagFR2-r17* is broadcast to UE supporting power class 6. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 7.4.1.1.1-1.

Table A.7.4.1.1.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz |

For this test a single NR cell is used. Tables A.7.4.1.1.1-2 and A.7.4.1.1.1-2A define 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 A.7.4.1.1.1-3.

Table A.7.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test1 | | | Test2 | |
| SSB ARFCN |  | 1 | Freq1 | | | Freq1 | |
| TDD configuration |  | 1 | | TDDConf.3.1 | | | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | | | |
| Data RBs allocated |  | 1 | 66 | | | | |
| Initial BWP Configuration |  | 1 | DLBWP.0.1  ULBWP.0.1 | | | | |
| Dedicated BWP Configuration |  | 1 | DLBWP.1.1  ULBWP.1.1 | | | | |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | | | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | | | | |
| DRx Cycle | ms | 1 | N/A | | | | DRX.8Note5 |
| PDSCH Reference measurement channel |  | 1 | SR.3. 3 TDD | | | | |
| RMSI CORESET Reference Channel |  | 1 | CR.3. 2 TDD | | | | |
| Dedicated CORESET Reference Channel |  | 1 | CCR.3. 7 TDD | | | | |
| OCNG Patterns |  | 1 | OP.1 | | | | |
| SSB Configuration |  | 1 | SSB.4 FR2 | | | | |
| SMTC Configuration |  | 1 | SMTC.1 | | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1 | 120 | | | | |
| EPRE ratio of PSS to SSS | dB | 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) |  |  |  | | |  | |
| Propagation condition |  | 1 | AWGN | | | | |
| SRS Config |  | 1 | 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: Void  Note 3: Void  Note 4: Void  Note 5: DRx related parameters are given in Table A.3.3.8-1  Note 6: SRS configs are given in Table A.7.4.1.1.1-3 | | | | | | | |

Table A.7.4.1.1.1-2A: OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | Test 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 6 |  | Fine | |
| Note1 | dBm/15kHzNote4 | -112 | |
| Note1 | dBm/SCSNote3 | -100 | |
|  | dB | 4 | |
| SS-RSRPNote2 | dBm/SCS Note4 | -96 | |
|  | dB | 4 | |
| IoNote2 | dBm/95.04 MHz Note4 | -68.5 | |
| 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: SS B\_RP 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: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | |

Table A.7.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 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 | 17 | 17 | Matches NRB,c |
|  | freqHopping  b-SRS | 0 | 0 |  |
|  | freqHopping  b-hop | 0 | 0 |  |
|  | groupOrSequenceHopping | Neither | Neither |  |
|  | resourceType | Periodic | Periodic |  |
|  | periodicityAndOffset-p | sl1, 0 | sl2560, 4 | Offset to align with DRx periodicity |
|  | sequenceId | 0 | 0 | Any 10 bit number |

Table A.7.4.1.1.1-4: Void

##### A.7.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC\_CONNECTED for every test case.

Following will be the test sequence for this test:

1) Setup NR PCell according to parameters given in Table A.7.4.1.1.1-1.

2) After connection set up with the cell, the test equipment will verify that 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 13792

b. The Te values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1

3) The test system shall adjust the timing of the DL path by values given in Table A.7.4.1.1.2-1

Table A.7.4.1.1.2-1 Adjustment Value for DL Timing

|  |  |  |
| --- | --- | --- |
| SCS of SSB signals (kHz) | Adjustment Value | |
|  | Test1 | Test2 |
| 240 | +8\*64Tc | +4\*64Tc |

4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within (NTA + NTA\_offset) ×Tc ± Te respective to the first path (in time) of DL SSB used by the UE to determine downlink timing is received from the reference cell at the UE antenna. Skip this step for test 2 with DRX confiured.

5) The test system shall verify that the UE transmit timing offset stays within (NTA + NTA\_offset) ×Tc ± Te of the first path (in time) of DL SSB used by the UE to determine downlink timing is received from the reference cell at the UE antenna. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

#### A.7.4.1.2 NR UE Transmit Timing Test for FR2-2

##### A.7.4.1.2.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb 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 clause 7.1.2.

Supported test configurations are shown in Table A.7.4.1.2.1-1.

**Table A.7.4.1.2.1-1: Supported test configurations for FR2 PCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |
| Note: The UE is required to be tested in the configuration with the largest supported SCS | |

For this test a single NR cell is used. Tables A.7.4.1.2.1-2 and A.7.4.1.2.1-2A define 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 A.7.4.1.2.1-3.

**Table A.7.4.1.2.1-2: Cell Specific Test Parameters for UL Transmit Timing test**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Test1** | | | **Test2** | |
| SSB ARFCN |  | 1 | Freq1 | | | Freq1 | |
| TDD configuration |  | 1 | | TBD | | | |
|  | 2 | | TBD | | | |
|  | 3 | | TBD | | | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | | | |
| 2 | 400: NRB,c = 66 | | | | |
| 3 | 400: NRB,c = 33 | | | | |
| Data RBs allocated |  | 1 | 66 | | | | |
|  | 2 | 66 | | | | |
|  | 3 | 33 | | | | |
| Initial BWP Configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 | | | | |
| Dedicated BWP Configuration |  | 1,2,3 | DLBWP.1.1  ULBWP.1.1 | | | | |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | | | |
|  | 2 | TBD | | | | |
|  | 3 | TBD | | | | |
| PDSCH/PDCCH TCI state |  | 1,2,3 | TCI.State.2 | | | | |
| DRx Cycle | ms | 1,2,3 | N/A | | | | DRX.8Note5 |
| PDSCH Reference measurement channel |  | 1 | SR.3. 3 TDD | | | | |
|  | 2 | TBD | | | | |
|  | 3 | TBD | | | | |
| RMSI CORESET Reference Channel |  | 1 | CR.3. 2 TDD | | | | |
|  | 2 | TBD | | | | |
|  | 3 | TBD | | | | |
| Dedicated CORESET Reference Channel |  | 1 | CCR.3. 7 TDD | | | | |
|  | 2 | TBD | | | | |
|  | 3 | TBD | | | | |
| OCNG Patterns |  | 1,2,3 | OP.1 | | | | |
| SSB Configuration |  | 1 | SSB.4 FR2 | | | | |
|  | 2 | TBD | | | | |
|  | 3 | TBD | | | | |
| SMTC Configuration |  | 1,2,3 | SMTC.1 | | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1 | 120 | | | | |
| 2 | 480 | | | | |
| 3 | 960 | | | | |
| EPRE ratio of PSS to SSS | dB | 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) |  |  |  | | |  | |
| Propagation condition |  | 1 | AWGN | | | | |
| SRS Config |  | 1 | 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: Void  Note 3: Void  Note 4: Void  Note 5: DRx related parameters are given in Table A.3.3.8-1  Note 6: SRS configs are given in Table A.7.4.1.2.1-3 | | | | | | | |

**Table A.7.4.1.2.1-2A: OTA related test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Test 1** | **Test 2** |
| Angle of arrival configuration |  | 1,2,3 | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 6 |  | 1,2,3 | Fine | |
| Note1 | dBm/15kHzNote4 |  | -112 | |
| Note1 | dBm/SCSNote3 | 1 | -100 | |
|  | 2 | -94 | |
|  | 3 | -91 | |
|  | dB | 1,2,3 | 4 | |
| SS-RSRPNote2 | dBm/SCS Note4 | 1 | -96 | |
|  | 2 | -90 | |
|  | 3 | -87 | |
|  | dB | 1,2,3 | 4 | |
| IoNote2 | dBm/95.04 MHz Note4 | 1 | -68.5 | |
| dBm/380.16 MHz Note4 | 2,3 | -62.5 | |
| 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: SS B\_RP 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: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

**Table A.7.4.1.2.1-3: SRS Configuration for Timing Accuracy Test**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **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 | 17 | 17 | Matches NRB,c |
|  | freqHopping  b-SRS | 0 | 0 |  |
|  | freqHopping  b-hop | 0 | 0 |  |
|  | groupOrSequenceHopping | Neither | Neither |  |
|  | resourceType | Periodic | Periodic |  |
|  | periodicityAndOffset-p | sl1, 0 | sl2560, 4 | Offset to align with DRx periodicity |
|  | sequenceId | 0 | 0 | Any 10 bit number |

##### A.7.4.1.2.2 Test requirements

The test sequence shall be carried out in RRC\_CONNECTED for every test case.

Following will be the test sequence for this test:

1) Setup NR PCell according to parameters given in Table A.7.4.1.2.2-1.

2) After connection set up with the cell, the test equipment will verify that 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 13792

b. The Te values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1

3) The test system shall adjust the timing of the DL path by values given in Table A.7.4.1.2.2-1

**Table A.7.4.1.2.2-1 Adjustment Value for DL Timing**

|  |  |  |
| --- | --- | --- |
| SCS of SSB signals (kHz) | Adjustment Value | |
|  | Test1 | Test2 |
| 120 | +8\*64Tc | +4\*64Tc |
| 480 | +4\*64Tc | +2\*64Tc |
| 960 | +4\*64Tc | +2\*64Tc |

4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within (NTA + NTA\_offset) ×Tc ± Te respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.

5) The test system shall verify that 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.

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

### A.7.4.2 UE timer accuracy

### A.7.4.3 Timing advance

#### A.7.4.3.1 SA FR2 timing advance adjustment accuracy

##### A.7.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

##### A.7.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.7.4.3.1.2-2, A.7.4.3.1.2-3 and A.7.4.3.1.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.4.3.1.2-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k+1 for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [7], shall be configured so that it does not expire in the duration of the test.

Table A.7.4.3.1.2-1: Timing advance supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.4.3.1.2-2: General test parameters for timing advance

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF channel number |  | 1 |  |
| Initial DL BWP |  | DLBWP.0.1 | As specified in Table A.3.9.2.1-1 |
| Dedicated DL BWP |  | DLBWP.1.1 | As specified in Table A.3.9.2.2-1 |
| Initial UL BWP |  | ULBWP.0.1 | As specified in Table A.3.9.3.1-1 |
| Dedicated UL BWP |  | ULBWP.1.1 | As specified in Table A.3.9.3.2-1 |
| 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 120 kHz SCS NTA\_new = NTA\_old + 1024\*Tc* (based on equation in clause 4.2 of TS 38.213 [3]) |
| T1 | s | 5 |  |
| T2 | s | 5 |  |

Table A.7.4.3.1.2-3: Cell specific test parameters for timing advance

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test1 | |
|  |  | T1 | T2 |
| Duplex mode |  | TDD | |
| TDD configuration |  | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | |
| BWP BW | MHz | 100: NRB,c = 66 | |
| DRx Cycle | ms | Not Applicable | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | |
| CORESET Reference Channel |  | CR.3.1 TDD | |
| OCNG Patterns |  | OCNG pattern 1 | |
| TRS configuration |  | TRS.2.1 TDD | |
| PDSCH/PDCCH TCI state |  | TCI.State.2 | |
| SMTC configuration |  | SMTC.1 FR2 | |
| SSB Configuration |  | SSB.3 FR2 | |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 kHz | |
| PUCCH/PUSCH subcarrier spacing | kHz | 120 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) |  |  | |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone | | | |

Table A.7.4.3.1.2-3A: OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | T1 | T2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 6 |  | Fine | |
| Note1 | dBm/15kHzNote4 | -112 | |
| Note1 | dBm/SCSNote3 | -103 | |
|  | dB | 4 | |
| SS-RSRPNote2 | dBm/SCS Note4 | -99 | |
|  | dB | 4 | |
| IoNote2 | dBm/95.04 MHz Note4 | -68.5 | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | |

Table A.7.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| c-SRS | 16 | 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 | 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 [2]. | | |

##### A.7.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. *k+1* slots after the reception of the timing advance command, where *k* = 11.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

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

#### A.7.4.3.2 SA FR2-2 timing advance adjustment accuracy

##### A.7.4.3.2.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

##### A.7.4.3.2.2 Test Parameters

Supported test configurations are shown in table A.7.4.3.2.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.7.4.3.2.2-2, A.7.4.3.2.2-3 and A.7.4.3.2.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.4.3.2.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.4.3.2.2-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [7], shall be configured so that it does not expire in the duration of the test.

**Table A.7.4.3.2.2-1: Timing advance supported test configurations**

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |
| Note: The UE is required to be tested in the configuration with the largest supported SCS | |

**Table A.7.4.3.2.2-2: General test parameters for timing advance**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF channel number |  | 1 |  |
| Initial DL BWP |  | DLBWP.0.1 | As specified in Table A.3.9.2.1-1 |
| Dedicated DL BWP |  | DLBWP.1.1 | As specified in Table A.3.9.2.2-1 |
| Initial UL BWP |  | ULBWP.0.1 | As specified in Table A.3.9.3.1-1 |
| Dedicated UL BWP |  | ULBWP.1.1 | As specified in Table A.3.9.3.2-1 |
| 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 120 kHz SCS NTA\_new = NTA\_old + 1024\*Tc*  *For 480 kHz SCS NTA\_new = NTA\_old + 256\*Tc*  *For 960 kHz SCS NTA\_new = NTA\_old + 128\*Tc*  (based on equation in clause 4.2 of TS 38.213 [3]) |
| T1 | s | 5 |  |
| T2 | s | 5 |  |

**Table A.7.4.3.2.2-3: Cell specific test parameters for timing advance**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **T1** | | **T2** | |
| TDD configuration |  | 1 | | TBD | | |
|  | 2 | | TBD | | |
|  | 3 | | TBD | | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | | |
| 2 | 400: NRB,c = 66 | | | |
| 3 | 400: NRB,c = 33 | | | |
| Data RBs allocated |  | 1 | 66 | | | |
|  | 2 | 66 | | | |
|  | 3 | 33 | | | |
| Initial BWP Configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 | | | |
| Dedicated BWP Configuration |  | 1,2,3 | DLBWP.1.1  ULBWP.1.1 | | | |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | | |
|  | 2 | TBD | | | |
|  | 3 | TBD | | | |
| PDSCH/PDCCH TCI state |  | 1,2,3 | TCI.State.2 | | | |
| DRx Cycle | ms | 1,2,3 | N/A | | | DRX.8Note5 |
| PDSCH Reference measurement channel |  | 1 | SR.3. 3 TDD | | | |
|  | 2 | TBD | | | |
|  | 3 | TBD | | | |
| RMSI CORESET Reference Channel |  | 1 | CR.3. 2 TDD | | | |
|  | 2 | TBD | | | |
|  | 3 | TBD | | | |
| Dedicated CORESET Reference Channel |  | 1 | CCR.3. 7 TDD | | | |
|  | 2 | TBD | | | |
|  | 3 | TBD | | | |
| OCNG Patterns |  | 1,2,3 | OP.1 | | | |
| SSB Configuration |  | 1 | SSB.4 FR2 | | | |
|  | 2 | TBD | | | |
|  | 3 | TBD | | | |
| SMTC Configuration |  | 1,2,3 | SMTC.1 | | | |

**Table A.7.4.3.2.2-3A: OTA related test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **T1** | **T2** |
| Angle of arrival configuration |  | 1,2,3 | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 6 |  | 1,2,3 | Fine | |
| Note1 | dBm/15kHzNote4 |  | -112 | |
| Note1 | dBm/SCSNote3 | 1 | -100 | |
|  | 2 | -94 | |
|  | 3 | -91 | |
|  | dB | 1,2,3 | 4 | |
| SS-RSRPNote2 | dBm/SCS Note4 | 1 | -96 | |
|  | 2 | -90 | |
|  | 3 | -87 | |
|  | dB | 1,2,3 | 4 | |
| IoNote2 | dBm/95.04 MHz Note4 | 1 | -68.5 | |
| dBm/380.16 MHz Note4 | 2,3 | -62.5 | |
| 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: SS B\_RP 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: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

**Table A.7.4.3.2.2-4: Sounding Reference Symbol Configuration for timing advance**

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| c-SRS | 16 | 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=0 | 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 [2]. | | |

##### A.7.4.3.2.3 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. *k+1* slots after the reception of the timing advance command.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

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

## A.7.5 Signaling characteristics

### A.7.5.1 Radio link Monitoring

In the following clause, 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 on the basis of the UE output power:

*Editor note: The metric for the detection of the UE UL transmitted signal by the TE is FFS.*

#### A.7.5.1.1 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

##### A.7.5.1.1.1 Test Purpose and Environment

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 FR2 radio link monitoring requirements in clause 8.1.

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 table A.7.5.1.1.1-1. The test parameters are given in Tables A.7.5.1.1.1-2, A.7.5.1.1.1-3, and A.7.5.1.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.7.5.1.1.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. 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. In addition to RLM-RS radio link monitoring using SSB index 0 and SSB index 1, the UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.7.5.1.1.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz |

Table A.7.5.1.1.1-2: General test parameters for FR2 out-of-sync testing in non-DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 |  | 100: NRB,c = 66 |
| Data RBs allocated | | Config 1 |  | 24 |
| 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.3.1 |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.3.4 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 120 KHz |
| PRACH Configuration | | Config 1 |  | Table A.3.8.3.1 |
| SSB index assigned as RLM RS | | Config 1 |  | 0,1 |
| OCNG parameters | | |  | OP.5 |
| CP length | | |  | Normal |
| 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 for CSI reporting | | Config 1 |  | CSI-RS.3.1 TDD |
| reportConfigType | | |  | periodic |
| reportQuantity | | |  | cri-RI-PMI-CQI |
| CSI reporting periodicity | | | slot | 40 |
| CSI reporting offset | | | slot | 4 |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 9.68 |
| T3 | | | s | 9.68 |
| D1 | | | s | 9.64 |
| 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. | | | | |

Table A.7.5.1.1.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | |
|  | |  | T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | |
|  | |  | AoA1 | | | AoA2 | | |
| Assumption for UE beams Note 5 | |  | Rough | | | Rough | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | | Not sent | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | |  | | |
| 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 |  | | |  | | |
| ssb-Index 0 SNR | Config 1 | dB | 2Note 6 | -6Note 6 | -15 |  | | |
| ssb-Index 1 SNR | Config 1 |  | Not sent | | | 2Note 6 | -15 | -15 |
|  | Config 1 | dBm/ 15kHz | -92.1 | | | -92.1 | | |
| Time multiplexing of the downlink transmissions from each AoA | |  | Defined in Figure A.7.5.1.1.1-2 | | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | TDL-A 30ns 75Hz | | |
| Note 1: OCNG shall be used such a constant total transmitted power spectral density is achieved for all OFDM symbols.  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 SSS REs.  Note 4: 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 A.3.6.  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: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | |

Table A.7.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

|  |  |
| --- | --- |
| Field | Test 1 |
| Value |
| gapOffset | 0 |

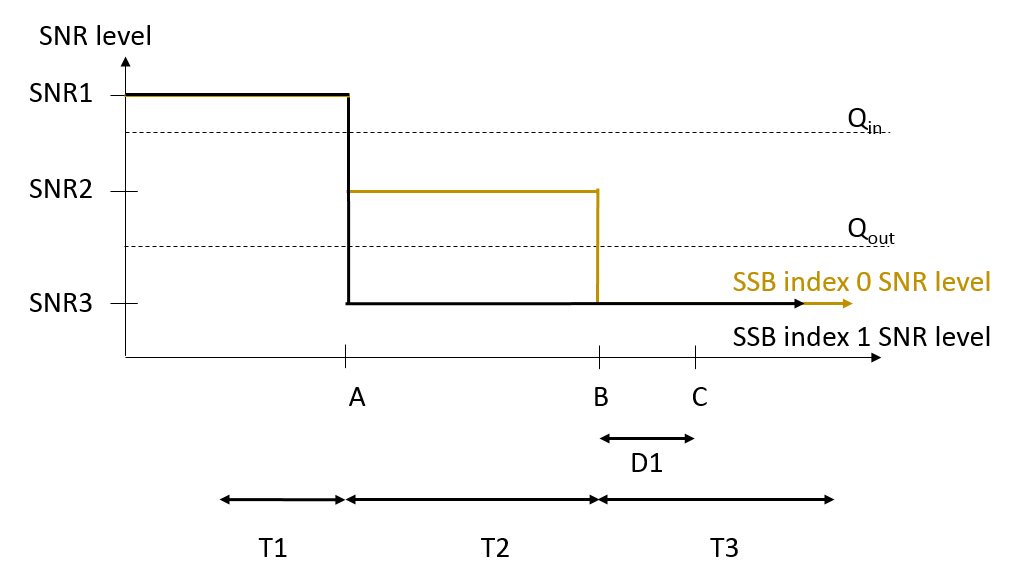


Figure A.7.5.1.1.1-1: SNR variation for out-of-sync testing



Figure A.7.5.1.1.1-2: Time multiplexed downlink transmissions

##### A.7.5.1.1.2 Test Requirements

The UE behavior 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%.

#### A.7.5.1.2 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

##### A.7.5.1.2.1 Test Purpose and Environment

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 FR2 radio link monitoring requirements in clause 8.1.

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 table A.7.5.1.2.1-1.The test parameters are given in Tables A.7.5.1.2.1-2, and A.7.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.7.5.1.2.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. 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.

Table A.7.5.1.2.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz |

Table A.7.5.1.2.1-2: General test parameters for FR2 in-sync testing in non-DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 |  | 100: NRB,c = 66 |
| Data RBs allocated | | Config 1 |  | 24 |
| 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.3.1 |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.3.1 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1 |  | SMTC.3 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 120 KHz |
| PRACH Configuration | | Config 1 |  | Table A.3.8.3.1 |
| SSB index assigned as RLM RS | | Config 1 |  | 0,1 |
| OCNG parameters | | |  | OP.5 |
| CP length | | |  | Normal |
| 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 | 4000 |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1 |  | CSI-RS.3.1 TDD |
| reportConfigType | | |  | periodic |
| reportQuantity | | |  | cri-RI-PMI-CQI |
| CSI reporting periodicity | | | slot | 40 |
| CSI reporting offset | | | slot | 4 |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.2 |
| T3 | | | s | 1.88 |
| T4 | | | s | 0.2 |
| T5 | | | s | 3.84 |
| D1 | | | s | 3.8 |
| 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. | | | | |

Table A.7.5.1.2.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | | | | | |
|  | |  | **AoA1** | | | | | **AoA2** | | | | |
| Assumption for UE beams Note 5 | |  | Rough | | | | | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | | Not sent | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | |  | | | | |
| 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 |  | | | | |  | | | | |
| ssb-Index 0 SNR | Config 1 | dB | 2Note 6 | -6Note 6 | -15 | -4.5 | 2Note 6 |  | | | | |
| ssb-Index 1 SNR | Config 1 |  | Not sent | | | | | 2Note 6 | -15 | -15 | -15 | -15 |
|  | Config 1 | dBm/ 15kHz | -92.1 | | | | | -92.1 | | | | |
| Time multiplexing of the downlink transmissions from each AoA | |  | Defined in Figure A.7.5.1.2.1-2 | | | | | | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.  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 SSS REs.  Note 4: 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 A.3.6.  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: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | | | | | |

Table A.7.5.1.2.1-4: Void

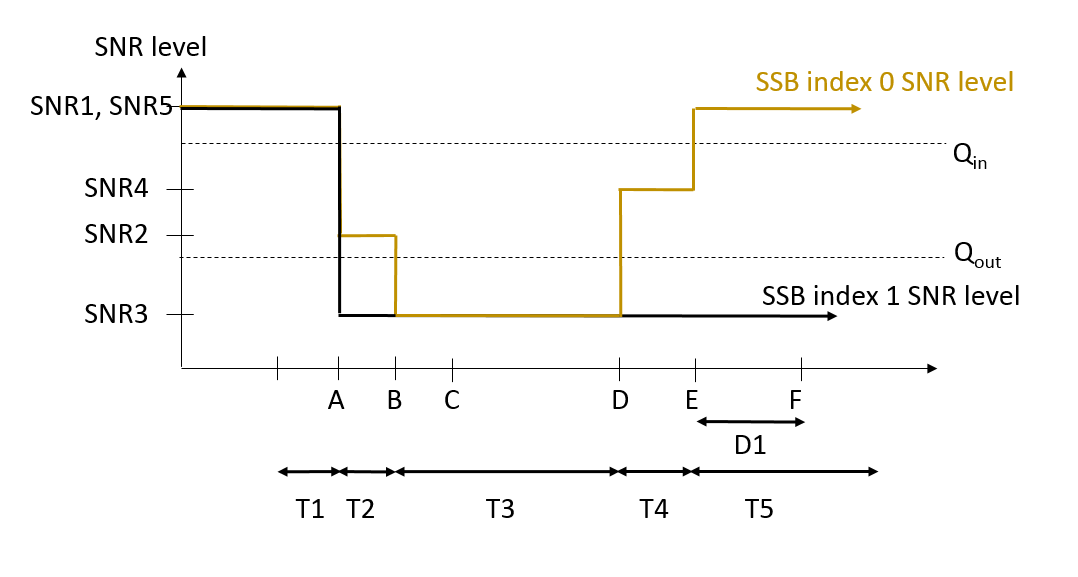


Figure A.7.5.1.2.1-1: SNR variation for in-sync testing



Figure A.7.5.1.2.1-2: Time multiplexed downlink transmissions

##### A.7.5.1.2.2 Test Requirements

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

During the period from time point A to time point F (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%.

#### A.7.5.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

##### A.7.5.1.3.1 Test Purpose and Environment

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 when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

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 table A.7.5.1.3.1-1. The test parameters are given in Tables A.7.5.1.3.1-2, and A.7.5.1.3.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.3.1-1 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. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI 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.

Table A.7.5.1.3.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz |

Table A.7.5.1.3.1-2: General test parameters for FR2 out-of-sync testing in DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 |  | 100: NRB,c = 66 |
| Data RBs allocated | | Config 1 |  | 66 |
| 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.3.1 |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.3.4 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 120 KHz |
| PRACH Configuration | | Config 1 |  | Table A.3.8.3.1 |
| SSB index assigned as RLM RS | | Config 1 |  | 0,1 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| 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 Configuration | | |  | DRX.3 |
| Gap pattern ID | | |  | N.A. |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | *0* |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1 |  | CSI-RS.3.1 TDD |
| reportConfigType | | |  | periodic |
| reportQuantity | | |  | cri-RI-PMI-CQI |
| CSI reporting periodicity | | | slot | 40 |
| CSI reporting offset | | | slot | 4 |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 14.48 |
| T3 | | | s | 14.48 |
| D1 | | | s | 14.44 |
| 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. | | | | |

Table A.7.5.1.3.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | |
|  | |  | T1 | T2 | T3 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | |
| Assumption for UE beams Note 5 | |  | Rough | | |
| 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 |  | | |
| ssb-Index 0 SNR | Config 1 | dB | 2Note 6 | -6Note 6 | -15 |
| ssb-Index 1 SNR | Config 1 | 2Note 6 | -15 | -15 |
|  | Config 1 | dBm/15KHz | -104.7dBm | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains 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 SSS REs.  Note 4: 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 A.3.6.  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: This value allows up to 1dB degradation from applied SNR to UE baseband. | | | | | |

Table A.7.5.1.3.1-4: Void

Table A.7.5.1.3.1-5: Void

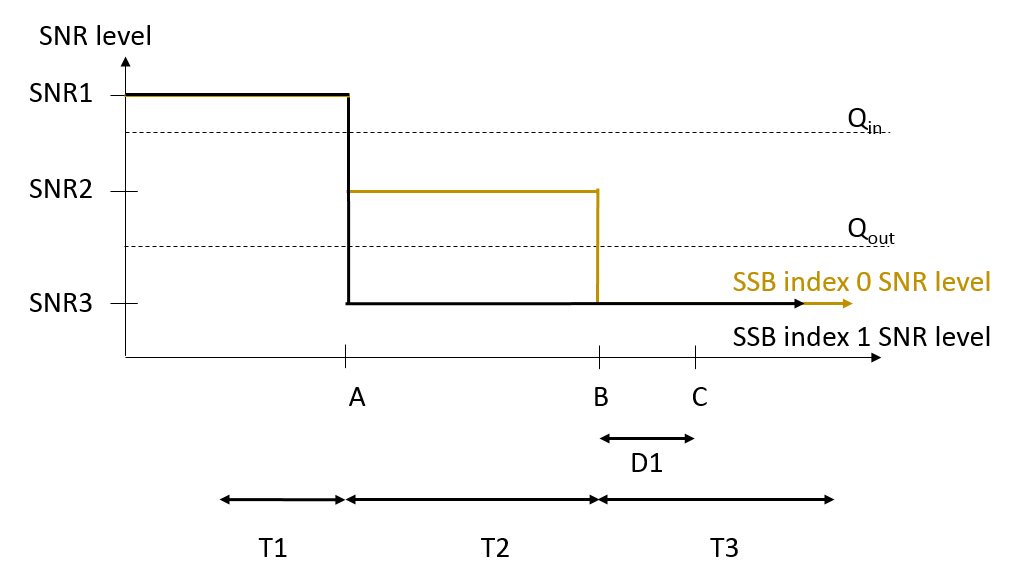


Figure A.7.5.1.3.1-1: SNR variation for out-of-sync testing

##### A.7.5.1.3.2 Test Requirements

The UE behavior 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%.

#### A.7.5.1.4 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

##### A.7.5.1.4.1 Test Purpose and Environment

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 when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

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 table A.7.5.1.4.1-1. The test parameters are given in Tables A.7.5.1.4.1-2, and A.7.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.4.1-1 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. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI 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.

Table A.7.5.1.4.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz |

Table A.7.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 |  | 100: NRB,c = 66 |
| Data RBs allocated | | Config 1 |  | 66 |
| 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.3.1 |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.3.1 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1 |  | SMTC.3 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 120 KHz |
| PRACH Configuration | | Config 1 |  | Table A.3.8.3.1 |
| SSB index assigned as RLM RS | | Config 1 |  | 0,1 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| 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 Configuration | | |  | DRX.11 |
| Gap pattern ID | | |  | N.A. |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | 4000 |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1 |  | CSI-RS.3.1 TDD |
| reportConfigType | | |  | periodic |
| reportQuantity | | |  | cri-RI-PMI-CQI |
| CSI reporting periodicity | | | slot | 40 |
| CSI reporting offset | | | slot | 4 |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.2 |
| T3 | | | s | 2.8 |
| T4 | | | s | 0.2 |
| T5 | | | s | 3.88 |
| D1 | | | s | 3.84 |
| 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. | | | | |

Table A.7.5.1.4.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring test in DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 5 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |
| 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 |  | | | | |
| ssb-Index 0 SNR | Config 1 | dB | 2Note 6 | -6Note 6 | -15 | -4.5 | 2Note 6 |
| ssb-Index 1 SNR | Config 1 | 2Note 6 | -15 | -15 | -15 | -15 |
|  | Config 1 | dBm/15KHz | -104.7dBm | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.3  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: 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 A.3.6.  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: This value allows up to 1dB degradation from applied SNR to UE baseband. | | | | | | | |

Table A.7.5.1.4.1-4: Void

Table A.7.5.1.4.1-5: Void

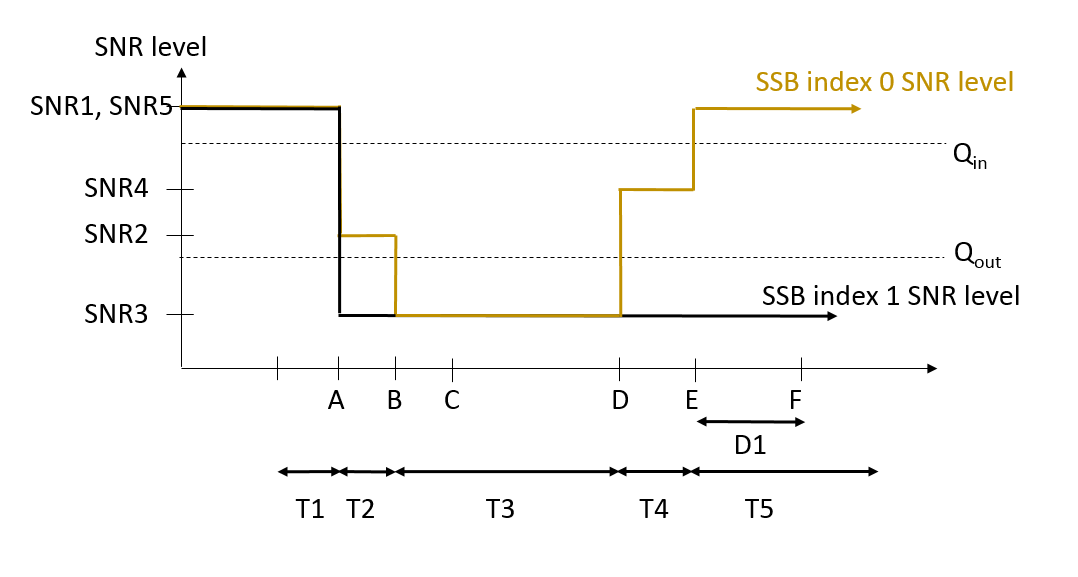


Figure A.7.5.1.4.1-1: SNR variation for in-sync testing

##### A.7.5.1.4.2 Test Requirements

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

During the period from time point A to time point F (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%.

#### A.7.5.1.5 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

##### A.7.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.5.1-1, A.7.5.1.5.1-2, A.7.5.1.5.1-3 and A.7.5.1.5.1-4 below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.5.1-1 shows the variation of the downlink SNR in the PCell 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 10 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.5.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |

Table A.7.5.1.5.1-2: General test parameters for FR2 PCell for CSI-RS out-of-sync testing in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1 |  | TDD |
| BWchannel | Config 1 |  | 100: NRB,c = 66 |
| Data RBs allocated | Config 1 |  | 24 |
| BWoccupied | Config 1 |  | 24 |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1 |  | DLBWP.1.4 |
| UL initial BWP configuration | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1 |  | ULBWP.1.4 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.3.4 TDD  CCR.3.6 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120 KHz |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.2.1 TDD  Resource #4 in TRS.2.2 TDD |
| TRS configuration | |  | TRS.2.1 TDD  TRS.2.2 TDD |
| TCI configuration for PDCCH#1/PDSCH | |  | TCI.State.2 |
| TCI configuration for PDCCH#2 | |  | TCI.State.3 |
| OCNG parameters | |  | OP.5 |
| CP length | |  | Normal |
| 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 CSI-RS RE energy | dB | 4 |
| Ratio of hypothetical PDCCH DMRS energy to average CSI-RS 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 for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD |
| reportConfigType | |  | periodic |
| reportQuantity | |  | cri-RI-PMI-CQI |
| CSI reporting periodicity | | slot | 40 |
| CSI reporting offset | | slot | 4 |
| T1 | | s | 0.2 |
| T2 | | s | 0.35 |
| T3 | | s | 0.35 |
| D1 | | s | 0.31 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

Table A.7.5.1.5.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | |
|  | |  | T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | |
|  | |  | **AoA1** | | | **AoA2** | | |
| Assumption for UE beams Note 10 | |  | Rough | | | Rough | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | | Not sent | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | |  | | |
| 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-RS1 | Config 1 | dB | 2Note 11 | -6Note 11 | -15 |  | | |
| SNR on RLM-RS2 | Config 1 |  | Not sent | | | 2Note 11 | -14 | -15 |
|  | Config 1 | dBm/ 15kHz | -92.1 | | | -92.1 | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | 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.  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 SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.1.5.1-1.  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 A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | |

Table A.7.5.1.5.1-4: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

|  |  |
| --- | --- |
| Field | Test 1 |
| Value |
| gapOffset | 0 |
| Note 1: RLM RS is partially overlapped with measurement gap | |

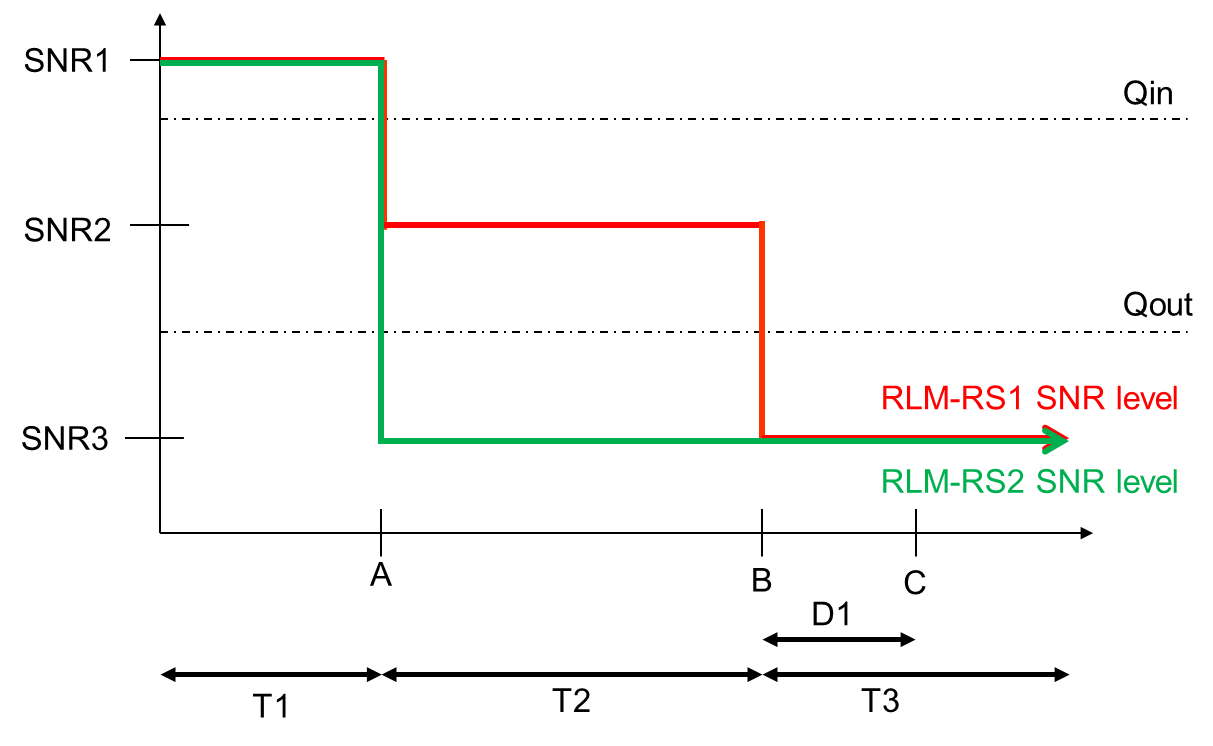


Figure A.7.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

##### A.7.5.1.5.2 Test Requirements

The UE behaviour 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 in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 no later than time point C (D1 second after the start of the time duration T3) on the PCell.

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

#### A.7.5.1.6 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

##### A.7.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.6.1-1, A.7.5.1.6.1-2 and A.7.5.1.6.1-3 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.6.1-1 shows the variation of the downlink SNR in the PCell 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 10 ms. In the test, DRX configuration is not enabled. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.6.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |

Table A.7.5.1.6.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1 |  | TDD |
| BWchannel | Config 1 |  | 100: NRB,c = 66 |
| Data RBs allocated | Config 1 |  | 24 |
| BWoccupied | Config 1 |  | 24 |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1 |  | DLBWP.1.4 |
| UL initial BWP configuration | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1 |  | ULBWP.1.4 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.3.1 TDD  CCR.3.3 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120 KHz |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.2.1 TDD  Resource #4 in TRS.2.2 TDD |
| TRS configuration | |  | TRS.2.1 TDD  TRS.2.2 TDD |
| TCI configuration for PDCCH#1/PDSCH | |  | TCI.State.2 |
| TCI configuration for PDCCH#2 | |  | TCI.State.3 |
| OCNG parameters | |  | OP.5 |
| CP length | |  | Normal |
| 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 CSI-RS RE energy | dB | 4 |
| Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
| DMRS precoder granularity |  | REG bundle size |
| REG bundle size |  | 6 |
| 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 CSI-RS RE energy | dB | 0 |
| Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |
| DMRS precoder granularity |  | REG bundle size |
| REG bundle size |  | 6 |
| DRX | |  | OFF |
| Gap pattern ID | |  | N.A. |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | 1000 |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD |
| reportConfigType | |  | periodic |
| reportQuantity | |  | cri-RI-PMI-CQI |
| CSI reporting periodicity | | slot | 40 |
| CSI reporting offset | | slot | 4 |
| T1 | | s | 0.2 |
| T2 | | s | 0.2 |
| T3 | | s | 0.24 |
| T4 | | s | 0.2 |
| T5 | | s | 0.88 |
| D1 | | s | 0.84 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

Table A.7.5.1.6.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | | | | | |
|  | |  | **AoA1** | | | | | **AoA2** | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | | | | Not sent | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | | | |  | | | | |
| 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-RS1 | Config 1 | dB | 2Note 11 | -6Note 11 | -15 | -4.5 | 2Note 11 |  | | | | |
| SNR on RLM-RS2 | Config 1 |  | Not sent | | | | | 2Note 11 | -14 | -15 | -15 | -14 |
|  | Config 1 | dBm/ 15KHz | -92.1 | | | | | -92.1 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | | 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.  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 SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.5.1.6.1-1.  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 A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband. | | | | | | | | | | | | |

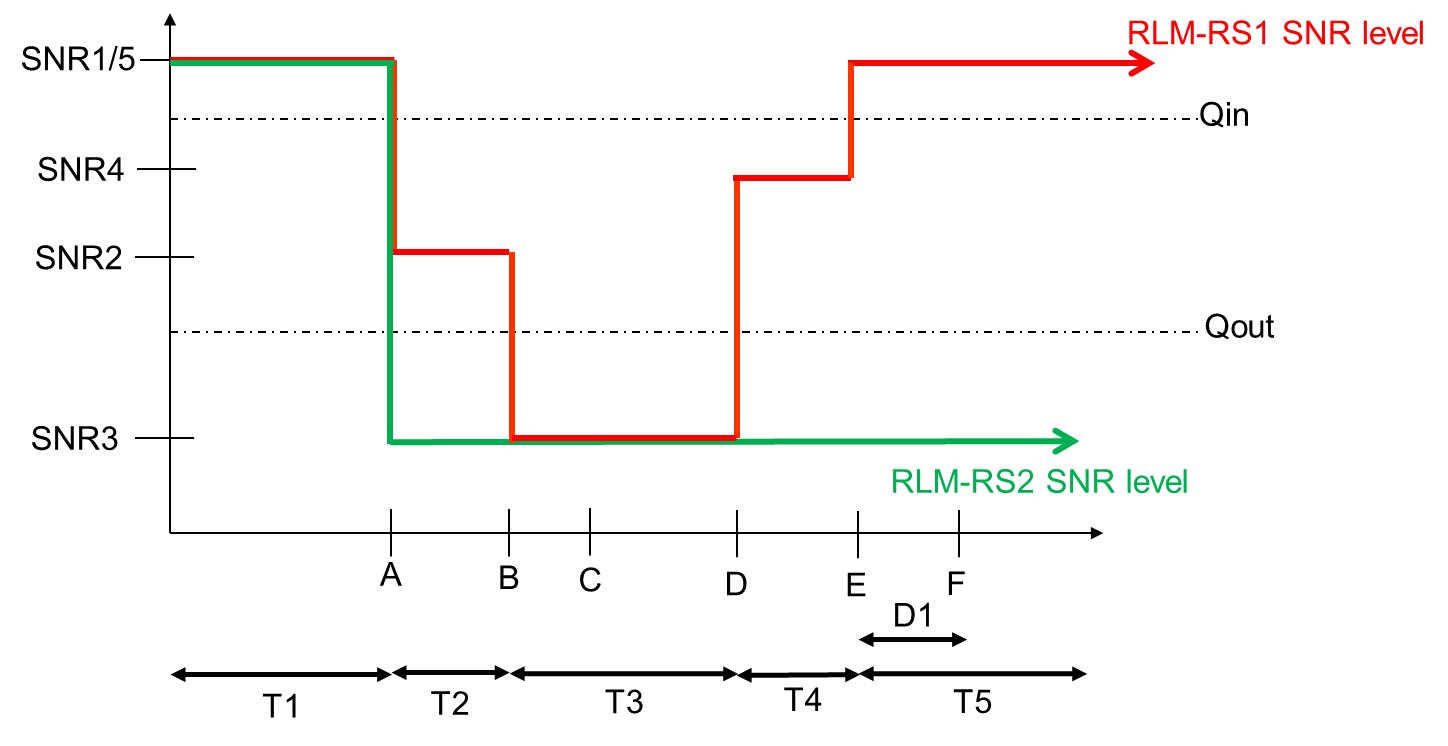
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Figure A.7.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

##### A.7.5.1.6.2 Test Requirements

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

During the period from time point A to time point F (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 on the PCell.

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

#### A.7.5.1.7 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

##### A.7.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.7.1-1, A.7.5.1.7.1-2, and A.7.5.1.7.1-3 below. There is one cell, cell 1 is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.7.1-1 shows the variation of the downlink SNR in the PCell 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 10 ms. 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. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.7.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |

Table A.7.5.1.7.1-2: General test parameters for FR2 PCell for CSI-RS out-of-sync testing in DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1 |  | TDD |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |
| 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 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.3.4 TDD  CCR.3.6 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120 KHz |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.2.1 TDD  Resource #4 in TRS.2.2 TDD |
| TRS configuration | |  | TRS.2.1 TDD  TRS.2.2 TDD |
| TCI configuration for PDCCH#1/PDSCH | |  | TCI.State.2 |
| TCI configuration for PDCCH#2 | |  | TCI.State.3 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| 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 CSI-RS RE energy | dB | 4 |
| Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
| DMRS precoder granularity |  | REG bundle size |
| REG bundle size |  | 6 |
| DRX | |  | DRX.3 |
| Gap pattern ID | |  | N.A. |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | *0* |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD |
| reportConfigType | |  | periodic |
| reportQuantity | |  | cri-RI-PMI-CQI |
| CSI reporting periodicity | | slot | 40 |
| CSI reporting offset | | slot | 4 |
| T1 | | s | 0.2 |
| T2 | | s | 1.28 |
| T3 | | s | 1.28 |
| D1 | | s | 1.24 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

**Table A.7.5.1.7.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in DRX mode**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | |
|  | |  | T1 | T2 | T3 |
| AoA setup | | dB | Setup 1 defined in A.3.15 | | |
| Assumption for UE beams Note 10 | |  | Rough | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | |
| 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-RS1 | Config 1 | dB | 2Note 11 | -6Note 11 | -15 |
| SNR on RLM-RS2 | Config 1 | dB | 2Note 11 | -14 | -15 |
|  | Config 1 | dBm/15KHz | -104.7 | | |
| 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.  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 SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.1.7.1-1.  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 specified in clause A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband. | | | | | |

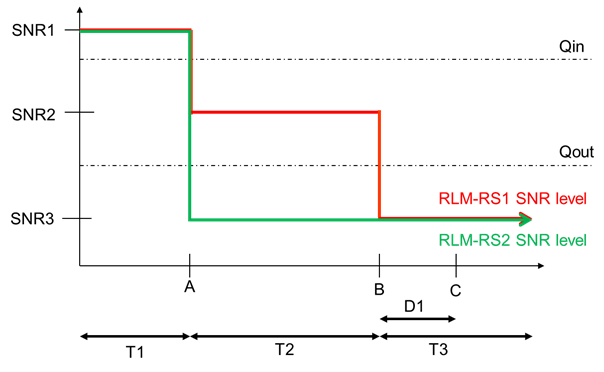
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Figure A.7.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

##### A.7.5.1.7.2 Test Requirements

The UE behaviour 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 in Cell 1 (PCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 (PCell) no later than time point C (D1 secondafter the start of the time duration T3) on the PCell.

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

#### A.7.5.1.8 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

##### A.7.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.8.1-1, A.7.5.1.8.1-2, A.7.5.1.8.1-3 and A.7.5.1.8.1-4 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.8.1-1 shows the variation of the downlink SNR in the PCell 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 10 ms. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.8.1-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |

Table A.7.5.1.8.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1 |  | TDD |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |
| 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 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.3.1 TDD  CCR.3.3 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120 KHz |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.2.1 TDD  Resource #4 in TRS.2.2 TDD |
| TRS configuration | |  | TRS.2.1 TDD  TRS.2.2 TDD |
| TCI configuration for PDCCH#1/PDSCH | |  | TCI.State.2 |
| TCI configuration for PDCCH#2 | |  | TCI.State.3 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| 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 CSI-RS RE energy | dB | 4 |
| Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
| DMRS precoder granularity |  | REG bundle size |
| REG bundle size |  | 6 |
| 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 CSI-RS RE energy | dB | 0 |
| Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |
| DMRS precoder granularity |  | REG bundle size |
| REG bundle size |  | 6 |
| DRX | |  | DRX.3 |
| Gap pattern ID | |  | \**gp0* |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | *2000* |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD |
| reportConfigType | |  | periodic |
| reportQuantity | |  | cri-RI-PMI-CQI |
| CSI reporting periodicity | | slot | 40 |
| CSI reporting offset | | slot | 4 |
| T1 | | s | 0.2 |
| T2 | | s | 0.2 |
| T3 | | s | 1.64 |
| T4 | | s | 0.2 |
| T5 | | s | 1.88 |
| D1 | | s | 1.84 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

Table A.7.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | | dB | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | | | |
| 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 | |  |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | |  |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR on RLM-RS1 | Config 1 | dB | 2Note 11 | -6Note 11 | -15 | -4.5 | 2Note 11 |
| SNR on RLM-RS2 | Config 1 | dB | 2Note 11 | -14 | -15 | -15 | -14 |
|  | Config 1 | dBm/15KHz | -104.7 | | | | |
| 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.  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 SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.5.1.8.1-1.  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 A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband. | | | | | | | |

Table A.7.5.1.8.1-4: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

|  |  |
| --- | --- |
| Field | Test 1 |
| Value |
| gapOffset | 0 |
| Note 1: RLM RS is partially overlapped with measurement gap | |

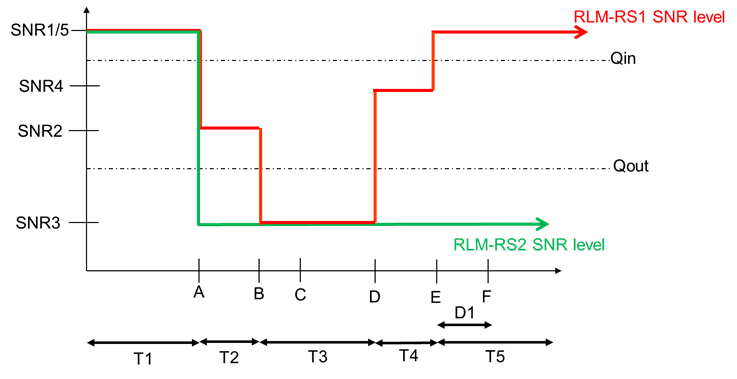
****

Figure A.7.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

##### A.7.5.1.8.2 Test Requirements

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

During the period from time point A to time point F (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 on the PCell.

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

#### A.7.5.1.9 UE Radio Link Monitoring Scheduling Restrictions on FR2

##### A.7.5.1.9.1 Test Purpose and Environment

The purpose is to verify that the NR UE correctly follows the RLM scheduling restrictions requirements defined in clause 8.1.7. This test verifies that the UE correctly receive the PDCCH scheduled on the symbols right before the RLM SSB symbols without overlap so that it sends ACK/NACK correctly. The test case is only applicable to UE which supports pdcch-MonitoringAnyOccasions or pdcch-MonitoringAnyOccasionsWithSpanGap.

The test parameters are given in table A.7.5.1.9.1-1, table A.7.5.1.9.1-2 and table A.7.5.1.9.1-3 below. The UE is required during time period T1 to transmit ACK/NACK correctly upon scheduling of PDSCH.

Table A.7.5.1.9.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 120 kHz RMC SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.5.1.9.1-2: General test parameters for NR RLM scheduling restriction test case in FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| RF Channel Number |  | 1 | 1 |  |
| SSB configuration |  | 1 | SSB.1 FR2 |  |
| SMTC configuration |  | 1 | SMTC pattern 1 |  |
| DRX cycle length | s | 1 | OFF |  |
| T1 | s | 1 | 5 | During T1 the UE is required to correctly transmit ACK/NACK |

Table A.7.5.1.9.1-3: Cell specific test parameters for NR RLM scheduling restriction test case in FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | |
| AoA setup |  | 1 | Setup 3 defined in A.3.15.3 | |
|  |  |  | AoA1 | AoA2 |
| Assumption for UE beams Note 1 |  |  | Rough | Rough |
| TDD configuration |  | 1 | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1 | 24 | |
| PDSCH Reference measurement channel |  | 1 | SR.3.2 TDD | Not sent |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | Not sent |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.2 TDD | Not sent |
| TRS configuration |  | 1 | TRS.2.1 TDD | TRS.2.2 TDD |
| PDCCH/PDSCH TCI state |  | 1 | TCI.State.2 | N/A |
| OCNG Pattern |  | 1 | OP.5 defined in A.3.2.1 | Not sent |
| Initial DL BWP configuration |  | 1 | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1 | ULBWP.0.1 | |
| RLM-RS |  | 1 | SSB with index 0 | SSB with index 1 |
|  | dBm/15kHz | 1 | -92.1 | -92.1 |
| Note2 | dBm/SCS | 1 | -83.1 | -83.1 |
|  | dB | 1 | 2 | 2 |
| BB Note 4 | dB | 1 | 1 | 1 |
| SSB\_RP Note3 | dBm/SCS | 1 | -81.1 | -81.1 |
| Io | dBm/95.04 MHz | 1 | -54.35 | -54.35 |
| Time multiplexing of the downlink transmissions from each AoA | | 1 | Defined in Figure A.7.5.1.9.1-1 | |
| Propagation Condition |  | 1 | AWGN | AWGN |
| Note 1: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | |



Figure A.7.5.1.9.1-1: Time multiplexed downlink transmissions

##### A.7.5.1.9.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.1.7.3.

### A.7.5.2 Interruption

#### A.7.5.2.1 Interruptions during measurements on deactivated NR SCC in FR2

##### A.7.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE missed ACK/NACK rate does not exceed the limits at NR PSCell interruptions during the measurement on the deactivated NR SCC. This test will verify the missed ACK/NACK rate for PCell in standalone NR specified in clause 8.2.2.2. Supported test configurations are shown in table A.7.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.7.5.2.1.1-2 and A.7.5.2.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell, Cell2 is an NR deactivated SCell. Cell1 shall be configured as PCell and Cell2 shall be configured as SCell.

The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector, defines the start of time period T1. During T1, PCell is continuously scheduled in DL.

Table A.7.5.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD – TDD duplex mode |

**Table A.7.5.2.1.1-2: General test parameters for interruptions during measurements on deactivated NR SCC in standalone NR**

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 | Two NR RF channels |
| Active PCell |  | Cell1 | PCell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell2 | Deactivated SCell on NR RF channel number 2. |
| CP length |  | Normal | Applicable to Cell1 and Cell2 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 640 |  |
| T1 | s | 10 |  |

Table A.7.5.2.1.1-3: NR cell specific test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell1 | Cell2 |
| Frequency Range | |  | FR2 | |
| Duplex mode |  |  | TDD | |
| TDD configuration |  |  | TDDConf.3.1 | |
| BWchannel |  |  | 100 MHz: NRB,c = 66 | |
| Data RBs allocated |  |  | 66 | |
| Initial DL BWP Configuration |  |  | DLBWP.0.2Note4 | |
| Initial UL BWP Configuration |  |  | ULBWP.0.2 Note6 | |
| Downlink dedicated BWP Configuration |  |  | DLBWP.1.1 | |
| Uplink dedicated BWP configuration |  |  | ULBWP.1.1 | |
| PDSCH Reference measurement channel |  |  | SR.3.1 TDD | |
| RMSI CORESET parameters |  |  | CR.3.1 TDD | |
| Dedicated CORESET parameters |  |  | CCR.3.1 TDD | |
| OCNG Patterns | |  | OP.1 | |
| SMTC Configuration | |  | SMTC.1 | |
| SSB Configuration |  |  | SSB.1 FR2 | |
| TCI State |  |  | TCI.State.0 | |
| TRS Configuration |  |  | TRS.2.1 TDD | |
| 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) | |  |  |  |
| Time offset to Cell1 Note 3 | | μs | - | 3 |
| 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: Void  Note 3: 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 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in clause 12 of of TS 38.213 [3]. | | | | |

Table A.7.5.2.1.1-4: OTA related test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 |
| Angle of arrival configuration | |  | Setup1 according to table A.3.15.1 | Setup 1according to table A.3.15.1 |
| Assumption for UE beams Note 6 | |  | Rough | Rough |
| Note1 | NR\_TDD\_FR2\_A | dBm/15kHz | -104.7 | -104.7 |
|  | NR\_TDD\_FR2\_B |  |  |  |
|  | NR\_TDD\_FR2\_F |  |  |  |
|  | NR\_TDD\_FR2\_G |  |  |  |
|  | NR\_TDD\_FR2\_T |  |  |  |
|  | NR\_TDD\_FR2\_Y |  |  |  |
| Note1 | NR\_TDD\_FR2\_A | dBm/SCS | -95.7 | -95.7 |
|  | NR\_TDD\_FR2\_B |  |  |  |
|  | NR\_TDD\_FR2\_F |  |  |  |
|  | NR\_TDD\_FR2\_G |  |  |  |
|  | NR\_TDD\_FR2\_T |  |  |  |
|  | NR\_TDD\_FR2\_Y |  |  |  |
| SSB\_RPNote2 | NR\_TDD\_FR2\_A | dBm/120KHz Note3 | -88.7 | -88.7 |
|  | NR\_TDD\_FR2\_B |  |  |  |
|  | NR\_TDD\_FR2\_F |  |  |  |
|  | NR\_TDD\_FR2\_G |  |  |  |
|  | NR\_TDD\_FR2\_T |  |  |  |
|  | NR\_TDD\_FR2\_Y |  |  |  |
|  |  | dB | 7 | 7 |
|  | | dB | 7 | 7 |
| IoNote2 | NR\_TDD\_FR2\_A | dBm/95.04 MHz Note4 | -58.92 | -58.92 |
|  | NR\_TDD\_FR2\_B |  |  |  |
|  | NR\_TDD\_FR2\_F |  |  |  |
|  | NR\_TDD\_FR2\_G |  |  |  |
|  | NR\_TDD\_FR2\_T |  |  |  |
|  | NR\_TDD\_FR2\_Y |  |  |  |
| 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SSB\_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | |

##### A.7.5.2.1.2 Test Requirements

The UE shall be continuously scheduled on PCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on PCell.

If the NR PCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PCell immediately before and immediately after an SMTC. Each interruption on NR PCell shall not exceed the value defined in Table A.7.5.2.1.2-1.

If the NR PCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PCell no earlier than 4 slots before an SMTC and no later than 4 slots after the SMTC. the interruption on NR PCell shall not exceed the value defined in Table A.7.5.2.1.2-2.

Table A.7.5.2.1.2-1: Interruption duration if the PCell is not in the same band as the deactivated SCell

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length  (slot) |
| 3 | 0.125 | 4 |

Table A.7.5.2.1.2-2: Interruption duration if the PCell is in the same band as the deactivated SCell

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length  (slot) |
| 3 | 0.125 | 8 + SMTC duration |

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

#### A.7.5.2.2 SA interruptions at NR SRS carrier-based switching

##### A.7.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that when a UE needs to transmit aperiodic SRS, the UE can perform SRS carrier-based switching to a carrier not configured for PUCCH/PUSCH transmission from a carrier with PUCCH/PUSCH transmission. The test will partly verify the interruption requirements on PCell in clause 8.2.2.2.9.

##### A.7.5.2.2.2 Test Parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the FR2 PCell. Cell 2 is an activated FR2 SCell on the TDD SCC which operats in downlink without PUCCH/PUSCH. The UE is configured with the SRS switching between PCell and SCell.The test parameters for PCell and SCell are given in Tables A.7.5.2.2.2-2, A.7.5.2.2.2-3, and A.7.5.2.2.2-4 below. The test consists of two successive time periods, with duration of T1 and T2, respectively. Immediately at the beginning of T2, the UE is triggered for SRS switching. The UE shall be scheduled on PCell continuously throughout the test.

The test equipment verifies that potential interruption is carried out correctly by monitoring ACK/NACK sent in PCell.

Table A.7.5.2.2.2-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 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. | |

Table A.7.5.2.2.2-2: General test parameters for SA interruptions at NR SRS carrier-based switching

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 | Two NR radio channel (1, 2) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1 |
| Configured SCell |  | Cell 2 | Activated secondary cell on NR RF channel number 2 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of PCell |
| T1 | s | 5 |  |
| T2 | ms | 100 | UE shall perform SRS switching during T2 |

Table A.7.5.2.2.2-3: Cell-specific test parameters for SA interruptions at NR SRS carrier-based switching

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 |
| Frequency Range | |  | FR2 | |
| Duplex mode | Config 1 |  | TDD | |
| TDD configuration | Config 1 |  | TDDConf.3.1 | |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 | |
| Downlink initial BWP Configuration | Config 1 |  | DLBWP.0.1 | |
| Downlink dedicated BWP Configuration | Config 1 |  | DLBWP.1.1 | |
| Uplink initial BWP configuration | Config 1 |  | ULBWP.0.1 | |
| Uplink dedicated BWP configuration | Config 1 |  | ULBWP.1.1 | |
| SRS configuration | Config 1 |  | SRS.3 TDD | |
| TRS configuration | Config 1 |  | TRS.2.1 TDD | |
| TCI state | Config 1 |  | TCI.State.0 | |
| PDSCH Reference measurement channel | Config 1 |  | SR.3.1 TDD | |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD | |
| RMC CORESET Reference Channel | Config 1 |  | CCR.3.1 TDD | |
| OCNG Patterns | |  | OP.1 | |
| SSB Configuration | |  | SSB.1 FR2 | |
| SMTC Configuration | Config 1 |  | SMTC.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 | |  |  | |
| Ês/Noc | | dB | 17 | |
| Propagation Condition | |  | AWGN | |
| NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | |

Table A.7.5.2.2.2-4: OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
| T1 | T2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beams Note 6 |  | Fine | |
| Note 1 | dBm/15kHzNote 4 | -112 | |
| Note 1 | dBm/SCSNote 3 | -103 | |
|  | dB | 4 | |
| SS-RSRP Note 2 | dBm/SCS Note 4 | -99 | |
|  | dB | 4 | |
| IoNote2 | dBm/95.04 MHz Note 4 | -68.5 | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.  NOTE 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | |

##### A.7.5.2.2.3 Test Requirements

During T2, interruption on PCell due to SRS carrier-based switching between Cell 1 and Cell 2 shall not exceed the required values specified in clause 8.2.2.2.9.

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

### A.7.5.3 SCell Activation and Deactivation Delay

#### A.7.5.3.1 SCell Activation and deactivation for SCell in FR2 intra-band in non-DRX

##### A.7.5.3.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.1.1 except the PCell and SCell are in FR2 intra-band.

The supported test configurations are shown in table A.7.5.3.1.1-1 below. The general test parameters are the same as defined in Table A.6.5.3.1.1-2 except those described in Tables A.7.5.3.1.1-2, and cell specific test parameters are described in Tables A.7.5.3.1.1-3. OTA related test parameters are shown in table A.7.5.3.1.1-4 below.

Table A.7.5.3.1.1-1: Supported test configurations for FR2 SCell activation case

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |

Table A.7.5.3.1.1-2: General test parameters for FR2 SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channels are used for this test, cell 1 and cell2 use RF channel 1 and 2, respectively. |

Table A.7.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| SSB ARFCN |  | freq1 | | | freq2 | | |
| Duplex mode |  | TDD | | | | | |
| TDD configuration |  | TDDConf.3.1 | | | | | |
| 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 |  | TRS.2.1 TDD | | | | | |
| TCI state |  | TCI.State.0 | | | | | |
| BWchannel | MHz | 100: NRB,c = 66 | | | | | |
| Data RBs allocated |  | 66 | | 66 | | 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | | | - | | |
| RMSI CORESET Parameters |  | CR.3.1 TDD | | | - | | |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | | | - | | |
| OCNG Patterns |  | OP.1 | | | | | |
| SSB Configuration |  | SSB.1 FR2 | | | | | |
| SMTC Configuration |  | SMTC.1 | | | | | |
| CSI-RS configuration for CSI reporting |  | CSI-RS.3.1 TDD | | | | | |
| reportConfigType |  | periodic | | | N/A | | |
| reportQuantity |  | cri-RI-PMI-CQI | | | N/A | | |
| CSI reporting periodicity | slot | 40 | | | N/A | | |
| CSI reporting offset | slot | 4 | | | N/A | | |
| 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\_DMRS |  |  | | | | | |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  | | | | | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  | | | | | |
| Propagation conditions |  | 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: Void  Note 3: Void  Note 4: Void  Note 5: Void | | | | | | | |

Table A.7.5.3.1.1-4: OTA related test parameters for FR2 SCell activation case

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Angle of arrival configuration |  | Setup 1 according to table A.3.15.1 | | | Setup 1 according to table A.3.15.1 | | |
| Assumption for UE beams Note 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -104.7 | | | -104.7 | | |
| Note1 | dBm/SCSNote3 | -95.7 | | | -95.7 | | |
|  | dB | 7 | | | 7 | | |
| SSB\_RPNote2 | dBm/SCS Note4 | -88.7 | | | -88.7 | | |
|  | dB | 7 | | | 7 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -58.92 | | | -58.92 | | |
| 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: Es/Iot, SSB\_RP 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: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | |

##### A.7.5.3.1.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except Tactivation\_time will be replaced with the value TFirstSSB + 5ms as defined in clause 8.3.

#### A.7.5.3.2 SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2

##### A.7.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.1.1 except the PCell is in FR1 and SCell is in FR2.

The supported test configurations are defined in Table A.7.5.3.2.1-1. The general test parameters are the same as defined in Table A.6.5.3.1.1-2 except that the length of T2 is 2s. And cell specific test parameters are described in Tables A.7.5.3.2.1-2. OTA related test parameters are defined in Table A.7.5.3.2.1-3.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2.

During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot m+TL1-RSRP. In the next DL slot after slot m+TL1-RSRP, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

Table A.7.5.3.2.1-1: Supported test configurations for FR2 SCell activation case

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode  Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode  Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 3 | PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations | |

Table A.7.5.3.2.1-2: Cell specific test parameters for FR2 SCell activation case

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | | Unit | Cell 1 | | | | Cell 2 | | |
| T1 | T2 |  | |  | T1 | T2 |
| SSB ARFCN | |  | Freq1 | | | | Freq2 | | |
| Duplex mode | Config 1 |  | FDD | | | | TDD | | |
| Config 2,3 |  | TDD | | | | | | |
| TDD configuration | Config 1 |  | Not Applicable | | | TDDConf.3.1 | | | |
| Config 2 | TDDConf.1.1 | | |
| Config 3 | TDDConf.2.1 | | |
| Downlink initial BWP Configuration | Config 1,2,3 |  | DLBWP.0.1 | | | | | | |
| Downlink dedicated BWP Configuration | Config 1,2,3 |  | DLBWP.1.1 | | | | | | |
| Uplink initial BWP configuration | Config 1,2,3 |  | ULBWP.0.1 | | | | | | |
| Uplink dedicated BWP configuration | Config 1,2,3 |  | ULBWP.1.1 | | | | | | |
| TRS configuration | Config 1,2,3 |  | N/A | | | | TRS.2.1 TDD | | |
| TCI state | Config 1,2,3 |  | TCI.State.0 | | | | | | |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | | 100: NRB,c = 66 | | |
| Config 3 | 40: NRB,c = 106 | | | |
| Data RBs allocated | Config 1,2 |  | 52 | 66 | 52 | | 66 | 52 | 66 |
| Config 3 | 106 | 106 | | 106 |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | | - | | |
| Config 2 |  | SR.1.1 TDD | | | |
| Config 3 |  | SR.2.1 TDD | | | |
| RMSI CORESET Parameters | Config 1 |  | CR.1.1 FDD | | | | - | | |
| Config 2 |  | CR.1.1 TDD | | | |
| Config 3 |  | CR.2.1 TDD | | | |
| Dedicated CORESET Parameters | Config 1 |  | CCR.1.1 FDD | | | | - | | |
| Config 2 | CCR.1.1 TDD | | | |
| Config 3 | CCR.2.1 TDD | | | |
| OCNG Patterns | |  | OP.1 | | | | | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 | | | | SSB.3 FR2 | | |
| Config 3 | SSB.2 FR1 | | | |
| CSI-RS configuration for CSI reporting | Config 1~3 |  | N/A | | | | N/A | CSI-RS.3.1 TDD Note 6 | CSI-RS.3.1 TDD |
| reportConfigType for CSI reporting |  |  | periodic | | | | N/A | | |
| reportConfigType for L1-RSRP |  |  | periodic | | | | N/A | | |
| reportQuantity for CSI reporting |  |  | cri-RI-PMI-CQI | | | | N/A | | |
| reportQuantity for L1-RSRP |  |  | ssb-Index-RSRP | | | | N/A | | |
| CSI reporting periodicity | Config 1,2 | slot | 5 | | | | N/A | | |
| Config 3 | 10 | | | |
| L1-RSRP reporting periodicity Note 7 | Config 1,2 | slot | 5 | | | | N/A | | |
| Config 3 | 10 | | | |
| CSI reporting offset | Config 1,2 | slot | 2 | | | | N/A | | |
| Config 3 | 4 | | | |
| L1-RSRP reporting offset | Config 1,2 | slot | 2 | | | | N/A | | |
| Config 3 | 4 | | | |
| SMTC configuration | |  | SMTC.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\_DMRS | |  |  | | | | | | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |  |  | | | | | | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |  | | | | | | |
| Propagation conditions | |  | N/A  Link only, see clause A.3.7A | | | 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: Void  Note 3: Void  Note 4: Void  Note 5: All parameters apply for configuration 1, 2 and 3  Note 6: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 7: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | |

Table A.7.5.3.2.1-3: OTA related test parameters for FR1 PCell activation case with FR2 SCell

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | Cell 2 | | | | |
| T1 | T2 | T3 | T1 | T2 | | T3 | |
| Angle of arrival configuration | |  | N/A | | | According to clause A.3.15.1 | | | | |
| Assumption for UE beams Note 7 | |  | N/A | | | Rough | | | | |
| Note 1 | Config 1,2,3 | dBm/15kHz | Link only, see clause A.3.7A | | | -104.7 | | | | |
| Note 1 | Config 1,2,3 | dBm/SCS | -95.7 | | | | |
|  | Config 1,2,3 | dB | -∞ | | 7 | | 7 |
|  | Config 1,2,3 | dB | -∞ | | 7 | | 7 |
| SSB\_RPNote 2, Note 4 | Config 1,2,3 | dBm/SCS | -∞ | | -88.7 | | -88.7 |
| IoNote 2, Note 4 | Config 1,2,3 | dBm/95.04 MHz | -66.68 | | -58.92 | | -58.92 |
| 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: Es/Iot, SSB\_RP 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: Information about types of UE beam is given in B.2.1.3 and does not imit UE implementation or test system implementation. | | | | | | | | | | |

##### A.7.5.3.2.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PCell in the slot.

During T2 the UE shall start sending valid L1-RSRP report for the SCell in the configured slots for CSI reporting after slot (m+TL1-RSRP), where TL1-RSRP is no larger than

3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report

as defined in clause 8.3.2. For this test case, TFirstSSB\_MAX=TSMTC\_MAX=Trs=20ms; TL1-RSRP, measure=160ms and TL1-RSRP, report=5ms, which allows TL1-RSRP 680 ms.

During T2 the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot , where

- THARQ is defined in Table A.5.5.3.1.1-2

- Tactivation\_time = 3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}, which allows 710 ms

- TCSI\_Reporting = 10ms

- NR slot length is 0.125ms for this test case.

During T3 the UE shall stop sending CSI reports for both SCells no later than slot , as defined in clause 8.3.

During T2 interruption of PCell during SCell activation shall not happen outside the slot to , as defined in clause 8.3, where TX =20ms.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3.

The interruption of PCell due to activation of SCell shall not be more than the values specified for SA in Clause 8.2.2.2.7.

#### A.7.5.3.3 SCell Activation and deactivation for SCell in FR2 inter-band in non-DRX

##### A.7.5.3.3.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.1.1 except the PCell and SCell are in FR2 inter-band.

The supported test configurations are shown in table A.7.5.3.3.1-1 below. The general test parameters are described in Tables A.7.5.3.3.1-2, and cell specific test parameters are described in Tables A.7.5.3.3.1-3. OTA related test parameters are shown in table A.7.5.3.3.1-4 below.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell. A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m.

The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 is increased to same level as for cell 2. During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot m+TL1-RSRP. In the next DL slot after slot m+TL1-RSRP, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PSCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

Table A.7.5.3.3.1-1: Supported test configurations for FR2 SCell activation in FR2 inter-band

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |

Table A.7.5.3.3.1-2: General test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channels are used for this test. RF channel number 1 is in band 1 and RF channel number 2 is in band 2, where bands 1 and 2 are inter-band CA operating bands in FR2 as specified in Table 5.2A.2-1 in TS38.101-2. |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2. |
| 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 |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | ≤8 | A random value from 0μs to 8μs |
| T1 | s | 7 | During this time the PCell shall be known and the SCell configured and detected. |
| T2 | s | 2 | 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 [3] depends on UE’s capability |
| TCSI\_Reporting | ms | 2 | the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |

Table A.7.5.3.3.1-3: Cell specific test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | Unit | T1 | | T2 | | T3 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN |  | freq1 | freq2 | freq1 | freq2 | freq1 | freq2 |
| Duplex mode |  | TDD | | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | |
| Downlink initial BWP Configuration |  | DLBWP.0.1 | | DLBWP.0.1 | | DLBWP.0.1 | |
| Downlink dedicated BWP Configuration |  | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | ULBWP.0.1 | | ULBWP.0.1 | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | |
| TRS configuration |  | TRS.2.1 TDD | | TRS.2.1 TDD | | TRS.2.1 TDD | |
| TCI state |  | TCI.State.0 | | TCI.State.0 | | TCI.State.0 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Parameters |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| CSI-RS configuration |  | NA | NA | NA | CSI-RS.3.1 TDD Note 2 | NA | CSI-RS.3.1 TDD |
| CSI reporting periodicity Note 3 |  | NA | 5 | NA | 5 | NA | 5 |
| OCNG Patterns |  | OP.1 | | | | | |
| SSB Configuration |  | SSB.1 FR2 | | | | | |
| SMTC Configuration |  | SMTC.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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | 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: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 3: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | |

Table A.7.5.3.3.1-4: OTA related test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup |  | Setup 3 as specified in clause A.3.15 | | | | | |
| **AoA1** | | | **AoA2** | | |
| Assumption for UE beams Note 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -92.1 | | | -92.1 | | |
| Note1 | dBm/SCSNote3 | -83.1 | | | -83.1 | | |
|  | dB | 0 | | | 0 | | |
| SS-RSRPNote2 | dBm/SCS Note4 | -83.1 | | | -83.1 | | |
|  | dB | 0 | | | 0 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -51.1 | | | -51.1 | | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: All parameters apply for configuration 1  Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | |

##### A.7.5.3.3.2 Test Requirements

During T2 the UE shall start sending CSI report for the SCell in the configured slots for CSI reporting after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k). UE shall send the first CSI report for SCell after receiving at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k), or in the next available uplink resource for CSI reporting if the slot was subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PCell in the slot.

During T2, the UE shall start sending valid L1-RSRP report for the SCell in the configured slots for CSI reporting after slot (m+TL1-RSRP), where TL1-RSRP is no larger than 3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report as defined in clause 8.3.2. For this test case, TFirstSSB\_MAX=TSMTC\_MAX=Trs=20ms; TL1-RSRP, measure=480ms and TL1-RSRP, report=5ms, which allows TL1-RSRP =1000ms.

During T2, the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot , where

- THARQ is defined in Table A.7.5.3.3.1-2

- Tactivation\_time = 3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}, which allows 1030ms

- TCSI\_Reporting = 10ms

- NR slot length is 0.125ms for this test case.

During T2, the interruption of PCell during SCell activation shall not happen outside the slot to , where TX =20ms.

During T3, the UE shall stop sending CSI reports for SCell no later than slot , as defined in clause 8.3.

During T3, the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to as defined in clause 8.3.

#### A.7.5.3.4 Direct SCell activation at SCell addition of known SCell in FR2

##### A.7.5.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the delay and interruption for direct SCell activation delay at SCell addition are within the requirements stated in clause 8.3.4.

The supported test configurations are shown in Table A.7.5.3.4.1-1 below. The general test parameters are given in Table A.7.5.3.4.1-2 and cell-specific test parameters in Table A.7.5.3.4.1-3. OTA related test parameters are shown in Table A.7.5.3.4.1-4.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two FR2 carriers and two NR cells. Before the test starts the UE is connected to Cell 1 (PCell) on carrier #1, but is not aware of Cell 2 on NR carrier #2. Cell 1 and Cell 2 have constant signal levels throughout the test. The UE is monitoring the PCell. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the Cell 2 is monitored by the UE. During T1, Cell 2 should be detected and measured by the UE such that it meets the condition for known cell defined in clause 8.3.4 for direct SCell activation.

Time period T2 starts when the *RRCReconfiguration* message for the configuration and activation of Cell 2 (the SCell), which is sent from the test equipment, is received at the UE antenna connector in a slot # denoted m. The test equipment shall set the parameter *sCellState* to *activated* for the SCell, which causes Cell 2 to become configured and activated.

Time period T3 starts at (m + Ndirect), at which point UE shall be reporting a valid CQI for both PCell and SCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during the activation of SCell. The test equipment verifies the activation time by counting the slots from the time when the SCell activation message is sent until a CQI report with other than CQI index 0 is received.

Table A.7.5.3.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 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 | |

Table A.7.5.3.4.1-2: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channels (1,2) in FR2 are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured and activated SCell |  | Cell 2 | Configured and activated SCell on NR RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| T1 | s | 7 | During this time the measurement for Cell 2 is configured, and Cell 2 is detected. |
| T2 | s | Ndirect | During this time the UE shall configure and activate Cell 2 as SCell. |
| T3 | ms | 100 | During this time the UE shall report valid CQI for both PCell and SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots indicated by the PDSCH-to-HARQ\_feedback timing indicator field in a corresponding DCI format or provided by *dl-DataToUL-ACK* if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3] |
| k | slot |  | As specified in clause 4.3 of TS 38.213 [3] |

Table A.7.5.3.4.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| SSB ARFCN | |  | freq1 | | | freq2 | | |
| Duplex mode | Config 1 |  | TDD | | | | | |
| TDD configuration | Config 1 |  | TDDConf.3.1 | | | | | |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 | | | | | |
| 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 | | | | | |
| Timing offset to Cell 1 | | ms | Not Applicable | | | 0 | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.3.1 TDD | | | SR.3.1 TDD | | |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD | | | CR.3.1 TDD | | |
| RMC CORESET Reference Channel | Config 1 |  | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| TRS configuration | Config 1 |  | TRS.2.1 TDD | | | TRS.2.1 TDD | | |
| CSI-RS configuration | Config 1 |  | CSI-RS.3.1 TDD | | | CSI-RS.3.1 TDD | | |
| CSI reporting periodicity | Config 1 | ms | 5 | | | 5 | | |
| OCNG Patterns | |  | OP.1 | | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | |
| SSB configuration | Config 1 |  | SSB.1 FR2 | | | SSB.1 FR2 | | |
| 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) | |
| Propagation condition | | - | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | | | | |

Table A.7.5.3.4.1-4: OTA related test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 1 | | | Cell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Angle of arrival configuration |  | Setup 1 according to A.3.15.1 | | | | | |
| Assumption for UE beamsNote 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -112 | | | -112 | | |
| Note1 | dBm/SCSNote3 | -102.97 | | | -102.97 | | |
|  | dB | 14 | | | 14 | | |
| SS-RSRPNote2 | dBm/SCS Note4 | -88.97 | | | -88.97 | | |
|  | dB | 14 | | | 14 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -59.81 | | | -59.81 | | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: All parameters apply for configuration 1  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.5.3.4.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after slot (m+k). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PCell in the slot.

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot , where

Ndirect = TRRC\_Process + T1 + Tactivation\_time + TCSI\_Reporting - 3ms,

- TRRC\_Process = 16ms, which is the RRC procedure delay defined for SCell addition in clause 12 of TS 38.331 [2],

- T1 is the delay from slot m + TRRC\_Process until the transmission of *RRCReconfigurationComplete* message,

- Tactivation\_time = TFirstSSB+ 5ms = 25ms,

- TCSI\_Reporting = 10ms

This gives a total of Ndirect = 16 + T1 + 25 + 10 - 3 = (48 + T1) ms, and NR slot length is 0.125ms.

During T3 the UE shall send CSI reports for SCell with non-zero CQI index and continue to send CSI reports for SCell with non-zero CQI index until the end of T3.

During T2 interruption of PSCell during SCell activation shall not happen outside the window from slot *m*+1 to slot *m+*1+ as defined in clause 8.3.4, where TX =20ms.

The interruption of PCell due to activation of SCell shall not be more than the values specified for NR SA in clause 8.2.2.2.11.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot as defined in clause 8.3.4 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

#### A.7.5.3.5 Direct SCell activation at handover with known SCell in FR2

##### A.7.5.3.5.1 Test Purpose and Environment

This test is to verify the requirements specified in sub clause 8.3.5 for the FR2 handover with direct SCell activation.

The test scenario comprises of three FR2 cells, one source PCell (Cell 1), one target PCell (Cell 2) and one SCell (Cell 3). The test consists of three successive time periods, with time durations of T1, T2, and T3 respectively.

At the start of time duration T1, the UE is in connected mode with PCell (Cell 1). Both Cell 2 and Cell 3 are known to UE and UE is reporting CQI for all Cell 1.

Time period T2 starts when UE receives a handover command that initiate handover of UE to Cell2 and also activates Cell 3. This is done using an *RRCConnectionReconfiguration* message with parameter *sCellState* set to *activated* for the Cell 3. The message is sent from the test equipment to the UE and is received in a slot number n at the UE antenna connector. The UE shall accomplish the handover, addition and activation of the SCell no later than slot (n +).

Time period T3 starts at (n +), at which point UE shall be reporting a valid CSI for both Cell 2 and Cell 3 as given in tables A.7.5.3.5.1-1 and A.7.5.3.5.1-2.

Table A.7.5.3.5.1-1: Supported test configurations for FR2 handover with direct SCell activation case

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | SCell: NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.5.3.5.1-2: General test parameters for FR2 handover with direct SCell activation case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | |  | 1, 2, 3 | Three NR radio channels are used for this test, Cell 1, Cell2 and Cell 3 use RF channel 1, 2 and 3 respectively. |
| A4-Offset | | dBm | -120 |  |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| Initial conditions | Source cell |  | Cell 1 | Source Cell |
| Target cell |  | Cell 2 | Neighbour cell |
| SCell |  | Cell 3 | SCell is not added and activated |
| Final condition | Source cell |  | Cell 2 | Cell 2 is Source cell after handover |
| Neighbour cell |  | Cell 1 | Neighbour cell |
| SCell |  | Cell 3 | SCell is added and activated |

Table A.7.5.3.5.1-3: Cell specific test parameters for FR2 SCell activation case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | Unit | T1 | | | T2 | | | T3 | | |
| Cell 1 | Cell 2 | Cell 3 | Cell 1 | Cell 2 | Cell 3 | Cell 1 | Cell 2 | Cell 3 |
| SSB ARFCN |  | freq1 | freq2 | freq 3 | freq1 | freq2 | freq 3 | freq1 | freq2 | freq3 |
| Duplex mode |  | TDD | | | TDD | | | TDD | | |
| TDD configuration |  | TDDConf.3.1 | | | TDDConf.3.1 | | | TDDConf.3.1 | | |
| Downlink initial BWP Configuration |  | DLBWP.0.1 | | | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Downlink dedicated BWP Configuration |  | DLBWP.1.1 | | | DLBWP.1.1 | | | DLBWP.1.1 | | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | | ULBWP.0.1 | | | ULBWP.0.1 | | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | | ULBWP.1.1 | | | ULBWP.1.1 | | |
| TRS configuration |  | TRS.2.1 TDD | | | TRS.2.1 TDD | | | TRS.2.1 TDD | | |
| TCI state |  | TCI.State.0 | | | TCI.State.0 | | | TCI.State.0 | | |
| BWchannel | MHz | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | | - | SR.3.1 TDD | | - | SR.3.1 TDD | |  |
| RMSI CORESET Parameters |  | CR.3.1 TDD | | - | CR.3.1 TDD | | - | CR.3.1 TDD | |  |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | | - | CCR.3.1 TDD | | - | CCR.3.1 TDD | |  |
| OCNG Patterns |  | OP.1 | | | | | | | | |
| SSB Configuration |  | SSB.1 FR2 | | | | | | | | |
| SMTC Configuration |  | SMTC.1 | | | | | | | | |
| PRACH configuration |  | FR2 PRACH configuration 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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | 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: Void | | | | | | | | | | |

Table A.7.5.3.5.1-4: OTA related test parameters for FR2 SCell activation case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
| T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| Angle of arrival configuration |  | Setup 1 according to table A.3.15.1 | | | Setup 1 according to table A.3.15.1 | | | Setup 1 according to table A.3.15.1 | | |
| Assumption for UE beams Note 7 |  | Rough | | | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -112 | | | -112 | | | -112 | | |
| Note1 | dBm/SCSNote3 | -102.97 | | | -102.97 | | | -102.97 | | |
|  | dB | 14 | | | 14 | | | 14 | | |
| SS-RSRPNote2 | dBm/SCS Note4 | -88.97 | | | -88.97 | | | -88.97 | | |
|  | dB | 14 | | | 14 | | | 14 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -88.80 | | | -88.80 | | | -88.80 | | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | | | | |

##### A.7.5.3.5.2 Test Requirements

The UE shall be capable to transmit valid CSI report for PCell (Cell 2) and to the directly activated SCell1 no later than in slot n+ *Ndirect*.

The SCell activation delay, Ndirect, can be expressed as: Ndirect = TRRC\_process + Tinterrupt + T2 + T3 + Tactivation\_time + TCSI\_Reporting - 3ms; Where:

- TRRC\_Process: RRC procedure delay defined in clause 12 of TS 38.331 and it is equal to 16ms,

- Tinterrupt: Interruption time during handover as specified in clause 6.1.1. The value to be verified in the test is 52 ms (Tinterrupt = 0 ms for Tsearch + 10ms for TIU + 20 ms for Tprocessing + 20ms for T∆ + 2 ms for Tmargin ms) by assuming known SCell and SMTC.1 configuration.

- T2: Delay from slot until UE has obtained a valid TA command for the target PCell,

- T3: Delay for applying the received TA for uplink transmission in the target PCell, and greater than or equal to k+1 slot, where k is defined in clause 4.2 in TS 38.213,

- Tactivation\_timeand TCSI\_Reportingare specified in clause 8.3.2, where the following definitions of *TFirstSSB* and *TFirstSSB\_MAX* as defined in section 8.3.5 shall apply:

During time period T2 of the test, the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot , Tactivation\_time = TSMTC\_SCell + 5ms, as defined in clause 8.3.

During time period T3 of the test, the UE shall stop sending CSI reports for SCell at latest in a slot , as defined in clause 8.3.

During time period T2 of the test, interruption of PCell / PSCell during SCell activation shall not happen outside the slot to , as defined in clause 8.3.

During time period T3 of the test, the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3.

The interruption on any activated serving cell shall not be more than the values specified for SA in clause 8.2.2.2.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During time period T2 of the test, if there are no uplink resources for reporting the valid CSI in a slot as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

#### A.7.5.3.6 PUCCH SCell activation and deactivation for FR1+FR2 inter-band with target SCell in FR2 and known

##### A.7.5.3.6.1 Test Purpose and Environment

The purpose of this test is to verify that the PUCCH SCell activation and deactivation times are within the requirements stated in clause 8.3.12 and 8.3.14, when the PUCCH SCell in FR2 is known by the UE at the time of activation.

The supported test configurations are shown in table A.7.5.3.6.1-1 below. The test parameters are given in Tables A.7.5.3.6.1-2 and cell-specific parameters in A.7.5.3.6.1-3 below. The test consists of four successive time periods, with duration of T1, T2 T3, and T4 respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the PUCCH SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the PUCCH SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI for the activated PUCCH SCell at latest in slot*n*+ , and report valid CSI for the activated DL SCell at latest in slot*n*+, as defined in clause 8.3.13. In this test case, both valid TA and invalid TA cases shall be tested.

Test for case when UE has valid TA: the *TimeAlignmentTimer* [2] associated with the TAG containing the PUCCH SCell is running, and Tdelay\_multiple\_SCells\_PUCCH\_SCell = Tactivation\_time\_multiple\_scells + [X]\*Ttarget\_PL\_RS + TCSI\_Reporting.

Test for case when UE do not have valid TA: Tdelay\_multiple\_SCells\_PUCCH\_SCell = Tactivation\_time\_multiple\_scells + max ((TFirst\_available\_CSI + TCSI\_processing), [X]\*Ttarget\_PL\_RS,(T1+T2+T3)) + TCSI\_reporting\_after

Tactivation\_time\_multiple\_scells is the target SCell activation delay in millisecond in multiple SCell activation scenario as specified in section 8.3.7

Any PCell interruption due to activation of PUCCH SCell shall occur in the slot to , as defined in clause 8.3, where is the interruption length given in clause 8.2

Time period T3 starts when a MAC message for deactivation of PUCCH SCell abd DL SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot , as defined in clause 8.3.14and the starting point of any PCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3.14.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of PUCCH SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

Table A.7.5.3.6.1-1: Supported test configurations for FR2 SCell activation case

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode  Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode  Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 3 | PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations | |

Table A.7.5.3.6.1-2: Cell specific test parameters for FR2 SCell activation case

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter Note 5** | | **Unit** | **Cell 1** | | | | | | | **Cell 2** | | | | | | |
| **T1** | **T2** | | **T3** | | **T4** | | **T1** | **T2** | | **T3** | | **T4** |
| SSB ARFCN | |  | Freq1 | | | | | | | Freq2 | | | | | | |
| Duplex mode | Config 1 |  | FDD | | | | | | | TDD | | | | | | |
| Config 2,3 |  | TDD | | | | | | | | | | | | | |
| TDD configuration | Config 1 |  | Not Applicable | | | | | | TDDConf.3.1 | | | | | | | |
| Config 2 | TDDConf.1.1 | | | | | |
| Config 3 | TDDConf.2.1 | | | | | |
| Downlink initial BWP Configuration | Config 1,2,3 |  | DLBWP.0.1 | | | | | | | | | | | | | |
| Downlink dedicated BWP Configuration | Config 1,2,3 |  | DLBWP.1.1 | | | | | | | | | | | | | |
| Uplink initial BWP configuration | Config 1,2,3 |  | ULBWP.0.1 | | | | | | | | | | | | | |
| Uplink dedicated BWP configuration | Config 1,2,3 |  | ULBWP.1.1 | | | | | | | | | | | | | |
| TRS configuration | Config 1,2,3 |  | N/A | | | | | | | TRS.2.1 TDD | | | | | | |
| TCI state | Config 1,2,3 |  | TCI.State.0 | | | | | | | | | | | | | |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | | | | | 100: NRB,c = 66 | | | | | | |
| Config 3 | 40: NRB,c = 106 | | | | | | |
| Data RBs allocated | Config 1,2 |  | 52 | | 66 | | 52 | | | 66 | | 52 | | 66 | | |
| Config 3 | 106 | | 106 | | | 106 | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | | | | | - | | | | | | |
| Config 2 |  | SR.1.1 TDD | | | | | | |
| Config 3 |  | SR.2.1 TDD | | | | | | |
| RMSI CORESET Parameters | Config 1 |  | CR.1.1 FDD | | | | | | | - | | | | | | |
| Config 2 |  | CR.1.1 TDD | | | | | | |
| Config 3 |  | CR.2.1 TDD | | | | | | |
| Dedicated CORESET Parameters | Config 1 |  | CCR.1.1 FDD | | | | | | | - | | | | | | |
| Config 2 | CCR.1.1 TDD | | | | | | |
| Config 3 | CCR.2.1 TDD | | | | | | |
| OCNG Patterns | |  | OP.1 | | | | | | | | | | | | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 | | | | | | | SSB.3 FR2 | | | | | | |
| Config 3 | SSB.2 FR1 | | | | | | |
| CSI-RS configuration for CSI reporting | Config 3 |  | N/A | | | | | | | CSI-RS.3.1 TDD | | | | | | |
| reportConfigType for CSI reporting |  |  | periodic | | | | | | |
| reportQuantity for CSI reporting |  |  | cri-RI-PMI-CQI | | | | | | |
| CSI reporting periodicity | Config 3 | slot | 40 | | | | | | |
| CSI reporting offset | Config 3 | slot | 8 | | | | | | |
| SMTC configuration | |  | SMTC.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\_DMRS | |  |  | | | | | | | | | | | | | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |  |  | | | | | | | | | | | | | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |  | | | | | | | | | | | | | |
| Propagation conditions | |  | N/A  Link only, see clause A.3.7A | | | | | | 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: Void  Note 3: Void  Note 4: Void  Note 5: All parameters apply for configuration 1, 2 and 3 | | | | | | | | | | | | | | | | |

Table A.7.5.3.6.1-3: OTA related test parameters for FR2 SCell with FR1 PCell

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | | | **Cell 2** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Angle of arrival configuration | |  | N/A | | | According to clause A.3.15.1 | | |
| Assumption for UE beams Note 7 | |  | N/A | | | Rough | | |
| Note 1 | Config 1,2,3 | dBm/15kHz | Link only, see clause A.3.7A | | | -104.7 | | |
| Note 1 | Config 1,2,3 | dBm/SCS | -95.7 | | |
|  | Config 1,2,3 | dB | -∞ | 7 | 7 |
|  | Config 1,2,3 | dB | -∞ | 7 | 7 |
| SSB\_RPNote 2, Note 4 | Config 1,2,3 | dBm/SCS | -∞ | -88.7 | -88.7 |
| IoNote 2, Note 4 | Config 1,2,3 | dBm/95.04 MHz | -66.68 | -58.92 | -58.92 |
| 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: Es/Iot, SSB\_RP 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: Information about types of UE beam is given in B.2.1.3 and does not imit UE implementation or test system implementation. | | | | | | | | |

##### A.7.5.3.6.2 Test Requirements

By end of T2 the UE shall finish the DL activation for the PUCCH SCell. Assuming the periodic CSI reporting is used and assuming periodic CSI activation and TCI state is sent along with SCell activation MAC CE, UE shall finish the DL activation by slot n+ 10ms + THARQ + TFineTiming

With SSB periodicity of 20ms, UE shall complete DL activation of PUCCH SCell with in 30ms after transmitting HARQ message for SCell activation command.

During T2 the UE shall start sending PRACH preamble to TE and shall obtain the TA command from TA and shall be ready to send valid CSI report to the TE. CSI report shall be transmitted within 30ms + [X=0] + max ((TFirst\_available\_CSI + TCSI\_processing), (T1+T2+T3)) + TCSI\_reporting\_after from the transmission of HARQ feedback of SCell activation command as specified in the 8.3.12.

During T3 the UE shall stop sending CSI reports for both SCells no later than slot , as defined in clause 8.3.

During T2 interruption of PCell during SCell activation shall not happen outside the slot to , as defined in clause 8.3, where TX =20ms.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3.

The interruption of PCell due to activation of SCell shall not be more than the values specified for SA in Clause 8.2.2.2.7.

#### A.7.5.3.7 PUCCH SCell activation and deactivation delay requirements of FR2 unknown cell with FR1 PCell

##### A.7.5.3.7.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.7.1 except the PUCCH SCell in FR2 is unknown.

The supported test configurations and the general test parameters are defined in Table A.7.5.3.7.1-1 and Table A.7.5.3.7.1-2, respectively. And cell specific test parameters are described in Tables A.7.5.3.7.1-3. OTA related test parameters are defined in Table A.7.5.3.7.1-4. In all test cases, two cells are used. Cell 1 is the FR1 PCell in the primary Timing Advance Group (pTAG) and cell 2 is the FR2 PUCCH SCell in the secondary Timing Advance Group (sTAG).

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment T1 after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. At the time of T2, the UE does not have a valid TA for the SCell in sTAG. Immediately at the beginning of T2 the transmission power of Cell 2 is increased to same level as for cell 2

During T2, the test equipment monitors the L1-RSRP measurement result for the SCell reported on the PCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot m+TL1-RSRP. In the next DL slot after slot m+TL1-RSRP, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell and PUCCH-SpatialRelation of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell. THARQ + Tactivation\_time after slot m, the UE shall be able to monitor PDCCH on the SCell that triggers PDCCH order-based contention-free PRACH. The test equipment receives the PRACH and sends random access response with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value estimated from the PRACH. The UE shall start reporting CSI of the SCell with non-zero CQI index via PUCCH on the SCell no later than slot m + (THARQ + Tdelay\_PUCCH\_SCell)/NR slot length. Here, Tactivation\_time is the SCell activation delay defined in 8.3.2 for FR2 unknown SCell with periodic CSI-RS used for CSI reporting, and Tdelay\_PUCCH\_SCell is the PUCCH SCell activation delay defined in 8.3.12 for an invalid TA scenario.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during the activation of the SCell.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CSI reporting on the SCell is discontinued.

Table A.7.5.3.7.11: Supported test configurations for FR2 SCell activation case

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode  Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode  Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 3 | PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations | |

Table A.7.5.3.7.1-2: General test parameters for unknown FR2 PUCCH SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channel (1, 2) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated PUCCH SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | ≤25 | A random value from 0μs to 25μs |
| T1 | s | 7 | During this time the PCell shall be known and the SCell configured and detected. |
| T2 | s | 2 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| THARQ | ms | Config 1: 2  Config 2: 3  Config 3: 2.5 | 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 [3] that will meet the timing constraints of this test case. |
| TCSI\_Reporting | ms | 15 | 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) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] and TS 38.213 [3]. |

Table A.7.5.3.7.1-3: Cell specific test parameters for FR2 PUCCH SCell activation case

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | | Unit | Cell 1 | | | | Cell 2 | | |
| T1 | T2 |  | |  | T1 | T2 |
| SSB ARFCN | |  | Freq1 | | | | Freq2 | | |
| Duplex mode | Config 1 |  | FDD | | | | TDD | | |
| Config 2,3 |  | TDD | | | | | | |
| TDD configuration | Config 1 |  | Not Applicable | | | TDDConf.3.1 | | | |
| Config 2 | TDDConf.1.1 | | |
| Config 3 | TDDConf.2.1 | | |
| Downlink initial BWP Configuration | Config 1,2,3 |  | DLBWP.0.1 | | | | | | |
| Downlink dedicated BWP Configuration | Config 1,2,3 |  | DLBWP.1.1 | | | | | | |
| Uplink initial BWP configuration | Config 1,2,3 |  | ULBWP.0.1 | | | | | | |
| Uplink dedicated BWP configuration | Config 1,2,3 |  | ULBWP.1.1 | | | | | | |
| TRS configuration | Config 1,2,3 |  | N/A | | | | TRS.2.1 TDD | | |
| TCI state | Config 1,2,3 |  | TCI.State.0 | | | | | | |
| PUCCH Spatial Relation | Config 1,2,3 |  | N/A | | | | PUCCH.SRI.0 | | |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | | 100: NRB,c = 66 | | |
| Config 3 | 40: NRB,c = 106 | | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | | SR.3.1 TDD | | |
| Config 2 |  | SR.1.1 TDD | | | |
| Config 3 |  | SR.2.1 TDD | | | |
| RMSI CORESET Parameters | Config 1 |  | CR.1.1 FDD | | | | - | | |
| Config 2 |  | CR.1.1 TDD | | | |
| Config 3 |  | CR.2.1 TDD | | | |
| Dedicated CORESET Parameters | Config 1 |  | CCR.1.1 FDD | | | | CCR.3.1 TDD | | |
| Config 2 | CCR.1.1 TDD | | | |
| Config 3 | CCR.2.1 TDD | | | |
| OCNG Patterns | |  | OP.1 | | | | | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 | | | | SSB.3 FR2 | | |
| Config 3 | SSB.2 FR1 | | | |
| CSI-RS configuration for CSI reporting | Config 1,2,3 |  | N/A | | | | N/A | CSI-RS.3.1 TDD Note 6 | CSI-RS.3.1 TDD |
| TimeAlignmentTimer for pTAG | Config 1,2,3 |  | ms500 | | | | N/A | | |
| TimeAlignmentTimer for sTAG | Config 1,2,3 |  | N/A | | | | ms500 | | |
| reportConfigType for CSI reporting |  |  | - | | | | Periodic | | |
| reportConfigType for L1-RSRP |  |  | periodic | | | | - | | |
| reportQuantity for CSI reporting |  |  | - | | | | cri-RI-PMI-CQI | | |
| reportQuantity for L1-RSRP |  |  | ssb-Index-RSRP | | | | - | | |
| CSI reporting periodicity | Config 1,2 | slot | - | | | | 40 | | |
| Config 3 | - | | | |
| L1-RSRP reporting periodicity Note 7 | Config 1,2 | slot | 5 | | | | - | | |
| Config 3 | 10 | | | |
| CSI reporting offset | Config 1,2 | slot | - | | | | 4 | | |
| Config 3 | - | | | |
| L1-RSRP reporting offset | Config 1,2 | slot | 2 | | | | - | | |
| Config 3 | 4 | | | |
| SMTC configuration | |  | SMTC.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\_DMRS | |  |  | | | | | | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |  |  | | | | | | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |  | | | | | | |
| Propagation conditions | |  | N/A  Link only, see clause A.3.7A | | | 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: Void  Note 3: Void  Note 4: Void  Note 5: Void  Note 6: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 7: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | |

Table A.7.5.3.7.1-4: OTA related test parameters for FR2 PUCCH SCell activation

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | Cell 2 | | | | |
| T1 | T2 | T3 | T1 | T2 | | T3 | |
| Angle of arrival configuration | |  | N/A | | | According to clause A.3.15.1 | | | | |
| Assumption for UE beams Note 7 | |  | N/A | | | Rough | | | | |
| Note 1 | Config 1,2,3 | dBm/15kHz | Link only, see clause A.3.7A | | | -104.7 | | | | |
| Note 1 | Config 1,2,3 | dBm/SCS | -95.7 | | | | |
|  | Config 1,2,3 | dB | -∞ | | 7 | | 7 |
|  | Config 1,2,3 | dB | -∞ | | 7 | | 7 |
| SSB\_RPNote 2, Note 4 | Config 1,2,3 | dBm/SCS | -∞ | | -88.7 | | -88.7 |
| IoNote 2, Note 4 | Config 1,2,3 | dBm/95.04 MHz | -66.68 | | -58.92 | | -58.92 |
| 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: Es/Iot, SSB\_RP 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: Information about types of UE beam is given in B.2.1.3 and does not imit UE implementation or test system implementation. | | | | | | | | | | |

##### A.7.5.3.7.2 Test Requirements

During T2 the UE shall start sending a valid L1-RSRP report of the SCell to the PCell in the configured slots for CSI reporting after slot (m+TL1-RSRP), where TL1-RSRP is no larger than 3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report as defined in clause 8.3.2.

During T2 the UE shall start sending CSI reports of the SCell with non-zero CQI index via PUCCH on the SCell in the configured slots for CSI reporting no later than slot as defined in clause 8.3.12.

During T3 the UE shall stop sending CSI reports on the SCell no later than slot , as defined in clause 8.3.14.

During T2 interruption of PCell during the SCell activation shall not happen outside the slot to , as defined in clause 8.3, where TX =20ms. If the UE is not capable of parallelTxPRACH-SRS-PUCCH-PUSCH additional interruption can be allowed as defined in Clause 8.2.2.2.18.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3.14.

The interruption of PCell due to activation of SCell shall not be more than the values specified for SA in Clause 8.2.2.2.18.

#### A.7.5.3.8 SCell Activation and deactivation for known PUCCH SCell in FR2 inter-band in non-DRX

##### A.7.5.3.8.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements specified in clause 8.3, when PUCCH for a being activated SCell is configured on the SCell. The PCell and SCell are inter-band in FR2 and the SCell is known by a UE. The test shall be performed for the cases respectively where UE has valid TA and where UE does not have valid TA for an sTAG which the SCell belongs to at the time of activation.

The supported test configurations are shown in table A.7.5.3.8.11-1 below. The general test parameters are described in Tables A.7.5.3.8.1-2, and cell specific test parameters are described in Tables A.7.5.3.8.1-3. OTA related test parameters are shown in table A.7.5.3.8.1-4 below.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. The UE shall be continuously scheduled in the PCell (Cell 1) throughout the whole test.

Before the test starts, the UE is connected to the Cell 1 (PCell) on radio channel 1 but is not aware of Cell 2 (SCell) on radio channel 2. The PCell is in the pTAG and the SCell is in an sTAG. The UE is only monitoring the PCell.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured with PUCCH on radio channel 2. The UE now starts monitoring the Cell 2. During T1, Cell 2 should be detected and measured by the UE such that it meets the condition for known cell defined in clause 8.3.2 for SCell activation.

A MAC message for activation of SCell is sent by the test equipment in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2.

During T2,

- When the UE has a valid TA, the UE shall be able to report valid CSI for the activated SCell no later than in slot n+, as defined in clause 8.3.12.

- When the UE does not have a valid TA, the test equipment should send a PDCCH order to the UE to initiate RA procedure on the PUCCH SCell no later than in slot n+, and the UE shall be able to report valid CSI for the activated SCell no later than in slot , as defined in clause 8.3.12.

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot , as defined in clause 8.3, and the starting point of any PCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and the deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received from the PUCCH SCell.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting from the PUCCH SCell is discontinued.

Table A.7.5.3.8.1-1: Supported test configurations for FR2 PUCCH SCell activation in FR2 inter-band

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |

Table A.7.5.3.8.1-2: General test parameters for known PUCCH SCell activation in FR2 inter-band

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 | Two NR radio channels are used for this test. RF channel number 1 is in band 1 and RF channel number 2 is in band 2, where bands 1 and 2 are inter-band CA operating bands in FR2 as specified in Table 5.2A.2-1 in TS38.101-2. |
| Active PCell |  | Cell1 | PCell on NR RF channel number 1. |
| Configured PUCCH SCell |  | Cell2 | Configured PUCCH SCell on NR RF channel number 2. |
| 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 |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | ≤8 | A random value from 0μs to 8μs |
| Filter coefficient |  | 0 | L3 filtering is not used |
| 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 [3] depends on UE’s capability |
| TCSI\_Reporting | ms | 2 | the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |
| T1 | s | 7 | During this time the PUCCH SCell shall be configured and detected. |
| T2 | s | 2 | During this time the UE shall activate the PUCCH SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the PUCCH SCell. |
| TimeAlignmentTimer | ms | 1280 | Cell 1 in pTAG. |
| TimeAlignmentTimerSTAG | ms | [1280] | Cell 2 in sTAG. |

Table A.7.5.3.8.1-3: Cell specific test parameters for FR2 PUCCH SCell activation in FR2 inter-band

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | Unit | T1 | | T2 | | T3 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN |  | freq1 | freq2 | freq1 | freq2 | freq1 | freq2 |
| Duplex mode |  | TDD | | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | |
| Downlink initial BWP Configuration |  | DLBWP.0.1 | | DLBWP.0.1 | | DLBWP.0.1 | |
| Downlink dedicated BWP Configuration |  | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | ULBWP.0.1 | | ULBWP.0.1 | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | |
| TRS configuration |  | TRS.2.1 TDD | | TRS.2.1 TDD | | TRS.2.1 TDD | |
| TCI state |  | TCI.State.0 | | TCI.State.0 | | TCI.State.0 | |
| Spatial Relation Configuration |  | PUCCH.SRI.0 | | PUCCH.SRI.0 | | PUCCH.SRI.0 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Parameters |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| CSI-RS configuration |  | NA | NA | NA | CSI-RS.3.1 TDD Note 2 | NA | CSI-RS.3.1 TDD |
| CSI reporting periodicity Note 3 |  | NA | 5 | NA | 5 | NA | 5 |
| PRACH configuration |  | - | - | - | FR2 PRACH configuration 2 | - | FR2 PRACH configuration 2 |
| OCNG Patterns |  | OP.1 | | | | | |
| SSB Configuration |  | SSB.1 FR2 | | | | | |
| SMTC Configuration |  | SMTC.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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | 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: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 3: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | |

Table A.7.5.3.8.1-4: OTA related test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup |  | Setup 3 as specified in clause A.3.15 | | | | | |
| **AoA1** | | | **AoA2** | | |
| Assumption for UE beams Note 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -92.1 | | | -92.1 | | |
| Note1 | dBm/SCSNote3 | -83.1 | | | -83.1 | | |
|  | dB | 0 | | | 0 | | |
| SS-RSRPNote2 | dBm/SCS Note4 | -83.1 | | | -83.1 | | |
|  | dB | 0 | | | 0 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -51.1 | | | -51.1 | | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: All parameters apply for configuration 1  Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | |

##### A.7.5.3.8.2 Test Requirements

During T2, when the UE has valid TA, the UE shall start sending CSI report for the SCell with non-zero CQI index on the PUCCH SCell no later than in slot n+, where Tactivation\_time is max(Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay-THARQ) as defined in clause 8.3.2, which allows 5ms.

If the UE has a valid TA for transmitting on the SCell, during T2, the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting on PUCCH SCell no later than slot , where

- THARQ is defined in Table A.4.5.3.1.1-2

- Tactivation\_time = max(Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay-THARQ), which allows 5ms

- TCSI\_Reporting = 10ms

- NR slot length is 0.125ms for this test case.

If the UE does not have a valid TA for transmitting on the SCell, during T2, the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot , where

- THARQ is defined in Table A.4.5.3.1.1-2

- Tdelay\_PUCCH\_SCell = Tactivation\_time + max ((TFirst\_available\_CSI + TCSI\_processing), (T1+T2+T3), [X]\*Ttarget\_PL-RS) + TCSI\_reporting\_after

- FFS the value of T1+T2+T3 and TCSI\_reporting\_after

- NR slot length is 0.125ms for this test case.

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot to , as defined in clause 8.3.

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot n, as defined in clause 8.3.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3.

#### A.7.5.3.9 PUCCH SCell Activation and deactivation of unknown SCell in FR2

##### A.7.5.3.9.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation are done within the required time period defined in clause 8.3.12, when PUCCH for a being activated SCell is configured on the NR FR2 SCell. The PCell and SCell are in different FR2 band. The SCell is unknown by the UE and the UE does not have valid TA for a sTAG which the SCell belongs to at the time of activation. Supported test configurations are shown in table A.7.5.3.9.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.7.5.3.9.1-2 and A.7.5.3.9.1-3 below. OTA related test parameters are shown in table A.7.5.3.9.1-4 below.

In the test there are two cells: Cell1 and Cell2. Cell1 is PCell, Cell2 is the PUCCH SCell being activated and deactivated. The test consists of three successive time periods with duration of T1, T2 and T3, respectively. The UE shall be continuously scheduled in Cell1 (PCell) throughout the test.

Before the test starts, the UE is connected to the PCell (Cell 1) on NR radio channel 1 (PCC), but is not aware of SCell (Cell2) on NR radio channel 2 (SCC). The PCell is in the pTAGs and the SCell is in a sTAG. The UE is only monitoring the PCC.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) gets configured with PUCCH on NR radio channel 2 (SCC). The UE now starts monitoring the SCC2 also. Test equipment sends a MAC message for activation of the SCell. The MAC message for the activation is received at the UE antenna connector at slot # denoted m, which is defined as the start of time period T2.

Immediately at beginning of T2 the transmission power of Cell 2 is increased to same level as for Cell 1. During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot m+TL1-RSRP. In the next DL slot after slot m+TL1-RSRP, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell. During T2, the test equipment should send a PDCCH order to the UE to initiate RA procedure on the PUCCH SCell at slot (m+) after UE report on PCell.

Time period T3 starts when a MAC message for deactivation of the PUCCH SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CSI reporting for SCell is discontinued.

Table A.7.5.3.9.1-1: PUCCH SCell Activation and deactivation test configurations in FR2 inter-band

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |

Table A.7.5.3.9.1-2: General test parameters for PUCCH SCell activation and deactivation in FR2 inter-band

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 | Two NR radio channels are used for this test. RF channel number 1 is in band 1 and RF channel number 2 is in band 2, where bands 1 and 2 are inter-band CA operating bands in FR2 as specified in Table 5.2A.2-1 in TS38.101-2. |
| Active PCell |  | Cell1 | PCell on NR RF channel number 1. |
| Configured PUCCH SCell |  | Cell2 | Configured PUCCH SCell on NR RF channel number 2. |
| 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 |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| *TimeAlignmentTimer* for sTAG | ms | 5120 | Set for UE has not valid TA at start of T2 based on T1 = 7s. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to Cell1 | μs | ≤ 8 | A random value from 0μs to 8μs |
| Filter coefficient |  | 0 | L3 filtering is not used |
| 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 k1 should be the minimum value defined in TS 38.213 [3] depends on UE’s capability |
| TCSI\_Reporting | ms | 2 | the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |
| T1 | s | 7 | During this time the PUCCH SCell shall be configured and detected. |
| T2 | s | 2 | During this time the UE shall activate the PUCCH SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the PUCCH SCell. |

Table A.7.5.3.9.1-3: NR Cell specific test parameters for PUCCH SCell activation and deactivation in FR2 inter-band

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| SSB ARFCN |  | freq1 | | | freq2 | | |
| Duplex mode |  | TDD | | | | | |
| TDD configuration |  | TDDConf.3.1 | | | | | |
| 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 |  | TRS.2.1 TDD | | | | | |
| TCI state |  | TCI.State.0 | | | | | |
| BWchannel | MHz | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | | | - | | |
| RMSI CORESET Parameters |  | CR.3.1 TDD | | | - | | |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | | | - | | |
| CSI-RS configuration |  | NA | | | NA | CSI-RS.3.1 TDD Note 2 | |
| CSI reporting periodicity Note 3 |  | NA | | | NA | 5 | |
| OCNG Patterns |  | OP.1 | | | | | |
| SSB Configuration |  | SSB.1 FR2 | | | | | |
| SMTC Configuration |  | SMTC.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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | 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: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 3: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | |

Table A.7.5.3.9.1-4: OTA related test parameters for PUCCH SCell activation and deactivation in FR2 inter-band

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup |  | Setup 3 as specified in clause A.3.15 | | | | | |
| **AoA1** | | | **AoA2** | | |
| Assumption for UE beams Note 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -92.1 | | | -92.1 | | |
| Note1 | dBm/SCSNote3 | -83.1 | | | -83.1 | | |
|  | dB | 0 | | | -infinite | 0 | |
| SS-RSRPNote2 | dBm/SCS Note4 | -83.1 | | | -infinite | -83.1 | |
|  | dB | 0 | | | -infinite | 0 | |
| IoNote2 | dBm/ 95.04 MHz Note4 | -51.1 | | | -54.1 | -51.1 | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: All parameters apply for configuration 1  Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | |

##### A.7.5.3.9.2 Test Requirements

During T2, the UE shall start sending valid L1-RSRP report for the SCell in the configured slots for CSI reporting after slot (m+TL1-RSRP), where TL1-RSRP is no larger than 3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report as defined in clause 8.3.12. For this test case, TFirstSSB\_MAX=TSMTC\_MAX=Trs=20ms; TL1-RSRP, measure=480ms and TL1-RSRP, report=5ms, which allows TL1-RSRP =1000ms.

During T2, the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot , where

- THARQ is defined in Table A.7.5.3.3.1-2

- Tdelay\_PUCCH\_SCell = Tactivation\_time + max ((TFirst\_available\_CSI + TCSI\_processing), (T1+T2+T3), Tmeas) + TCSI\_reporting\_after

- Tactivation\_time = 3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}, which allows 1030ms

- Tmeas = 5\* Trs = 100ms

- NR slot length is 0.125ms for this test case.

During T2, the interruption of PCell during SCell activation shall not happen outside the slot to , where TX =20ms.

During T3, the UE shall stop sending CSI reports for SCell no later than slot , as defined in clause 8.3.14.

During T3, the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to as defined in clause 8.3.14.

#### A.7.5.3.10 SCell Activation and deactivation of FR2 known PUCCH SCell and one FR2 unknown SCell with FR2 PCell

##### A.7.5.3.10.1 Test Purpose and Environment

The purpose of this test is to verify that when a PUCCH SCell and DL SCell are activated using the same MAC CE command, the PUCCH SCell, and DL SCell activation and deactivation delays are within the requirements stated in clause 8.3.13 and 8.3.15. When UE receive the MAC CE activation command, PUCCH SCell in FR2 is known to UE and DL SCell in FR2 is unknown to the UE.

The supported test configurations are provided in table A.7.5.3.10.1-1 below. The general test parameters are given in Tables A.7.5.3.10.1-2 and cell-specific test parameters are given in A.7.5.3.10.1-3. OTA related test parameters are given in A.7.5.3.10.1-4.

The test consists of two sub tests, one with valid timing advance (TA), and other with invalid TA. The test consists of six successive time periods, with duration of T1, T2, and T3 respectively. There are two NR carriers, and PCC has two cell and SCC has one cells. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 but is not aware of Cell 2 (PUCCH SCell) and Cell 3 (DL SCell). Cell1 and Cell 3 are configured on primary timing advance group (pTAG). Cell2 is on different band than Cell1 and Cell3. For valid TA case, Cell1, Cell2 and Cell 3 are on same TAG. For invalid TA case Cell 2 is on different TAG than Cell1 and Cell3. At the start of the test, the UE is monitoring PCC and not SCC.

At the beginning of T1, the UE receives an RRC message by which the PUCCH SCell (Cell 2) and DL SCell (Cell 3) becomes configured on radio channel 2 and 1 respectively. In T1, the UE starts measuring PUCCH SCell 1 and DL SCell is not detectable. During the duration of T1, the time alignment timer is running on and pTAG, and the TA is maintained on PCell. At the end of T1, the test equipment sends a MAC CE message for activation of the PUCCH SCell and DL SCell simultaneously.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI for the activated PUCCH SCell at latest in slot*n1*+ , and report valid CSI for the activated DL SCell at latest in slot*n1*+, as defined in clause 8.3.13. In this test case, both valid TA and invalid TA cases shall be tested.

Test for case when UE has valid TA (i.e., the *TimeAlignmentTimer* [2] associated with the TAG containing the PUCCH SCell is running), Tdelay\_multiple\_SCells\_PUCCH\_SCell = Tactivation\_time\_multiple\_scells + [X]\*Ttarget\_PL\_RS + TCSI\_Reporting.

Test for case when UE do not have valid TA: Tdelay\_multiple\_SCells\_PUCCH\_SCell = Tactivation\_time\_multiple\_scells + max ((TFirst\_available\_CSI + TCSI\_processing), [X]\*Ttarget\_PL\_RS,(T1+T2+T3)) + TCSI\_reporting\_after

Tactivation\_time\_multiple\_scells is the target SCell activation delay in millisecond in multiple SCell activation scenario as specified in section 8.3.7

In case of valid TA, for Cell2 activation, the UE shall start reporting CSI in PUCCH SCell in slot and shall report CQI index 0 (out-of-range) until the PUCCH SCell activation has been completed.

For Cell3 activation, the UE shall start reporting CSI in PCell in slot and shall report CQI index 0 (out-of-range) until the DL SCell activation has been completed.

Any PCell interruption due to activation of PUCCH SCell or DL SCell shall occur in the slot to , as defined in clause 8.3.13, where is the interruption length given in clause 8.2.2.2.7.

Time period T3 starts when a MAC message for deactivation of PUCCH SCell and DL SCell, sent from the test equipment to the UE in a slot # denoted n2, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot , as defined in clause 8.3.15, and the starting point of any PCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3.15.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of PUCCH SCell and DL SCell, respectively.

The test equipment verifies the PUCCH SCell activation time by counting the slots from the time when the PUCCH SCell activation command is sent until a CSI report with other than CQI index 0 is received. The test equipment verifies the DL SCell activation time by counting the slots from the time when the DL SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the PUCCH SCell deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for PUCCH SCell is discontinued. The test equipment verifies the DL SCell deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for DL SCell is discontinued.

Table A.7.5.3.10.1-1: Supported test configurations for FR2 SCell activation in FR2 inter-band

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode for PCell  NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode for PUCCH SCell and DL SCell |

Table A.7.5.3.10.1-2: General test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channels are used for this test. RF channel number 1 is in band 1 and RF channel number 2 is in band 2, where bands 1 and 2 are inter-band CA operating bands in FR2 as specified in Table 5.2A.2-1 in TS38.101-2. |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated PUCCH SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 2. |
| 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 |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 and Cell3 timing offset to cell1 | μs | ≤8 | A random value from 0μs to 8μs |
| T1 | s | 6 | During this time the PUCCH SCell shall be known and the DL SCell configured and detected. |
| T2 | s | 2 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| T4 | s | 6 | During this time the PUCCH SCell shall be known and the DL SCell configured and detected. |
| T5 | s | 2 | During this time the UE shall activate the PUCCH SCell and DL SCell. |
| T6 | s | 1 | During this time the UE shall deactivate the PUCCH SCell and DL 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 [3] depends on UE’s capability |
| TCSI\_Reporting | ms | 2 | the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |

Table A.7.5.3.10.1-3: Cell specific test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | Unit | T1 | | | T2 | | | T3 | | |
| Cell 1 | Cell 2 | Cell3 | Cell 1 | Cell 2 | Cell3 | Cell 1 | Cell 2 | Cell3 |
| SSB ARFCN |  | freq1 | freq2 | | freq1 | freq2 | | freq1 | freq2 | |
| Duplex mode |  | TDD | | | TDD | | | TDD | | |
| TDD configuration |  | TDDConf.3.1 | | | TDDConf.3.1 | | | TDDConf.3.1 | | |
| Downlink initial BWP Configuration |  | DLBWP.0.1 | | | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Downlink dedicated BWP Configuration |  | DLBWP.1.1 | | | DLBWP.1.1 | | | DLBWP.1.1 | | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | | ULBWP.0.1 | | | ULBWP.0.1 | | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | | ULBWP.1.1 | | | ULBWP.1.1 | | |
| TRS configuration |  | TRS.2.1 TDD | | | TRS.2.1 TDD | | | TRS.2.1 TDD | | |
| TCI state |  | TCI.State.0 | | | TCI.State.0 | | | TCI.State.0 | | |
| BWchannel | MHz | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | | SR.3.1 TDD | - | | SR.3.1 TDD | - | |
| RMSI CORESET Parameters |  | CR.3.1 TDD | - | | CR.3.1 TDD | - | | CR.3.1 TDD | - | |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | - | | CCR.3.1 TDD | - | | CCR.3.1 TDD | - | |
| CSI-RS configuration |  | CSI-RS.3.1 TDD | NA | | CSI-RS.3.1 TDD | CSI-RS.3.1 TDD Note 2 | | CSI-RS.3.1 TDD | CSI-RS.3.1 TDD | |
| CSI reporting periodicity Note 3 |  | NA | 5 | | NA | 5 | | NA | 5 | |
| OCNG Patterns |  | OP.1 | | | | | | | | |
| SSB Configuration |  | SSB.1 FR2 | | | | | | | | |
| SMTC Configuration |  | SMTC.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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | 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: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 3: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | | |

Table A.7.5.3.10.1-4: OTA related test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 1 | | Cell3 | | Cell 2 | | |
| T1 | T2 | | T3 | T1 | T2 | T3 |
| AoA setup |  | Setup 3 as specified in clause A.3.15 | | | | | | |
| **AoA1** | | | | **AoA2** | | |
| Assumption for UE beams Note 7 |  | Rough | | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -92.1 | | | | -92.1 | | |
| Note1 | dBm/SCSNote3 | -83.1 | | | | -83.1 | | |
|  | dB | 0 | | | | -∞ | | |
| SS-RSRPNote2 | dBm/SCS Note4 | -83.1 | | | | -83.1 | | |
|  | dB | 0 | | | | 0 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -51.1 | | | | -51.1 | | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: All parameters apply for configuration 1  Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | | |

##### A.7.5.3.10.2 Test Requirements

When UE receive SCell activation command at slot n1, during T2 the UE shall start sending CSI reports for SCell2 with non-zero CQI index in the configured slots for CSI reporting no later than slot , where

- THARQ is defined in Table A.5.5.3.x6.1-2

- Tdelay\_multiple\_SCells\_PUCCH\_SCell is defined in section 8.13.13.1. In this test case, both valid TA and invalid TA cases shall be tested.

- Test for case when UE has valid TA: the *TimeAlignmentTimer* [2] associated with the TAG containing the PUCCH SCell is running, and Tdelay\_multiple\_SCells\_PUCCH\_SCell = Tactivation\_time\_multiple\_scells + [X]\*Ttarget\_PL\_RS + TCSI\_Reporting.

- Test for case when UE do not have valid TA: Tdelay\_multiple\_SCells\_PUCCH\_SCell = Tactivation\_time\_multiple\_scells + max ((TFirst\_available\_CSI + TCSI\_processing), [X]\*Ttarget\_PL\_RS,(T1+T2+T3)) + TCSI\_reporting\_after.

- Tactivation\_time\_multiple\_scells is the target SCell activation delay in millisecond in multiple SCell activation scenario as specified in section 8.3.7.

- TCSI\_Reporting = 10ms

- NR slot length is 0.125ms.

During T2 the UE shall start sending CSI reports for SCell3 with non-zero CQI index in the configured slots for CSI reporting no later than slot where

- THARQ is defined in Table A.5.5.3.x6.1-2

- Tdelay\_multiple\_SCells\_other\_SCell = Tactivation\_time\_multiple\_scells +TCSI\_Reporting.

- Tactivation\_time\_multiple\_scells is the target SCell activation delay in millisecond in multiple SCell activation scenario as specified in section 8.3.7

- TCSI\_Reporting = 10ms

- NR slot length is 0.125ms.

Any PCell interruption due to activation of PUCCH SCell or DL SCell shall occur in the slot to , as defined in clause 8.3.13, where is the interruption length given in clause 8.2.2.2.7.

During T3, when UE receives deactivation MAC CE at n2 slot, the UE shall stop sending CSI reports for both PUCCH SCell and DL SCell no later than slot , as defined in clause 8.3. The starting point of any PCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3.15.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot , as defined in clause 8.3.13 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

#### A.7.5.3.11 PUCCH SCell activation and deactivation delay requirements of FR2 unknown cell with FR2 PCell

##### A.7.5.3.11.1 PUCCH SCell activation with non-PUCCH SCell in a secondary PUCCH Group

###### A.7.5.3.11.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.11 except the PUCCH SCell in FR2 is unknown and another to-be-activated FR2 non-PUCCH SCell in parallel with the PUCCH SCell belongs to the secondary PUCCH group.

The supported test configurations and the general test parameters are defined in Table A.7.5.3.11.1.1-1 and Table A.7.5.3.11.1.1-2, respectively. And cell specific test parameters are described in Tables A.7.5.3.11.1.1-3. OTA related test parameters are defined in Table A.7.5.3.11.1.1-4. In all test cases, three cells are used. Cell 1 is the FR2 PCell, and Cell 2 and Cell 3 are SCells in a different band from Cell 1. Cell 2 is PUCCH SCell and Cell 3 is non-PUCCH SCell belonging to the secondary PUCCH group.

In the test configuration 1, the UE is configured with a single Timingi Advance Group (TAG) for all cells, whereas UE is configured with a primary TAG (pTAG) for Cell 1 and a secondary TAG (sTAG) for Cell 2 and Cell 3 in the test configuration 2. The test configuration 1 and 2 are to verify the UE performance for the case where the UE has a valid TA for the PUCCH SCell and the case where the UE does not have a valid TA for the PUCCH SCell, respectively.

At the beginning of T1 the UE receives an RRC message by which the PUCCH SCell (Cell) and the non-PUCCH SCell (Cell 3) become configured on NR. During T1 the SCells are powered off and UE is not aware of the SCells.

A MAC message for activation of SCells is sent by the test equipment T1 after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCells is received at the UE antenna connector defines the start of time period T2. Immediately at the beginning of T2 the transmission power of Cell 2 is increased to same level as for cell 2 At the time of T2, the UE has a valid TA in the test configuration 1 while the UE does not have a valid TA for the SCell in sTAG in the test configuration 2. During the test for the test configuration 1, the UE needs to be provided with a new Timing Advance Command MAC control element at least once during each time alignment timer period.

During T2, the test equipment monitors the L1-RSRP measurement result for the PUCCH SCell reported on the PCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot m+TL1-RSRP. In the next DL slot after slot m+TL1-RSRP, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCells and PUCCH-SpatialRelation of the PUCCH SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for the SCells.

During the test for the test configuration 1, the UE shall start reporting CSI of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the SCell no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for a valid TA scenario.

During the test for the test configuration 2, THARQ + Tactivation\_time after slot m, the UE shall be able to monitor PDCCH on the PUCCH SCell that triggers PDCCH order-based contention-free PRACH. The test equipment receives the PRACH and sends random access response with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value estimated from the PRACH. The UE shall start reporting CSI of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the SCell no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tactivation\_time is the SCell activation delay defined in 8.3.2 for FR2 unknown SCell with periodic CSI-RS used for CSI reporting, and Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for an invalid TA scenario.

Time period T3 starts when a MAC message for deactivation of the SCells, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during the activation of the SCells.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CSI reporting on the PUCCH SCell is discontinued.

Table A.7.5.3.11.1.1-1: Supported test configurations for FR2 SCell activation case

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | PCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Target SCells: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | PCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Target SCells: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is required to pass both of the supported test configurations. The UE will be configured with a single Timing Advance Group (TAG) in the test configuration 1 whearas two TAGs are used in the test configuration 2. | |

Table A.7.5.3.11.1.1-2: General test parameters for unknown FR2 PUCCH SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2,3 | Three NR radio channel (1, 2, 3) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated PUCCH SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2. The cell is in a different FR2 band from Cell 1. |
| Configured deactivated non-PUCCH SCell |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 3. The cell is intra-band contiguous to Cell 2. |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | ≤25 | A random value from 0μs to 25μs |
| Cell3 timing offset to cell1 | μs | ≤25 | A random value from 0μs to 25μs |
| Cell3 timing offset to cell2 | μs | 0 |  |
| T1 | s | 7 | During this time the PCell (Cell 1) shall be known and the SCells (Cell 2 and Cell 3) configured and detected. |
| T2 | s | 2 | During this time the UE shall activate the SCells. |
| T3 | s | 1 | During this time the UE shall deactivate the SCells. |
| THARQ | ms | Config 1: 2  Config 2: 3  Config 3: 2.5 | 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 [3] that will meet the timing constraints of this test case. |
| TCSI\_Reporting | ms | 15 | 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) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] and TS 38.213 [3]. |

Table A.7.5.3.11.1.1-3: Cell specific test parameters for FR2 PUCCH SCell activation case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
| T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| SSB ARFCN | |  | freq1 | | | freq2 | | | freq3 | | |
| Duplex mode | Config 1,2 |  | TDD | | | | | | | | |
| TDD configuration | Config 1,2 |  | TDDConf.3.1 | | | | | | | | |
| Downlink initial BWP Configuration | Config 1,2 |  | DLBWP.0.1 | | | | | | | | |
| Downlink dedicated BWP Configuration | Config 1,2 |  | DLBWP.1.1 | | | | | | | | |
| Uplink initial BWP configuration | Config 1,2 |  | ULBWP.0.1 | | | | | | | | |
| Uplink dedicated BWP configuration | Config 1,2 |  | ULBWP.1.1 | | | | | | | | |
| TRS configuration | Config 1,2 |  | TRS.2.1 TDD | | | | | | | | |
| TCI state | Config 1,2 |  | TCI.State.0 | | | | | | | | |
| PUCCH Spatial Relation | Config 1,2 |  | PUCCH.SRI.0 | | | PUCCH.SRI.0 | | | N/A | | |
| BWchannel | Config 1,2 | MHz | 100: NRB,c = 66 | | | | | | | | |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.3.1 TDD | | | SR.3.1 TDD | | | - | | |
| RMSI CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD | | | - | | | - | | |
| Dedicated CORESET Parameters | Config 1,2 |  | CCR.3.1 TDD | | | CCR.3.1 TDD | | | - | | |
| TimeAlignmentTimer for pTAG | Config 1,2 |  | ms500 | | | N/A | | | N/A | | |
| TimeAlignmentTimer for sTAG | Config 1 |  | N/A | | | N/A | | | N/A | | |
| Config 2 |  | N/A | | | ms500 | | | N/A | | |
| CSI-RS configuration for CSI reporting | Config 1,2 |  | - | | | N/A | CSI-RS.3.1 TDD  Note 6 | | N/A | CSI-RS.3.1 TDD  Note 6 | |
| SSB configuration | Config 1,2 |  | SSB.3 FR2 | | | N/A | SSB.3 FR2 | | N/A | SSB.3 FR2 | |
| CSI reporting periodicity | Config 1,2 | ms | 5 | | | 5 | | | N/A | | |
| reportConfigType for CSI reporting | Config 1,2 |  | - | | | Periodic | | | N/A | | |
| reportConfigType for L1-RSRP | Config 1,2 |  | periodic | | | - | | | N/A | | |
| reportQuantity for CSI reporting | Config 1,2 |  | - | | | cri-RI-PMI-CQI | | | - | | |
| reportQuantity for L1-RSRP | Config 1,2 |  | ssb-Index-RSRP | | | - | | | N/A | | |
| CSI reporting periodicity | Config 1,2 |  | - | | | 40 | | | 40 | | |
| L1-RSRP reporting periodicity Note 7 | Config 1,2 |  | 40 | | | - | | | N/A | | |
| CSI reporting offset | Config 1,2 |  | - | | | 4 | | | 4 | | |
| L1-RSRP reporting offset | Config 1,2 |  | 4 | | | - | | | N/A | | |
| OCNG Patterns | |  | OP.1 | | | | | | | | |
| SMTC configuration | |  | SMTC.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) | |
| 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: Void  Note 3: Void  Note 4: Void  Note 5: Void  Note 6: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 7: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | | | |

Table A.7.5.3.11.1.1-4: OTA related test parameters for FR2 PUCCH SCell activation

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 2 | | | Cell 3 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Angle of arrival configuration |  | Setup 1 according to A.3.15.1 | | | | | |
| Assumption for UE beamsNote 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -112 | | | -112 | | |
| Note1 | dBm/SCSNote3 | -102.97 | | | -102.97 | | |
|  | dB | -∞ | 14 | 14 | -∞ | 14 | 14 |
| SS-RSRPNote2 | dBm/SCS Note4 | -∞ | -88.97 | -88.97 | -∞ | -88.97 | -88.97 |
|  | dB | -∞ | 14 | 14 | -∞ | 14 | 14 |
| IoNote2 | dBm/95.04 MHz Note4 | -73.98 | -59.81 | -59.81 | -73.98 | -59.81 | -59.81 |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: All parameters apply for configuration 1 and 2  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

###### A.7.5.3.11.1.2 Test Requirements

During T2 the UE shall start sending a valid L1-RSRP report of the SCell to the PCell in the configured slots for CSI reporting after slot (m+TL1-RSRP), where TL1-RSRP is no larger than 3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report as defined in clause 8.3.2.

During T2, if the test is based on the test configuration 1, the UE shall start sending CSI reports of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the SCell no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for a valid TA scenario.

During T2, if the test is based on the test configuration 2, the UE shall start sending CSI reports of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the SCell (Cell 2) no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for an invalid TA scenario.

During T3 the UE shall stop sending CSI reports on the PUCCH SCell no later than slot , as defined in clause 8.3.15.

During T2 interruption of PCell during the SCell activation shall not happen outside the slot to , as defined in clause 8.3, where TX =20ms. If the UE is not capable of parallelTxPRACH-SRS-PUCCH-PUSCH additional interruption can be allowed as defined in Clause 8.2.2.2.18.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3.15.

The interruption of PCell due to activation of SCells shall not be more than the values specified for SA in Clause 8.2.2.2.18.

##### A.7.5.3.11.2 PUCCH SCell activation with non-PUCCH SCell in a primary PUCCH Group

###### A.7.5.3.11.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.11 except the PUCCH SCell in FR2 is unknown and another to-be-activated FR2 non-PUCCH SCell in parallel with the PUCCH SCell belongs to the primary PUCCH group.

The supported test configurations and the general test parameters are defined in Table A.7.5.3.11.2.1-1 and Table A.7.5.3.11.2.1-2, respectively. And cell specific test parameters are described in Tables A.7.5.3.11.2.1-3. OTA related test parameters are defined in Table A.7.5.3.11.2.1-4. In all test cases, three cells are used. Cell 1 and Cell 3 are FR2 PCell and FR2 non-PUCCH SCell in the same band, respectively, and Cell 2 is PUCCH SCells in a different band from Cell 1 and Cell 3. Cell 3 belongs to the primary PUCCH group.

In the test configuration 1, the UE is configured with a single Timingi Advance Group (TAG) for all cells, whereas UE is configured with a primary TAG (pTAG) for Cell 1 and a secondary TAG (sTAG) for Cell 2 and Cell 3 in the test configuration 2. The test configuration 1 and 2 are to verify the UE performance for the case where the UE has a valid TA for the PUCCH SCell and the case where the UE does not have a valid TA for the PUCCH SCell, respectively.

At the beginning of T1 the UE receives an RRC message by which the PUCCH SCell (Cell) and the non-PUCCH SCell (Cell 3) become configured on NR. During T1 the SCells are powered off and UE is not aware of the SCells.

A MAC message for activation of SCells is sent by the test equipment T1 after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCells is received at the UE antenna connector defines the start of time period T2. Immediately at the beginning of T2 the transmission power of Cell 2 is increased to same level as for cell 2 At the time of T2, the UE has a valid TA in the test configuration 1 while the UE does not have a valid TA for the SCell in sTAG in the test configuration 2. During the test for the test configuration 1, the UE needs to be provided with a new Timing Advance Command MAC control element at least once during each time alignment timer period.

During T2, the test equipment monitors the L1-RSRP measurement result for the PUCCH SCell reported on the PCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot m+TL1-RSRP. In the next DL slot after slot m+TL1-RSRP, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCells and PUCCH-SpatialRelation of the PUCCH SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for the SCells.

During the test for the test configuration 1, the UE shall start reporting CSI of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the PUCCH SCell (Cell 2) and PCell (Cell 1), respectively, no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for a valid TA scenario.

During the test for the test configuration 2, THARQ + Tactivation\_time after slot m, the UE shall be able to monitor PDCCH on the PUCCH SCell that triggers PDCCH order-based contention-free PRACH. The test equipment receives the PRACH and sends random access response with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value estimated from the PRACH. The UE shall start reporting CSI of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the PUCCH SCell (Cell 2) and PCell (Cell 1), respectively, no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tactivation\_time is the SCell activation delay defined in 8.3.2 for FR2 unknown SCell with periodic CSI-RS used for CSI reporting, and Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for an invalid TA scenario.

Time period T3 starts when a MAC message for deactivation of the SCells, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during the activation of the SCells.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CSI reporting on the PUCCH SCell is discontinued.

Table A.7.5.3.11.2.1-1: Supported test configurations for FR2 SCell activation case

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | PCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Target SCells: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | PCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Target SCells: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is required to pass both of the supported test configurations. The UE will be configured with a single Timing Advance Group (TAG) in the test configuration 1 whearas two TAGs are used in the test configuration 2. | |

Table A.7.5.3.11.2.1-2: General test parameters for unknown FR2 PUCCH SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2,3 | Three NR radio channel (1, 2, 3) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated PUCCH SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2. The cell is in a different FR2 band from Cell 1. |
| Configured deactivated non-PUCCH SCell |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 3. The cell is intra-band contiguous to Cell 1. |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | ≤25 | A random value from 0μs to 25μs |
| Cell3 timing offset to cell1 | μs | ≤25 | A random value from 0μs to 25μs |
| Cell3 timing offset to cell2 | μs | 0 |  |
| T1 | s | 7 | During this time the PCell (Cell 1) shall be known and the SCells (Cell 2 and Cell 3) configured and detected. |
| T2 | s | 2 | During this time the UE shall activate the SCells. |
| T3 | s | 1 | During this time the UE shall deactivate the SCells. |
| THARQ | ms | Config 1: 2  Config 2: 3  Config 3: 2.5 | 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 [3] that will meet the timing constraints of this test case. |
| TCSI\_Reporting | ms | 15 | 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) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] and TS 38.213 [3]. |

Table A.7.5.3.11.2.1-3: Cell specific test parameters for FR2 PUCCH SCell activation case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
| T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| SSB ARFCN | |  | freq1 | | | freq2 | | | freq3 | | |
| Duplex mode | Config 1,2 |  | TDD | | | | | | | | |
| TDD configuration | Config 1,2 |  | TDDConf.3.1 | | | | | | | | |
| Downlink initial BWP Configuration | Config 1,2 |  | DLBWP.0.1 | | | | | | | | |
| Downlink dedicated BWP Configuration | Config 1,2 |  | DLBWP.1.1 | | | | | | | | |
| Uplink initial BWP configuration | Config 1,2 |  | ULBWP.0.1 | | | | | | | | |
| Uplink dedicated BWP configuration | Config 1,2 |  | ULBWP.1.1 | | | | | | | | |
| TRS configuration | Config 1,2 |  | TRS.2.1 TDD | | | | | | | | |
| TCI state | Config 1,2 |  | TCI.State.0 | | | | | | | | |
| PUCCH Spatial Relation | Config 1,2 |  | PUCCH.SRI.0 | | | PUCCH.SRI.0 | | | N/A | | |
| BWchannel | Config 1,2 | MHz | 100: NRB,c = 66 | | | | | | | | |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.3.1 TDD | | | SR.3.1 TDD | | | - | | |
| RMSI CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD | | | - | | | - | | |
| Dedicated CORESET Parameters | Config 1,2 |  | CCR.3.1 TDD | | | CCR.3.1 TDD | | | - | | |
| TimeAlignmentTimer for pTAG | Config 1,2 |  | ms500 | | | N/A | | | N/A | | |
| TimeAlignmentTimer for sTAG | Config 1 |  | N/A | | | N/A | | | N/A | | |
| Config 2 |  | N/A | | | ms500 | | | N/A | | |
| CSI-RS configuration for CSI reporting | Config 1,2 |  | - | | | N/A | CSI-RS.3.1 TDD  Note 6 | | N/A | CSI-RS.3.1 TDD  Note 6 | |
| SSB configuration | Config 1,2 |  | SSB.3 FR2 | | | N/A | SSB.3 FR2 | | N/A | SSB.3 FR2 | |
| CSI reporting periodicity | Config 1,2 | ms | 5 | | | 5 | | | N/A | | |
| reportConfigType for CSI reporting | Config 1,2 |  | - | | | Periodic | | | N/A | | |
| reportConfigType for L1-RSRP | Config 1,2 |  | periodic | | | - | | | N/A | | |
| reportQuantity for CSI reporting | Config 1,2 |  | - | | | cri-RI-PMI-CQI | | | - | | |
| reportQuantity for L1-RSRP | Config 1,2 |  | ssb-Index-RSRP | | | - | | | N/A | | |
| CSI reporting periodicity | Config 1,2 |  | - | | | 40 | | | 40 | | |
| L1-RSRP reporting periodicity Note 7 | Config 1,2 |  | 40 | | | - | | | N/A | | |
| CSI reporting offset | Config 1,2 |  | - | | | 4 | | | 4 | | |
| L1-RSRP reporting offset | Config 1,2 |  | 4 | | | - | | | N/A | | |
| OCNG Patterns | |  | OP.1 | | | | | | | | |
| SMTC configuration | |  | SMTC.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) | |
| 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: Void  Note 3: Void  Note 4: Void  Note 5: Void  Note 6: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 7: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | | | |

Table A.7.5.3.11.2.1-4: OTA related test parameters for FR2 PUCCH SCell activation

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 2 | | | Cell 3 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Angle of arrival configuration |  | Setup 1 according to A.3.15.1 | | | | | |
| Assumption for UE beamsNote 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -112 | | | -112 | | |
| Note1 | dBm/SCSNote3 | -102.97 | | | -102.97 | | |
|  | dB | -∞ | 14 | 14 | -∞ | 14 | 14 |
| SS-RSRPNote2 | dBm/SCS Note4 | -∞ | -88.97 | -88.97 | -∞ | -88.97 | -88.97 |
|  | dB | -∞ | 14 | 14 | -∞ | 14 | 14 |
| IoNote2 | dBm/95.04 MHz Note4 | -73.98 | -59.81 | -59.81 | -73.98 | -59.81 | -59.81 |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: All parameters apply for configuration 1 and 2  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

###### A.7.5.3.11.2.2 Test Requirements

During T2 the UE shall start sending a valid L1-RSRP report of the SCell to the PCell in the configured slots for CSI reporting after slot (m+TL1-RSRP), where TL1-RSRP is no larger than 3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report as defined in clause 8.3.2.

During T2, if the test is based on the test configuration 1, the UE shall start sending CSI reports of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the PUCCH SCell (Cell 2) and PCell (Cell 1), respectively, no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for a valid TA scenario.

During T2, if the test is based on the test configuration 2, the UE shall start sending CSI reports of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the PUCCH SCell (Cell 2) and PCell (Cell 1), respectively, no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for an invalid TA scenario.

During T3 the UE shall stop sending CSI reports on the PUCCH SCell no later than slot , as defined in clause 8.3.15.

During T2 interruption of PCell during the SCell activation shall not happen outside the slot to , as defined in clause 8.3, where TX =20ms. If the UE is not capable of parallelTxPRACH-SRS-PUCCH-PUSCH additional interruption can be allowed as defined in Clause 8.2.2.2.18.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3.15.

The interruption of PCell due to activation of SCells shall not be more than the values specified for SA in Clause 8.2.2.2.18.

#### A.7.5.3.12 PSCell RACH-less based Activation and deactivation for FR1+FR2 inter-band with target PSCell in FR2

##### A.7.5.3.12.1 Test Purpose and Environment

The purpose of this test case is to test the activation PSCell delay for a UE configured with one deactivated SCG in NR-DC and when PScell in one SCG is being activated. The test also tests the deactivation delay. The test case tests the requirements within which the UE shall be able to activate the deactivated SCG in section 8.17.2 for RACH-less based conditions when PSCell and TCI state are known. The PCell is in NR FR1 and the PSCell is in NR FR2.

The supported test configurations are defined in Table A.7.5.3.12.1-1. And cell specific test parameters are described in Tables A.7.5.3.12.1-2. OTA related test parameters are defined in Table A.7.5.3.12.1-3.

At the beginning of T1 the UE is configured with a PSCell which is activated. At T1 the PSCell is deactivated. PSCell is configured with *bfd-and-RLM* with value *true*.

An RRC message for activation of PSCell is sent by the test equipment 1s after the RRC message deactivating the PSCell, in a slot # denoted m. The point in time at which the RRC message for activation of PSCell is received at the UE defines the start of time period T2.

During T2, the test equipment monitors for SR from the UE on the PSCell. The time when test equipment receives a scheduling request from the UE is denoted as slot T3.

Time period T4 starts when a RRC message for deactivation of the PSCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of the PSCell, respectively.

The test equipment verifies the activation time by when the SR from the UE is received in the activated PSCell.

The test equipment verifies the deactivation time by counting the slots from the time when the PSCell deactivation command is sent until UL transmission from the PSCell is discontinued.

Table A.7.5.3.12.1-1: Supported test configurations for FR2 PSCell activation case

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode  Target PSCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode  Target PSCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 3 | PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  Target PSCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations | |

Table A.7.5.3.12.1-2: Cell specific test parameters for FR2 PSCell activation case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | | Unit | Cell 1 | | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | | T1 | T2 | T3 | T4 |
| SSB ARFCN | |  | Freq1 | | | | | Freq2 | | | |
| Duplex mode | Config 1 |  | FDD | | | | | TDD | | | |
| Config 2,3 |  | TDD | | | | | | | | |
| TDD configuration | Config 1 |  | Not Applicable | | | | TDDConf.3.1 | | | | |
| Config 2 | TDDConf.1.1 | | | |
| Config 3 | TDDConf.2.1 | | | |
| Downlink initial BWP Configuration | Config 1,2,3 |  | DLBWP.0.1 | | | | | | | | |
| Downlink dedicated BWP Configuration | Config 1,2,3 |  | DLBWP.1.1 | | | | | | | | |
| Uplink initial BWP configuration | Config 1,2,3 |  | ULBWP.0.1 | | | | | | | | |
| Uplink dedicated BWP configuration | Config 1,2,3 |  | ULBWP.1.1 | | | | | | | | |
| TRS configuration | Config 1,2,3 |  | N/A | | | | | TRS.2.1 TDD | | | |
| TCI state | Config 1,2,3 |  | TCI.State.0 | | | | | | | | |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | | | 100: NRB,c = 66 | | | |
| Config 3 | 40: NRB,c = 106 | | | | |
| Data RBs allocated | Config 1,2 |  | 52 | 66 | 66 | 52 | | 66 | 52 | 52 | 66 |
| Config 3 | 106 | 106 | | 106 | 106 |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | | | - | | | |
| Config 2 |  | SR.1.1 TDD | | | | |
| Config 3 |  | SR.2.1 TDD | | | | |
| RMSI CORESET Parameters | Config 1 |  | CR.1.1 FDD | | | | | - | | | |
| Config 2 |  | CR.1.1 TDD | | | | |
| Config 3 |  | CR.2.1 TDD | | | | |
| Dedicated CORESET Parameters | Config 1 |  | CCR.1.1 FDD | | | | | - | | | |
| Config 2 | CCR.1.1 TDD | | | | |
| Config 3 | CCR.2.1 TDD | | | | |
| OCNG Patterns | |  | OP.1 | | | | | | | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 | | | | | SSB.3 FR2 | | | |
| Config 3 | SSB.2 FR1 | | | | |
| CSI-RS configuration for CSI reporting | Config 1~3 |  | N/A | | | | | CSI-RS.3.1 TDD | | | |
| reportConfigType for CSI reporting |  |  | periodic | | | | | N/A | | | |
| reportConfigType for L1-RSRP |  |  | periodic | | | | | N/A | | | |
| reportQuantity for CSI reporting |  |  | cri-RI-PMI-CQI | | | | | N/A | | | |
| reportQuantity for L1-RSRP |  |  | ssb-Index-RSRP | | | | | N/A | | | |
| CSI reporting periodicity | Config 1,2 | slot | 5 | | | | | N/A | | | |
| Config 3 | 10 | | | | |
| L1-RSRP reporting periodicity Note 7 | Config 1,2 | slot | 5 | | | | | N/A | | | |
| Config 3 | 10 | | | | |
| CSI reporting offset | Config 1,2 | slot | 2 | | | | | N/A | | | |
| Config 3 | 4 | | | | |
| L1-RSRP reporting offset | Config 1,2 | slot | 2 | | | | | N/A | | | |
| Config 3 | 4 | | | | |
| SMTC configuration | |  | SMTC.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\_DMRS | |  |  | | | | | | | | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |  |  | | | | | | | | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |  | | | | | | | | |
| Propagation conditions | |  | N/A  Link only, see clause A.3.7A | | | | AWGN | | | | |
| Scheduling request resource priodicity | | ms | N/A | | | | 20 | | | | |
| 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  Note 5: All parameters apply for configuration 1, 2 and 3  Note 6: Void.  Note 7: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | | | |

Table A.7.5.3.12.1-3: OTA related test parameters for FR1 PCell with FR2 PSCell activation case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| Angle of arrival configuration | |  | N/A | | | | According to clause A.3.15.1 | | | |
| Assumption for UE beams Note 7 | |  | N/A | | | | Rough | | | |
| Note 1 | Config 1,2,3 | dBm/15kHz | Link only, see clause A.3.7A | | | | -104.7 | | | |
| Note 1 | Config 1,2,3 | dBm/SCS | -95.7 | | | |
|  | Config 1,2,3 | dB | 7 | | | |
|  | Config 1,2,3 | dB | 7 | | | |
| SSB\_RPNote 2, Note 4 | Config 1,2,3 | dBm/SCS | -88.7 | | | |
| IoNote 2, Note 4 | Config 1,2,3 | dBm/95.04 MHz | -58.92 | | | |
| 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: Es/Iot, SSB\_RP 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: Information about types of UE beam is given in B.2.1.3 and does not imit UE implementation or test system implementation. | | | | | | | | | | |

##### A.7.5.3.12.2 Test Requirements

During T2 the UE shall send the first SR on PSCell in the first available uplink SR resource no later than T3 which is:

TRRC\_delay + Tprocessing + Tsearch + T∆ + TIU + 2 ms

as defined on section 8.17.2. In this test case:

- Tprocessing = 5ms (no RRC parameter has been modified),

- Tsearch = 0ms (RACH-less based PSCell activation, with RLM and BFD are configured, PSCell and TCI state are known), and

- T∆ = 20ms.

This allows T3 of [TRRC\_delay + TIU + 27]ms

During T4 the UE shall stop all transmissions on the PSCell no later than in slot as defined in 8.17.3.

During T2 the interruption of PCell during PSCell activation shall not happen outside the slot *m + TRRC\_delay*.

During T4 the interruption of PCell during PSCell deactivation shall not happen outside the slot *n + TRRC\_delay*.

The interruption duration on PCell due to activation and deactivation of PSCell shall not be more than the values specified for in Clause 8.17.2 and 8.17.3.

#### A.7.5.3.13 SCell Activation for SCell in FR2 intra-band in non-DRX

##### A.7.5.3.13.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.13.1 except the PCell and SCell are in FR2 intra-band.

The supported test configurations are shown in table A.7.5.3.13.1-1 below. The general test parameters are the same as defined in Table A.7.5.3.13.1-2 except those described in Tables A.7.5.3.13.1-2, and cell specific test parameters are described in Tables A.7.5.3.13.1-3. OTA related test parameters are shown in table A.7.5.3.13.1-4 below.

Table A.7.5.3.13.1-1: Supported test configurations for FR2 SCell activation case

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |

Table A.7.5.3.13.1-2: General test parameters for FR2 SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channels are used for this test, cell 1 and cell2 use RF channel 1 and 2, respectively. |

Table A.7.5.3.13.1-3: Cell specific test parameters for FR2 SCell activation case

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | | T1 | | T2 |
| SSB ARFCN |  | freq1 | | | freq2 | | |
| Duplex mode |  | TDD | | | | | |
| TDD configuration |  | TDDConf.3.1 | | | | | |
| 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 |  | TRS.2.1 TDD | | | | | |
| TCI state |  | TCI.State.0 | | | | | |
| BWchannel | MHz | 100: NRB,c = 66 | | | | | |
| Data RBs allocated |  | 66 | | 66 | | 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | | | - | | |
| RMSI CORESET Parameters |  | CR.3.1 TDD | | | - | | |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | | | - | | |
| OCNG Patterns |  | OP.1 | | | | | |
| SSB Configuration |  | SSB.1 FR2 | | | | | |
| Aperiodic CSI-RS for Scell activation |  | TRS.2.3 TDD | | | | | |
| gapBetweenBursts | Slot | N/A | | | | | |
| SMTC Configuration |  | SMTC.1 | | | | | |
| CSI-RS configuration for CSI reporting |  | CSI-RS.3.1 TDD | | | | | |
| reportConfigType |  | periodic | | | N/A | | |
| reportQuantity |  | cri-RI-PMI-CQI | | | N/A | | |
| CSI reporting periodicity | slot | 40 | | | N/A | | |
| CSI reporting offset | slot | 4 | | | N/A | | |
| 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\_DMRS |  |  | | | | | |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  | | | | | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  | | | | | |
| Propagation conditions |  | 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: Void  Note 3: Void  Note 4: Void  Note 5: Void | | | | | | | |

Table A.7.5.3.13.1-4: OTA related test parameters for FR2 SCell activation case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | Cell 2 | |
|  |  | T1 | T2 | T1 | T2 |
| Angle of arrival configuration |  | Setup 1 according to table A.3.15.1 | | Setup 1 according to table A.3.15.1 | |
| Assumption for UE beams Note 7 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -104.7 | | -104.7 | |
| Note1 | dBm/SCSNote3 | -95.7 | | -95.7 | |
|  | dB | 7 | | 7 | |
| SSB\_RPNote2 | dBm/SCS Note4 | -88.7 | | N/A | |
| CSI\_RPNote2 | dBm/SCS Note4 | N/A | | -88.7 | |
|  | dB | 7 | | 7 | |
| IoNote2 | dBm/95.04 MHz Note4 | -58.92 | | -58.92 | |
| 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: Es/Iot, SSB\_RP, CSI\_RP 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: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | |

##### A.7.5.3.13.2 Test Requirements

The test requirements defined in clause A.7.5.3.13.1 shall apply to this test case, except Tactivation\_time will be replaced with the value TFirstATRS + 5ms as defined in clause 8.3.16.

#### A.7.5.3.14 SCell Activation for known SCell in FR2 inter-band

##### A.7.5.3.14.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.14.1 except the PCell and SCell are in FR2 inter-band, when the SCell in FR2 is known by the UE at the time of activation.

The supported test configurations are shown in table A.7.5.3.14.1-1 below. The general test parameters are described in Tables A.7.5.3.14.1-2, and cell specific test parameters are described in Tables A.7.5.3.14.1-3. OTA related test parameters a A.7.5.3.14.1re shown in table A.7.5.3.14.1-4 below.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on NR. The UE now starts monitoring the SCell. The test equipment sends a MAC message for activation of the SCell triggering the aperiodic CSI-RS for fast SCell activation.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted m (where m mode 20=1), defines the start of time period T2. The UE shall be able to report valid CSI in PSCell for the activated SCell at latest in slot , as defined in clause 8.3.6. The UE shall start reporting CSI in PSCell after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption due to activation of SCell shall occur in the slot to slot , as defined in clause 8.3, where is the interruption length given in clause 8.2

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PSCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

Table A.7.5.3.14.1-1: Supported test configurations for FR2 SCell activation in FR2 inter-band

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |

Table A.7.5.3.14.1-2: General test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channels are used for this test. RF channel number 1 is in band 1 and RF channel number 2 is in band 2, where bands 1 and 2 are inter-band CA operating bands in FR2 as specified in Table 5.2A.2-1 in TS38.101-2. |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2. |
| 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 |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | ≤8 | A random value from 0μs to 8μs |
| T1 | s | 7 | During this time the PCell shall be known and the SCell configured and detected. |
| T2 | s | 2 | During this time the UE shall activate 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 [3] depends on UE’s capability |
| TCSI\_Reporting | ms | 2 | the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |

Table A.7.5.3.14.1-3: Cell specific test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | Unit | T1 | | T2 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN |  | freq1 | freq2 | freq1 | freq2 |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| Downlink initial BWP Configuration |  | DLBWP.0.1 | | DLBWP.0.1 | |
| Downlink dedicated BWP Configuration |  | DLBWP.1.1 | | DLBWP.1.1 | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | ULBWP.0.1 | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | ULBWP.1.1 | |
| TRS configuration |  | TRS.2.1 TDD | | TRS.2.1 TDD | |
| TCI state |  | TCI.State.0 | | TCI.State.0 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Parameters |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| CSI-RS configuration |  | NA | NA | NA | CSI-RS.3.1 TDD Note 2 |
| CSI reporting periodicity Note 3 |  | NA | 5 | NA | 5 |
| OCNG Patterns |  | OP.1 | | | |
| SSB Configuration |  | SSB.1 FR2 | | | |
| SMTC Configuration |  | SMTC.1 | | | |
| Aperiodic CSI-RS for Scell activation |  | - | - | - | TRS.2.3 TDD |
| gapBetweenBursts | Slot | N/A | | 0 | |
| 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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | 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: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 3: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | |

Table A.7.5.3.14.1-4: OTA related test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| AoA setup |  | Setup 3 as specified in clause A.3.15 | | | |
| **AoA1** | | **AoA2** | |
| Assumption for UE beams Note 7 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -92.1 | | -92.1 | |
| Note1 | dBm/SCSNote3 | -83.1 | | -83.1 | |
|  | dB | 0 | | 0 | |
| SS-RSRPNote2 | dBm/SCS Note4 | -83.1 | | N/A | |
| CSI-RSRPNote2 | dBm/SCS Note4 | N/A | | -83.1 | |
|  | dB | 0 | | 0 | |
| IoNote2 | dBm/95.04 MHz Note4 | -51.1 | | -51.1 | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: All parameters apply for configuration 1  Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | |

##### A.7.5.3.14.2 Test Requirements

During T2 the UE shall start sending CSI report for the SCell in the configured slots for CSI reporting after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k). UE shall send the first CSI report for SCell after receiving at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k), or in the next available uplink resource for CSI reporting if the slot was subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PCell in the slot.

During T2, the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot , where

- THARQ is defined in Table A.7.5.3.14.1-2

- Tactivation\_time = max(TFirstATRS + 5ms, Tuncertainty\_RRC + TRRC\_delay-THARQ)

- TCSI\_Reporting = 10ms

- NR slot length is 0.125ms for this test case.

During T2, the interruption of PCell during SCell activation shall not happen outside the slot to , where TX =4ms.

#### A.7.5.15 PSCell RACH-less based Activation and deactivation for FR1+FR2 inter-band with target PSCell in FR2

##### A.7.5.15.3.1 Test Purpose and Environment

The purpose of this test case is to test the activation PSCell delay for a UE configured with one deactivated SCG in NR-DC and when PScell in one SCG is being activated. The test also tests the deactivation delay. The test case tests the requirements within which the UE shall be able to activate the deactivated SCG in section 8.17.2 for RACH-less based conditions when PSCell and TCI state are known. The PCell is in NR FR1 and the PSCell is in NR FR2.

The supported test configurations are defined in Table A.7.5.15.3.1-1. And cell specific test parameters are described in Tables A.7.5.15.3.1-2. OTA related test parameters are defined in Table A.7.5.15.3.1-3.

At the beginning of T1 the UE is configured with a PSCell which is activated. At T1 the PSCell is deactivated. PSCell is configured with *bfd-and-RLM* with value *true*.

An RRC message for activation of PSCell is sent by the test equipment 1s after the RRC message deactivating the PSCell, in a slot # denoted m. The point in time at which the RRC message for activation of PSCell is received at the UE defines the start of time period T2.

During T2, the test equipment monitors for SR from the UE on the PSCell. The time when test equipment receives a scheduling request from the UE is denoted as slot T3.

Time period T4 starts when a RRC message for deactivation of the PSCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of the PSCell, respectively.

The test equipment verifies the activation time by when the SR from the UE is received in the activated PSCell.

The test equipment verifies the deactivation time by counting the slots from the time when the PSCell deactivation command is sent until UL transmission from the PSCell is discontinued.

**Table A.7.5.15.3.1-1: Supported test configurations for FR2 PSCell activation case**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode  Target PSCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode  Target PSCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 3 | PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  Target PSCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations | |

Table A.7.5.15.3.1-2: Cell specific test parameters for FR2 PSCell activation case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | | Unit | Cell 1 | | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | | T1 | T2 | T3 | T4 |
| SSB ARFCN | |  | Freq1 | | | | | Freq2 | | | |
| Duplex mode | Config 1 |  | FDD | | | | | TDD | | | |
| Config 2,3 |  | TDD | | | | | | | | |
| TDD configuration | Config 1 |  | Not Applicable | | | | TDDConf.3.1 | | | | |
| Config 2 | TDDConf.1.1 | | | |
| Config 3 | TDDConf.2.1 | | | |
| Downlink initial BWP Configuration | Config 1,2,3 |  | DLBWP.0.1 | | | | | | | | |
| Downlink dedicated BWP Configuration | Config 1,2,3 |  | DLBWP.1.1 | | | | | | | | |
| Uplink initial BWP configuration | Config 1,2,3 |  | ULBWP.0.1 | | | | | | | | |
| Uplink dedicated BWP configuration | Config 1,2,3 |  | ULBWP.1.1 | | | | | | | | |
| TRS configuration | Config 1,2,3 |  | N/A | | | | | TRS.2.1 TDD | | | |
| TCI state | Config 1,2,3 |  | TCI.State.0 | | | | | | | | |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | | | 100: NRB,c = 66 | | | |
| Config 3 | 40: NRB,c = 106 | | | | |
| Data RBs allocated | Config 1,2 |  | 52 | 66 | 66 | 52 | | 66 | 52 | 52 | 66 |
| Config 3 | 106 | 106 | | 106 | 106 |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | | | - | | | |
| Config 2 |  | SR.1.1 TDD | | | | |
| Config 3 |  | SR.2.1 TDD | | | | |
| RMSI CORESET Parameters | Config 1 |  | CR.1.1 FDD | | | | | - | | | |
| Config 2 |  | CR.1.1 TDD | | | | |
| Config 3 |  | CR.2.1 TDD | | | | |
| Dedicated CORESET Parameters | Config 1 |  | CCR.1.1 FDD | | | | | - | | | |
| Config 2 | CCR.1.1 TDD | | | | |
| Config 3 | CCR.2.1 TDD | | | | |
| OCNG Patterns | |  | OP.1 | | | | | | | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 | | | | | SSB.3 FR2 | | | |
| Config 3 | SSB.2 FR1 | | | | |
| CSI-RS configuration for CSI reporting | Config 1~3 |  | N/A | | | | | CSI-RS.3.1 TDD | | | |
| reportConfigType for CSI reporting |  |  | periodic | | | | | N/A | | | |
| reportConfigType for L1-RSRP |  |  | periodic | | | | | N/A | | | |
| reportQuantity for CSI reporting |  |  | cri-RI-PMI-CQI | | | | | N/A | | | |
| reportQuantity for L1-RSRP |  |  | ssb-Index-RSRP | | | | | N/A | | | |
| CSI reporting periodicity | Config 1,2 | slot | 5 | | | | | N/A | | | |
| Config 3 | 10 | | | | |
| L1-RSRP reporting periodicity Note 7 | Config 1,2 | slot | 5 | | | | | N/A | | | |
| Config 3 | 10 | | | | |
| CSI reporting offset | Config 1,2 | slot | 2 | | | | | N/A | | | |
| Config 3 | 4 | | | | |
| L1-RSRP reporting offset | Config 1,2 | slot | 2 | | | | | N/A | | | |
| Config 3 | 4 | | | | |
| SMTC configuration | |  | SMTC.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\_DMRS | |  |  | | | | | | | | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |  |  | | | | | | | | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |  | | | | | | | | |
| Propagation conditions | |  | N/A  Link only, see clause A.3.7A | | | | AWGN | | | | |
| Scheduling request resource priodicity | | ms | N/A | | | | 20 | | | | |
| 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  Note 5: All parameters apply for configuration 1, 2 and 3  Note 6: Void.  Note 7: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | | | |

Table A.7.5.15.3.1-3: OTA related test parameters for FR1 PCell with FR2 PSCell activation case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| Angle of arrival configuration | |  | N/A | | | | According to clause A.3.15.1 | | | |
| Assumption for UE beams Note 7 | |  | N/A | | | | Rough | | | |
| Note 1 | Config 1,2,3 | dBm/15kHz | Link only, see clause A.3.7A | | | | -104.7 | | | |
| Note 1 | Config 1,2,3 | dBm/SCS | -95.7 | | | |
|  | Config 1,2,3 | dB | 7 | | | |
|  | Config 1,2,3 | dB | 7 | | | |
| SSB\_RPNote 2, Note 4 | Config 1,2,3 | dBm/SCS | -88.7 | | | |
| IoNote 2, Note 4 | Config 1,2,3 | dBm/95.04 MHz | -58.92 | | | |
| 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: Es/Iot, SSB\_RP 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: Information about types of UE beam is given in B.2.1.3 and does not imit UE implementation or test system implementation. | | | | | | | | | | |

##### A.7.5.3.2.2 Test Requirements

During T2 the UE shall send the first SR on PSCell in the first available uplink SR resource no later than T3 which is:

TRRC\_delay + Tprocessing + Tsearch + T∆ + TIU + 2 ms

as defined on section 8.17.2. In this test case:

Tprocessing = 5ms (no RRC parameter has been modified),

Tsearch = 0ms (RACH-less based PSCell activation, with RLM and BFD are configured, PSCell and TCI state are known), and

T∆ = 20ms.

This allows T3 of [TRRC\_delay + TIU + 27]ms

During T4 the UE shall stop all transmissions on the PSCell no later than in slot as defined in 8.17.3.

During T2 the interruption of PCell during PSCell activation shall not happen outside the slot *m + TRRC\_delay*.

During T4 the interruption of PCell during PSCell deactivation shall not happen outside the slot *n + TRRC\_delay*.

The interruption duration on PCell due to activation and deactivation of PSCell shall not be more than the values specified for in Clause 8.17.2 and 8.17.3.

### A.7.5.4 Void

### A.7.5.5 Beam Failure Detection and Link recovery procedures

#### A.7.5.5.1 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

##### A.7.5.5.1.1 Test Purpose and Environment

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 FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.1.1-1, A.7.5.5.1.1-2, A.7.5.5.1.1-3 and A.7.5.5.1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.1.1-1 shows the variation of the downlink SNR of the SSB in set q0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.1.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery. 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. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 1.

Table A.7.5.5.1.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |
| 2 | TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR2 | |

Table A.7.5.5.1.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Test**  **Config.** | **Unit** | **Value** | **Comment** |
|  | |  |  | **Test 1** |  |
| Active PCell | | 1-2 |  | Cell 1 |  |
| RF Channel Number | | 1-2 |  | 1 |  |
| Duplex mode | | 1-2 |  | TDD |  |
| TDD Configuration | | 1-2 |  | TDDConf.3.1 |  |
| BWchannel | | 1-2 |  | 100: NRB,c = 66 |  |
| Data RBs allocated | | 1-2 |  | 66 |  |
| PDSCH/PDCCH subcarrier spacing | | 1-2 | kHz | 120 |  |
| DL initial BWP configuration | | 1-2 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1-2 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1-2 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1-2 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1 |  | SR.3.2 TDD |  |
| 2 | SR.3.3 TDD |  |
| RMSI CORESET Reference Channel | | 1 |  | CR.3.1 TDD |  |
| 2 | CR.3.2 TDD |  |
| Dedicated CORESET Reference Channel | | 1 |  | CCR.3.1 TDD |  |
| 2 | CCR.3.7 TDD |  |
| OCNG parameters | | 1-2 |  | OP.1 |  |
| CP length | | 1-2 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1-2 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1-2 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1 |  | SSB.1 FR2 |  |
| 2 | SSB.2 FR2 |  |
| SMTC Configuration | | 1-2 |  | SMTC.3 |  |
| PRACH Configuration | | 1-2 |  | FR2 PRACH configuration 2 | A.3.8.3.2 |
| DRX configuration | | 1-2 |  | OFF |  |
| SSB index assigned as BFD RS (q0) | | 1-2 |  | 0 |  |
| SSB index assigned as CBD RS (q1) | | 1-2 |  | 1 |  |
| SSB index assigned as RLM RS | | 1-2 |  | 0,1 |  |
| Beam failure detection transmission parameters | DCI format | 1-2 |  | 1-0 |  |
| Number of Control OFDM symbols | 1-2 |  | 2 |  |
| Aggregation level | 1-2 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1-2 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1-2 | dB | 0 |  |
| DMRS precoder granularity | 1-2 |  | REG bundle size |  |
| REG bundle size | 1-2 |  | 6 |  |
| Gap pattern ID | | 1-2 |  | gp0 |  |
| gapOffset | | 1-2 | ms | 0 |  |
| rlmInSyncOutOfSyncThreshold | | 1-2 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| 2 | -92 |
| powerControlOffsetSS | | 1-2 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1-2 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1-2 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1-2 |  | CSI-RS.3.1 TDD |  |
| reportConfigType | | 1-2 |  | periodic |  |
| reportQuantity | | 1-2 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1-2 | slot | 40 |  |
| CSI reporting offset | | 1-2 | slot | 4 |  |
| T310 | | 1-2 | ms | 1000 |  |
| N310 | | 1-2 |  | 2 |  |
| T1 | | 1-2 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1-2 | s | 2.61 |  |
| T3 | | 1-2 | s | 1.64 |  |
| T4 | | 1-2 | s | 0 |  |
| T5 | | 1-2 | s | 1.01 |  |
| D1 | | 1-2 | s | 0.97 |  |
| 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. | | | | | |

Table A.7.5.5.1.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| 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 1-2 | dB | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1-2 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| SSB\_RP of set q1 | Config 1 | dBm/ | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 2 | SCS | -101.5 | -101.5 | -81.5 | -81.5 | -81.5 |
|  | Config 1,2 | dBm/120 KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for 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 SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.1.1-1.  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 A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

**Table A.7.5.5.1.1-4: Void**

****

**Figure A.7.5.5.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode**

##### A.7.5.5.1.2 Test Requirements

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 = 960+10 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%.

#### A.7.5.5.2 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in DRX mode

##### A.7.5.5.2.1 Test Purpose and Environment

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 FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.2.1-1, A.7.5.5.2.1-2, A.7.5.5.2.1-3, A.7.5.5.2.1-4 and A.7.5.5.2.1-5 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.2.1-1 shows the variation of the downlink SNR of the SSB in set q0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.2.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery. 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. 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.

Table A.7.5.5.2.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |
| 2 | TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR2 | |

Table A.7.5.5.2.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Test**  **Config.** | **Unit** | **Value** | **Comment** |
|  | |  |  | **Test 1** |  |
| Active PCell | | 1-2 |  | Cell 1 |  |
| RF Channel Number | | 1-2 |  | 1 |  |
| Duplex mode | | 1-2 |  | TDD |  |
| TDD Configuration | | 1-2 |  | TDDConf.3.1 |  |
| BWchannel | | 1-2 |  | 100: NRB,c = 66 |  |
| Data RBs allocated | | 1-2 |  | 66 |  |
| PDSCH/PDCCH subcarrier spacing | | 1-2 | kHz | 120 |  |
| DL initial BWP configuration | | 1-2 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1-2 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1-2 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1-2 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1 |  | SR.3.2 TDD |  |
| 2 | SR.3.3 TDD |  |
| RMSI CORESET Reference Channel | | 1 |  | CR.3.1 TDD |  |
| 2 | CR.3.2 TDD |  |
| Dedicated CORESET Reference Channel | | 1 |  | CCR.3.1 TDD |  |
| 2 | CCR.3.7 TDD |  |
| OCNG parameters | | 1-2 |  | OP.1 |  |
| CP length | | 1-2 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1-2 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1-2 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1 |  | SSB.1 FR2 |  |
| 2 | SSB.2 FR2 |  |
| SMTC Configuration | | 1-2 |  | SMTC.3 |  |
| PRACH Configuration | | 1-2 |  | FR2 PRACH configuration 2 | A.3.8.3.2 |
| DRX configuration | | 1-2 |  | DRX.3 | A.3.3.3 |
| SSB index assigned as BFD RS (q0) | | 1-2 |  | 0 |  |
| SSB index assigned as CBD RS (q1) | | 1-2 |  | 1 |  |
| SSB index assigned as RLM RS | | 1-2 |  | 0,1 |  |
| Beam failure detection transmission parameters | DCI format | 1-2 |  | 1-0 |  |
| Number of Control OFDM symbols | 1-2 |  | 2 |  |
| Aggregation level | 1-2 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1-2 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1-2 | dB | 0 |  |
| DMRS precoder granularity | 1-2 |  | REG bundle size |  |
| REG bundle size | 1-2 |  | 6 |  |
| Gap pattern ID | | 1-2 |  | N/A |  |
| rlmInSyncOutOfSyncThreshold | | 1-2 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| 2 | -92 |
| powerControlOffsetSS | | 1-2 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1-2 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1-2 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1-2 |  | CSI-RS.3.1 TDD |  |
| reportConfigType | | 1-2 |  | periodic |  |
| reportQuantity | | 1-2 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1-2 | slot | 40 |  |
| CSI reporting offset | | 1-2 | slot | 4 |  |
| T310 | | 1-2 | ms | 1000 |  |
| N310 | | 1-2 |  | 2 |  |
| T1 | | 1-2 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1-2 | s | 3.37 |  |
| T3 | | 1-2 | s | 2.8 |  |
| T4 | | 1-2 | s | 0 |  |
| T5 | | 1-2 | s | 0.61 |  |
| D1 | | 1-2 | s | 0.57 |  |
| 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. | | | | | |

Table A.7.5.5.2.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| 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 1,2 | dB | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1-2 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| SSB\_RP of set q1 | Config 1 | dBm/SCS | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 2 |  | -101.5 | -101.5 | -81.5 | -81.5 | -81.5 |
|  | Config 1-2 | dBm/120 KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for 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: Void  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 SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.1.1-1.  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 A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband. | | | | | | | |

**Table A.7.5.5.2.1-4: Void**

**Table A.7.5.5.2.1-5: Void**

****

**Figure A.7.5.5.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode**

##### A.7.5.5.2.2 Test Requirements

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 = 560+10 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%.

#### A.7.5.5.3 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

##### A.7.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate 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 CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.3.1-1, A.7.5.5.3.1-2, and A.7.5.5.3.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.3.1-1 shows the variation of the downlink SNR of the CSI-RS in set q0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.3.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. 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. In the test, DRX configuration is not enabled.

Table A.7.5.5.3.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |

Table A.7.5.5.3.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

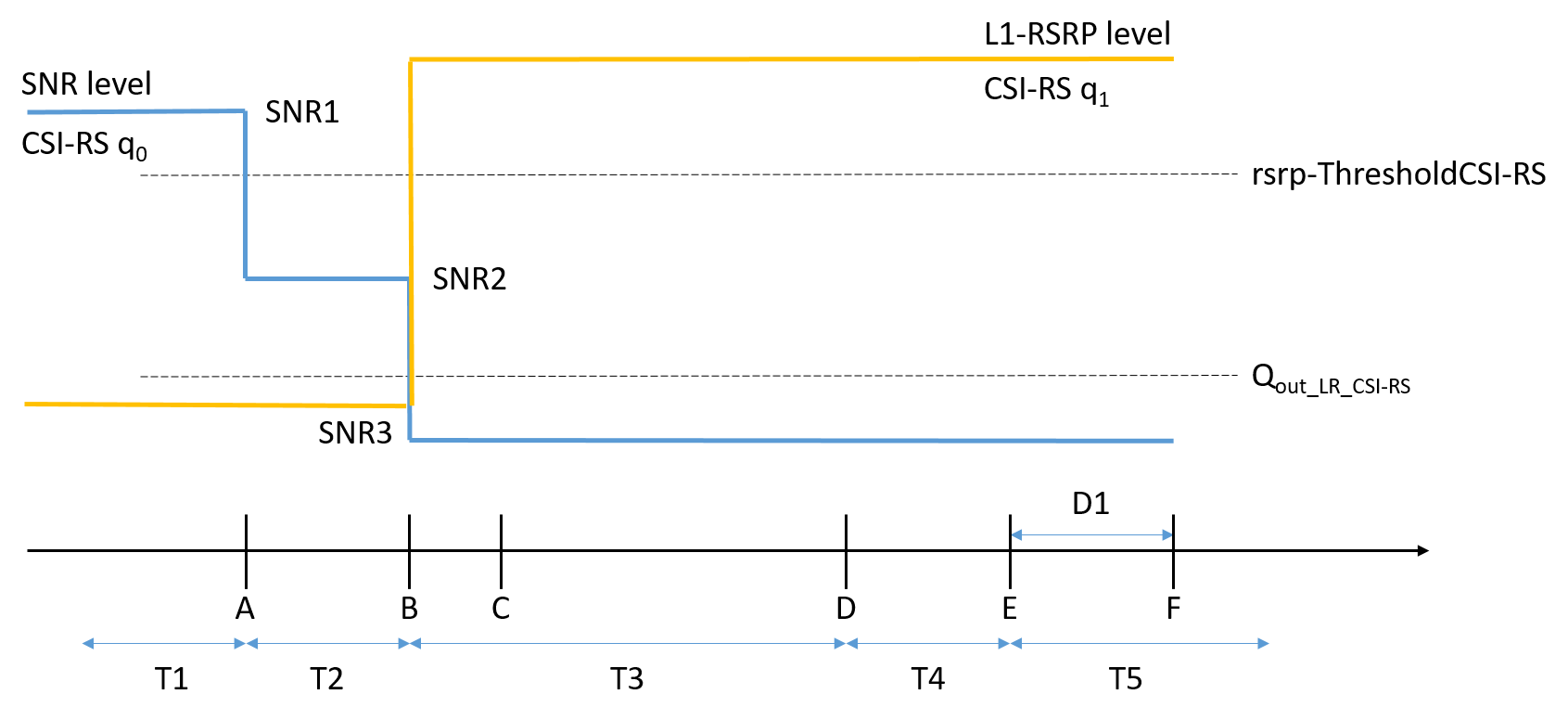
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Test**  **Config.** | **Unit** | **Value** | **Comment** |
|  | |  |  | **Test 1** |  |
| Active PCell | | 1 |  | Cell 1 |  |
| RF Channel Number | | 1 |  | 1 |  |
| Duplex mode | | 1 |  | TDD |  |
| TDD Configuration | | 1 |  | TDDConf.3.1 |  |
| BWchannel | | 1 |  | 100: NRB,c = 66 |  |
| Data RBs allocated | | 1 |  | 66 |  |
| PDSCH/PDCCH subcarrier spacing | | 1 | kHz | 120 |  |
| DL initial BWP configuration | | 1 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1 |  | SR.3.2 TDD |  |
| RMSI CORESET Reference Channel | | 1 |  | CR.3.1 TDD |  |
| Dedicated CORESET Reference Channel | | 1 |  | CCR.3.1 TDD |  |
| OCNG parameters | | 1 |  | OP.1 |  |
| CP length | | 1 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1 |  | SSB.1 FR2 |  |
| SMTC Configuration | | 1 |  | SMTC.3 |  |
| PRACH Configuration | | 1 |  | FR2 PRACH configuration 4 | A.3.8.3.4 |
| DRX configuration | | 1 |  | OFF |  |
| CSI-RS configuration for BFD/CBD/RLM | | 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS index assigned as BFD RS (q0) | | 1 |  | 0 |  |
| CSI-RS index assigned as CBD RS (q1) | | 1 |  | 1 |  |
| CSI-RS index assigned as RLM RS | | 1 |  | 0,1 |  |
| Beam failure detection transmission parameters | DCI format | 1 |  | 1-0 |  |
| Number of Control OFDM symbols | 1 |  | 2 |  |
| Aggregation level | 1 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1 | dB | 0 |  |
| DMRS precoder granularity | 1 |  | REG bundle size |  |
| REG bundle size | 1 |  | 6 |  |
| Gap pattern ID | | 1 |  | N/A |  |
| rlmInSyncOutOfSyncThreshold | | 1 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | 1 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| reportConfigType | | 1 |  | periodic |  |
| reportQuantity | | 1 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1 | slot | 40 |  |
| CSI reporting offset | | 1 | slot | 4 |  |
| T310 | | 1 | ms | 1000 |  |
| N310 | | 1 |  | 2 |  |
| T1 | | 1 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1 | s | 1.17 |  |
| T3 | | 1 | s | 0.9 |  |
| T4 | | 1 | s | 0 |  |
| T5 | | 1 | s | 0.31 |  |
| D1 | | 1 | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.7.5.5.3.1-3: Cell specific test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumptpion for UE beams Note 10 | |  | Rough | | | | |
| 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\_CSI-RS of set q0 | Config 1 | dB | 5 Note 11 | -3 Note 11 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q1 | Config 1 | dBm/SCS | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 1 | dBm/120 KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for 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: Void  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 REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.3.1-1.  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 A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

Table A.7.5.5.3.1-4: Void

Table A.7.5.5.3.1-5: Void



**Figure A.7.5.5.3.1-1: SNR and L1-RSRP variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode**

##### A.7.5.5.3.2 Test Requirements

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 shall detect beam failure and initiat 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 = 260+10 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%.

#### A.7.5.5.4 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in DRX mode

##### A.7.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate 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 CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.4.1-1, A.7.5.5.4.1-2, A.7.5.5.4.1-3, and A.7.5.5.4.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.4.1-1 shows the variation of the downlink SNR of the CSI-RS in set q0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.4.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. 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. 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.

Table A.7.5.5.4.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |

Table A.7.5.5.4.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Test**  **Config.** | **Unit** | **Value** | **Comment** |
|  | |  |  | **Test 1** |  |
| Active PCell | | 1 |  | Cell 1 |  |
| RF Channel Number | | 1 |  | 1 |  |
| Duplex mode | | 1 |  | TDD |  |
| TDD Configuration | | 1 |  | TDDConf.3.1 |  |
| BWchannel | | 1 |  | 100: NRB,c = 66 |  |
| Data RBs allocated | | 1 |  | 66 |  |
| PDSCH/PDCCH subcarrier spacing | | 1 | kHz | 120 |  |
| DL initial BWP configuration | | 1 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1 |  | SR.3.2 TDD |  |
| RMSI CORESET Reference Channel | | 1 |  | CR.3.1 TDD |  |
| Dedicated CORESET Reference Channel | | 1 |  | CCR.3.1 TDD |  |
| OCNG parameters | | 1 |  | OP.1 |  |
| CP length | | 1 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1 |  | SSB.1 FR2 |  |
| SMTC Configuration | | 1 |  | SMTC.3 |  |
| PRACH Configuration | | 1 |  | FR2 PRACH configuration 4 | A.3.8.3.4 |
| DRX configuration | | 1 |  | DRX.3 | A.3.3.3 |
| CSI-RS configuration for BFD/CBD/RLM | | 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS index assigned as BFD RS (q0) | | 1 |  | 0 |  |
| CSI-RS index assigned as CBD RS (q1) | | 1 |  | 1 |  |
| CSI-RS index assigned as RLM RS | | 1 |  | 0,1 |  |
| Beam failure detection transmission parameters | DCI format | 1 |  | 1-0 |  |
| Number of Control OFDM symbols | 1 |  | 2 |  |
| Aggregation level | 1 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1 | dB | 0 |  |
| DMRS precoder granularity | 1 |  | REG bundle size |  |
| REG bundle size | 1 |  | 6 |  |
| Gap pattern ID | | 1 |  | N/A |  |
| rlmInSyncOutOfSyncThreshold | | 1 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | 1 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| reportConfigType | | 1 |  | periodic |  |
| reportQuantity | | 1 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1 | slot | 40 |  |
| CSI reporting offset | | 1 | slot | 4 |  |
| T310 | | 1 | ms | 1000 |  |
| N310 | | 1 |  | 2 |  |
| T1 | | 1 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1 | s | 5.43 |  |
| T3 | | 1 | s | 5.16 |  |
| T4 | | 1 | s | 0 |  |
| T5 | | 1 | s | 0.31 |  |
| D1 | | 1 | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

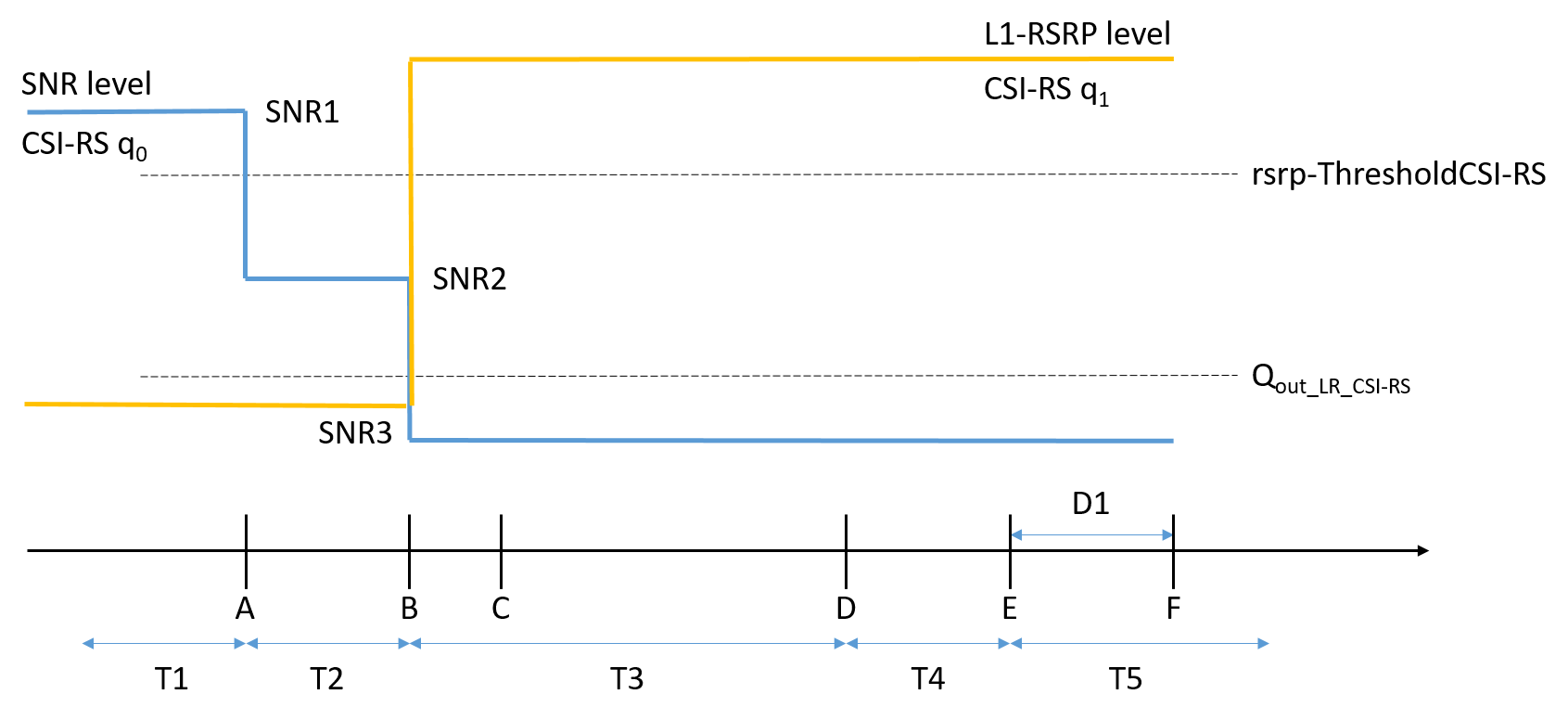
Table A.7.5.5.4.1-3: Cell specific test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| 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\_CSI-RS of set q0 | Config 1 | dB | 5 Note 11 | -3 Note 11 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q1 | Config 1 | dBm/SCS | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 1 | dBm/120 KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for 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: Void  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 REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.4.1-1.  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 A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

Table A.7.5.5.4.1-4: Void

Table A.7.5.5.4.1-5: Void

Table A.7.5.5.4.1-6: Void



**Figure A.7.5.5.4.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode**

##### A.7.5.5.4.2 Test Requirements

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 initiat 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 = 260+10 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%.

#### A.7.5.5.5 Scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

##### A.7.5.5.5.1 Test Purpose and Environment

The purpose is to test scheduling availability restrictions when the UE is performing beam failure detection or when the UE is performing L1-RSRP measurement for candidate beam detection, when no DRX is used. This test will verify the scheduling availability restriction requirements in clause 8.5.7 and 8.5.8.

The test parameters are given in Tables A.7.5.5.5.1-1, A.7.5.5.5.1-2 and A.7.5.5.5.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.5.1-1 shows the variation of the downlink SNR of the SSB in set q0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.5.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery. 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 5ms. This test will focus on the scheduling availability during beam failure detection) and candidate beam detection. In the test, DRX configuration is not enabled. Test is to test the scheduling availability restriction of UE performing beam failure detection and candidate beam detection when SSB RS configured for Beam failure detection and candidate beam detection. During the test the UE is scheduled to transmit continuously in UL.

Table A.7.5.5.5.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | NR 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.5.5.5.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Test**  **Config.** | **Unit** | **Value** | **Comment** |
|  | |  |  | **Test 1** |  |
| Active PCell | | 1-2 |  | Cell 1 |  |
| RF Channel Number | | 1-2 |  | 1 |  |
| Duplex mode | | 1-2 |  | TDD |  |
| TDD Configuration | | 1-2 |  | TDDConf.3.1 |  |
| BWchannel | | 1-2 |  | 100: NRB,c = 66 |  |
| Data RBs allocated | | 1-2 |  | 66 |  |
| PDSCH/PDCCH subcarrier spacing | | 1-2 | kHz | 120 |  |
| DL initial BWP configuration | | 1-2 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1-2 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1-2 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1-2 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1 |  | SR.3.2 TDD |  |
| 2 | SR.3.3 TDD |  |
| RMSI CORESET Reference Channel | | 1 |  | CR.3.1 TDD |  |
| 2 | CR.3.2 TDD |  |
| Dedicated CORESET Reference Channel | | 1 |  | CCR.3.1 TDD |  |
| 2 | CCR.3.7 TDD |  |
| OCNG parameters | | 1-2 |  | OP.1 |  |
| CP length | | 1-2 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1-2 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1-2 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1 |  | SSB.1 FR2 |  |
| 2 | SSB.2 FR2 |  |
| SMTC Configuration | | 1-2 |  | SMTC.1 |  |
| PRACH Configuration | | 1-2 |  | FR2 PRACH configuration 2 | A.3.8.3.2 |
| DRX configuration | | 1-2 |  | OFF |  |
| SSB index assigned as BFD RS (q0) | | 1-2 |  | 0 |  |
| SSB index assigned as CBD RS (q1) | | 1-2 |  | 1 |  |
| Beam failure detection transmission parameters | DCI format | 1-2 |  | 1-0 |  |
| Number of Control OFDM symbols | 1-2 |  | 2 |  |
| Aggregation level | 1-2 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1-2 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1-2 | dB | 0 |  |
| DMRS precoder granularity | 1-2 |  | REG bundle size |  |
| REG bundle size | 1-2 |  | 6 |  |
| Gap pattern ID | | 1-2 |  | N/A |  |
| rlmInSyncOutOfSyncThreshold | | 1-2 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| 2 | -92 |
| powerControlOffsetSS | | 1-2 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1-2 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1-2 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1-2 |  | CSI-RS.3.1 TDD |  |
| reportConfigType | | 1-2 |  | periodic |  |
| reportQuantity | | 1-2 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1-2 | slot | 40 |  |
| CSI reporting offset | | 1-2 | slot | 4 |  |
| T310 | | 1-2 | ms | 1000 |  |
| N310 | | 1-2 |  | 2 |  |
| T1 | | 1-2 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1-2 | s | 2.6 |  |
| T3 | | 1-2 | s | 1.64 |  |
| T4 | | 1-2 | s | 0 |  |
| T5 | | 1-2 | s | 1.01 |  |
| D1 | | 1-2 | s | 0.97 |  |
| 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. | | | | | |

Table A.7.5.5.5.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA Setup | |  | Setup1 defined in A.3.15.1 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| 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 1-2 | dB | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1-2 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| SSB\_RP of set q1 | Config 1 | dBm/SCS | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
| Config 2 | -101.5 | -101.5 | -81.5 | -81.5 | -81.5 |
|  | Config 1-2 | dBm/120 kHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for 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: Void  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 SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.5.1-1.  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 A.3.6.  Note 10: Information about types of UE beam given in B.2.1.3 and does not limit UE implementation or test system implementation  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband. | | | | | | | |

****

**Figure A.7.5.5.5.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode**

##### A.7.5.5.5.2 Test Requirements

The UE behaviour during time duration T3 follows the requirements defined in clause 8.5.7.3:

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on BFD-RS symbols to be measured for beam failure detection.

The UE behaviour during time durations T4 and T5 follows the requirements defined in clause 8.5.8.3:

- The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on reference symbols to be measured for candidate beam detection.

#### A.7.5.5.6 Beam Failure Detection and Link Recovery Test for FR2 SCell configured with CSI-RS-based BFD and LR in non-DRX mode

##### A.7.5.5.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for an active SCell and that the UE performs correct CSI-RS-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 SCell with *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 SCell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.6.1-1, A.7.5.5.6.1-2 and A.7.5.5.6.1-3. There are two cells, cell 1 is the active PCell and cell 2 is the active SCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.6.1-1 shows the variation of the downlink SNR of the CSI-RS in set q0 in the active SCell to emulate CSI-RS based beam failure. Figure A.7.5.5.6.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. 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. In the test, DRX configuration is not enabled.

Table A.7.5.5.6.1-1: Supported test configurations for FR2 PCell and SCell

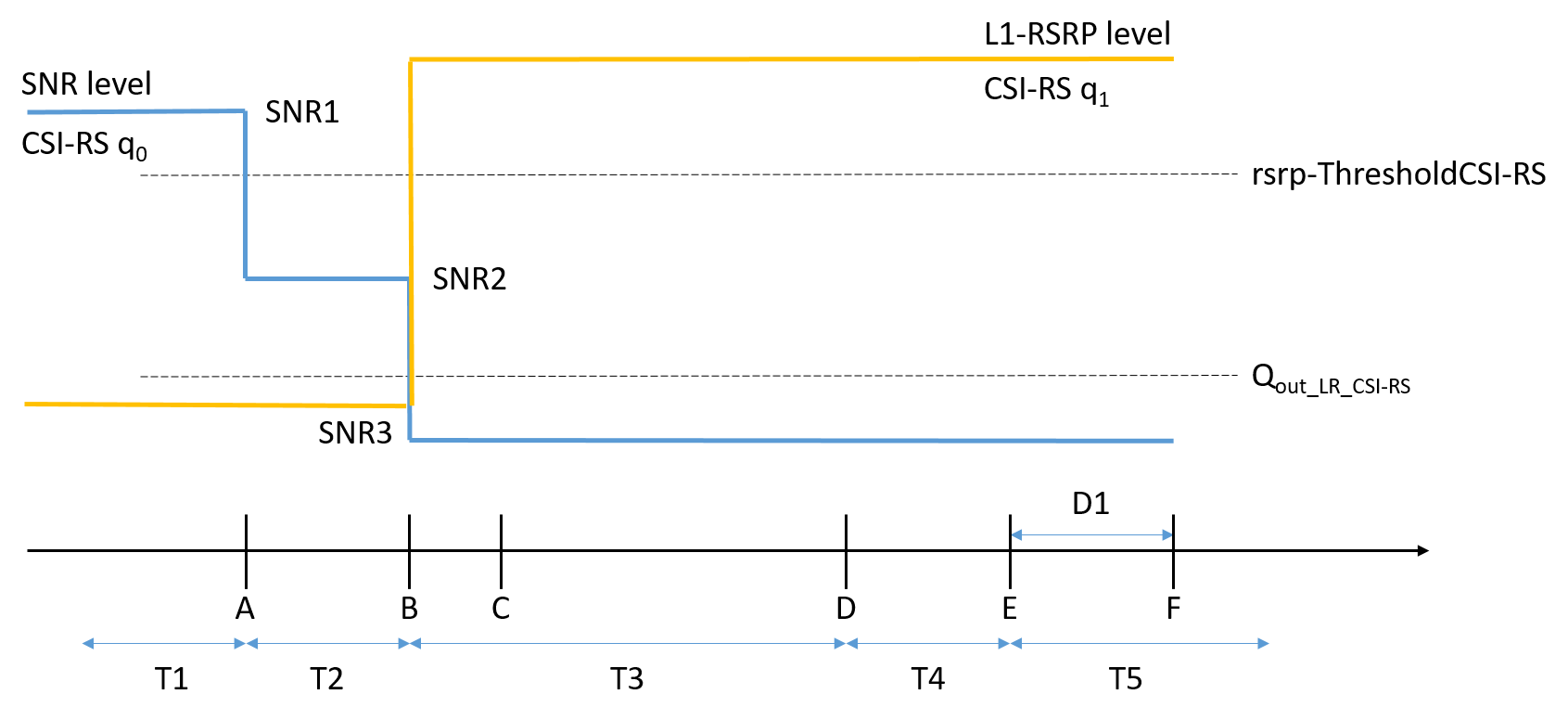
|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |

Table A.7.5.5.6.1-2: General test parameters for FR2 SCell for beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Test**  **Config.** | **Unit** | **Value** | **Comment** |
|  | |  |  | **Test 1** |  |
| Active PCell | | 1 |  | Cell 1 |  |
| RF Channel Number for PCell | | 1 |  | 1 |  |
| Active SCell | | 1 |  | Cell 2 |  |
| RF Channel Number for SCell | | 1 |  | 2 |  |
| Duplex mode | | 1 |  | TDD |  |
| TDD Configuration | | 1 |  | TDDConf.3.1 |  |
| BWchannel | | 1 | MHz | 100: NRB,c = 66 |  |
| Data RBs allocated | | 1 |  | 66 |  |
| PDSCH/PDCCH subcarrier spacing | | 1 | kHz | 120 |  |
| DL initial BWP configuration | | 1 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1 |  | SR.3.2 TDD |  |
| RMSI CORESET Reference Channel | | 1 |  | CR.3.1 TDD | A.3.1.2 |
| Dedicated CORESET Reference Channel | | 1 |  | CCR.3.1 TDD |  |
| OCNG parameters | | 1 |  | OP.1 | A.3.2.1 |
| CP length | | 1 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1 |  | SSB.3 FR2 | A.3.10 |
| SMTC Configuration | | 1 |  | SMTC.3 | A.3.11 |
| PRACH Configuration | | 1 |  | FR2 PRACH configuration 4 | Table A.3.8.3.4-1 |
| DRX configuration | | 1 |  | OFF |  |
| CSI-RS configuration for BFD/CBD on SCell | | 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS index assigned as BFD RS (q0) | | 1 |  | 0 |  |
| CSI-RS index assigned as CBD RS (q1) | | 1 |  | 1 |  |
| CSI-RS configuration for RLM on PCell | | 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| Beam failure detection transmission parameters | DCI format | 1 |  | 1-0 |  |
| Number of Control OFDM symbols | 1 |  | 2 |  |
| Aggregation level | 1 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1 | dB | 0 |  |
| DMRS precoder granularity | 1 |  | REG bundle size |  |
| REG bundle size | 1 |  | 6 |  |
| Gap pattern ID | | 1 |  | N/A |  |
| schedulingRequestID-BFR-SCell-r16 | | 1 |  | Configured |  |
| Periodicity of PUCCH for SR configuration for BFR on SCell | | 1 | slot | 40 | 5ms |
| Offset of PUCCH for SR configuration for BFR on SCell | | 1 | slot | 4 |  |
| PUCCH parameters for SR configuration for BFR on SCell | | 1 |  | Table 8.3.3.1.2-1 in [13] |  |
| rlmInSyncOutOfSyncThreshold | | 1 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | 1 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| reportConfigType | | 1 |  | periodic |  |
| reportQuantity | | 1 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1 | slot | 40 |  |
| CSI reporting offset | | 1 | slot | 4 |  |
| T310 | | 1 | ms | 1000 |  |
| N310 | | 1 |  | 2 |  |
| T1 | | 1 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1 | s | 1.17 |  |
| T3 | | 1 | s | 0.9 |  |
| T4 | | 1 | s | 0 |  |
| T5 | | 1 | s | 0.31 |  |
| D1 | | 1 | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.7.5.5.6.1-3: Cell specific test parameters for FR2 SCell for beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | **Cell 1** | Cell2  Test 1 | | | | |
|  | **T1 to T5** | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | Setup 1 defined in A.3.15 | | | | |
| Assumptpion for UE beams Note 10 | |  | Rough | Rough | | | | |
| 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 | 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\_CSI-RS of set q0 | Config 1 | dB | 5 | 5 | -3 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1 | dB | 0.2 | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q1 | Config 1 | dBm/SCS  kHz | -104.5 | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
| Noc | Config 1 | dBm/  120kHz | -104.7 | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for 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: Void  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 REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.6.1-1.  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 A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | | |



**Figure A.7.5.5.6.1-1: SNR and L1-RSRP variation for beam failure detection and link recovery testing for SCell in non-DRX mode**

##### A.7.5.5.6.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 in A.7.5.5.6.1 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 initial link recovery. During T4 and T5 the UE measures and evaluates beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit PUCCH with LRR, followed by BFR MAC CE containing a beam associated with the candidate beam set q1. The UE shall not transmit PUCCH with an LRR 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%.

#### A.7.5.5.7 Beam Failure Detection and Link Recovery Test for FR2 SCell configured with CSI-RS-based BFD and LR in DRX mode

##### A.7.5.5.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for an active SCell and that the UE performs correct CSI-RS-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 SCell with *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 SCell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.7.1-1, A.7.5.5.7.1-2 and A.7.5.5.7.1-3. There are two cell, cell 1 is the active PCell and cell 2 is the active SCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.7.1-1 shows the variation of the downlink SNR of the CSI-RS in set q0 in the active SCell to emulate CSI-RS based beam failure. Figure A.7.5.5.7.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. 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. 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.

Table A.7.5.5.7.1-1: Supported test configurations for FR2 PCell and SCell

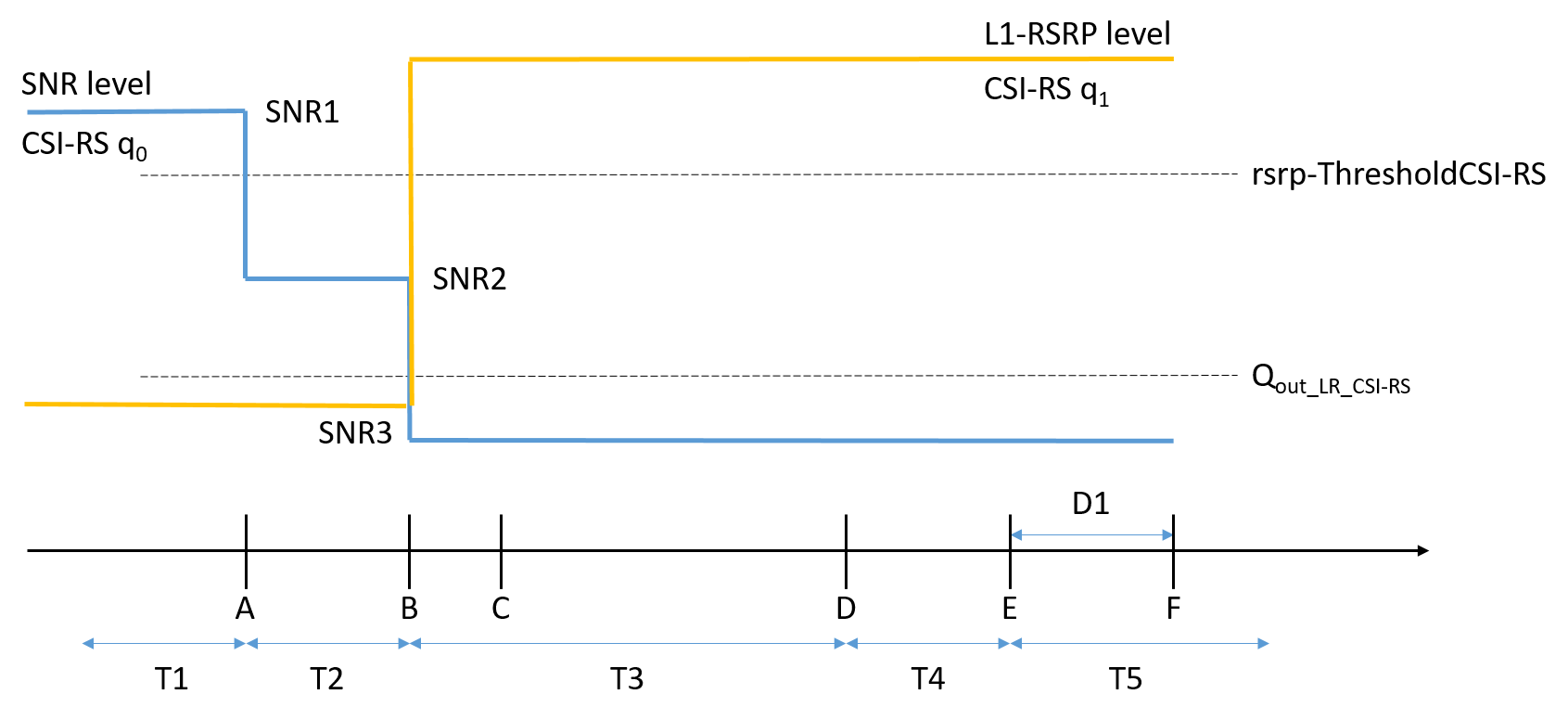
|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |

Table A.7.5.5.7.1-2: General test parameters for FR2 SCell for beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Test**  **Config.** | **Unit** | **Value** | **Comment** |
|  | |  |  | **Test 1** |  |
| Active PCell | | 1 |  | Cell 1 |  |
| RF Channel Number for PCell | | 1 |  | 1 |  |
| Active SCell | | 1 |  | Cell 2 |  |
| RF Channel Number for SCell | | 1 |  | 2 |  |
| Duplex mode | | 1 |  | TDD |  |
| TDD Configuration | | 1 |  | TDDConf.3.1 |  |
| BWchannel | | 1 | MHz | 100: NRB,c = 66 |  |
| Data RBs allocated | | 1 |  | 66 |  |
| PDSCH/PDCCH subcarrier spacing | | 1 | kHz | 120 |  |
| DL initial BWP configuration | | 1 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1 |  | SR.3.2 TDD |  |
| RMSI CORESET Reference Channel | | 1 |  | CR.3.1 TDD | A.3.1.2 |
| Dedicated CORESET Reference Channel | | 1 |  | CCR.3.1 TDD |  |
| OCNG parameters | | 1 |  | OP.1 | A.3.2.1 |
| CP length | | 1 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1 |  | SSB.3 FR2 | A.3.10 |
| SMTC Configuration | | 1 |  | SMTC.3 | A.3.11 |
| PRACH Configuration | | 1 |  | FR2 PRACH configuration 4 | Table A.3.8.3.4-1 |
| DRX configuration | | 1 |  | DRX.3 | A.3.3.3 |
| CSI-RS configuration for BFD/CBD on SCell | | 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS index assigned as BFD RS (q0) | | 1 |  | 0 |  |
| CSI-RS index assigned as CBD RS (q1) | | 1 |  | 1 |  |
| CSI-RS configuration for RLM on PCell | | 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| Beam failure detection transmission parameters | DCI format | 1 |  | 1-0 |  |
| Number of Control OFDM symbols | 1 |  | 2 |  |
| Aggregation level | 1 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1 | dB | 0 |  |
| DMRS precoder granularity | 1 |  | REG bundle size |  |
| REG bundle size | 1 |  | 6 |  |
| Gap pattern ID | | 1 |  | N/A |  |
| schedulingRequestID-BFR-SCell-r16 | | 1 |  | Configured |  |
| Periodicity of PUCCH for SR configuration for BFR on SCell | | 1 | slot | 40 | 5ms |
| Offset of PUCCH for SR configuration for BFR on SCell | | 1 | slot | 4 |  |
| PUCCH parameters for SR configuration for BFR on SCell | | 1 |  | Table 8.3.3.1.2-1 in [13] |  |
| rlmInSyncOutOfSyncThreshold | | 1 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | 1 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| reportConfigType | | 1 |  | periodic |  |
| reportQuantity | | 1 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1 | slot | 40 |  |
| CSI reporting offset | | 1 | slot | 4 |  |
| T310 | | 1 | ms | 1000 |  |
| N310 | | 1 |  | 2 |  |
| T1 | | 1 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1 | s | 5.43 |  |
| T3 | | 1 | s | 5.16 |  |
| T4 | | 1 | s | 0 |  |
| T5 | | 1 | s | 0.31 |  |
| D1 | | 1 | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.7.5.5.7.1-3: Cell specific test parameters for FR2 SCell for beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | **Cell1** | Test 1 Cell2 | | | | |
|  | **T1 to T5** | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | Rough | | | | |
| 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 | 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\_CSI-RS of set q0 | Config 1 | dB | 5 | 5 | -3 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1 | dB | 0.2 | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q1 | Config 1 | dBm/  SCS kHz | -104.5 | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
| Noc | Config 1 | dBm/120 kHz | -104.7 | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for 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: Void  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 REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.7.1-1.  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 A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | | |



**Figure A.7.5.5.7.1-1: SNR and L1-RSRP variation for beam failure detection and link recovery testing for SCell in DRX mode**

##### A.7.5.5.7.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 in A.7.5.5.7.1 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 initial link recovery. During T4 and T5 the UE measures and evaluates beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit PUCCH with LRR, followed by BFR MAC CE containing a beam associated with the candidate beam set q1. The UE shall not transmit PUCCH with an LRR 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%.

#### A.7.5.5.8 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in DRX mode for UE fulfilling relaxed measurement criterion

##### A.7.5.5.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate 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 CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.3.4 for UE fulfilling good serving cell quality relaxed measurement criteria. The test parameters are given in Tables A.7.5.5.8.1-1, A.7.5.5.8.1-2, A.7.5.5.8.1-3, and A.7.5.5.8.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.8.1-1 shows the variation of the downlink SNR of the CSI-RS in set q0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.8.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. 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 5ms. 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.

As specified in the Test Purpose, the UE is configured with the relaxed measurement criterion for both low mobility and good serving cell quality defined in clause 5.7.13.2 in TS 38.331 [2]. At the beginning of T1, the UE has fulfilled the good serving cell quality relaxation measurements criterion and is performing relaxed measurements for beam failure detection.

*- goodServingCellEvaluationBFD* [2] criterion is configured according to the parameters listed in Table A.7.5.5.8.1-2;

*- lowMobilityEvalutationcConnected* [2] criterion is configured according to the parameters listed in Table A.7.5.5.8.1-2.

Table A.7.5.5.8.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |

Table A.7.5.5.8.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Test  Config. | Unit | Value | Comment |
|  | |  |  | Test 1 |  |
| Active PCell | | 1 |  | Cell 1 |  |
| RF Channel Number | | 1 |  | 1 |  |
| Duplex mode | | 1 |  | TDD |  |
| TDD Configuration | | 1 |  | TDDConf.3.1 |  |
| BWchannel | | 1 |  | 100: NRB,c = 66 |  |
| Data RBs allocated | | 1 |  | 66 |  |
| PDSCH/PDCCH subcarrier spacing | | 1 | kHz | 120 |  |
| DL initial BWP configuration | | 1 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1 |  | SR.3.2 TDD |  |
| RMSI CORESET Reference Channel | | 1 |  | CR.3.1 TDD |  |
| Dedicated CORESET Reference Channel | | 1 |  | CCR.3.1 TDD |  |
| OCNG parameters | | 1 |  | OP.1 |  |
| CP length | | 1 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1 |  | SSB.1 FR2 |  |
| SMTC Configuration | | 1 |  | SMTC.3 |  |
| PRACH Configuration | | 1 |  | FR2 PRACH configuration 4 | A.3.8.3.4 |
| DRX configuration | | 1 |  | DRX.3 | A.3.3.3 |
| CSI-RS configuration for BFD/CBD/RLM | | 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS index assigned as BFD RS (q0) | | 1 |  | 0 |  |
| CSI-RS index assigned as CBD RS (q1) | | 1 |  | 1 |  |
| CSI-RS index assigned as RLM RS | | 1 |  | 0,1 |  |
| Beam failure detection transmission parameters | DCI format | 1 |  | 1-0 |  |
| Number of Control OFDM symbols | 1 |  | 2 |  |
| Aggregation level | 1 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1 | dB | 0 |  |
| DMRS precoder granularity | 1 |  | REG bundle size |  |
| REG bundle size | 1 |  | 6 |  |
| Gap pattern ID | | 1 |  | N/A |  |
| rlmInSyncOutOfSyncThreshold | | 1 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | 1 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| reportConfigType | | 1 |  | periodic |  |
| reportQuantity | | 1 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1 | slot | 40 |  |
| CSI reporting offset | | 1 | slot | 4 |  |
| T310 | | 1 | ms | 1000 |  |
| N310 | | 1 |  | 1 |  |
| offset | | 4 | dB | N/A | *offset* in goodServingCellEvaluationBFD |
| s-SearchDeltaP-Connected | | 1 | dB | 6 | Used to determine if low mobility relaxed criterion is fulfilled |
| t-SearchDeltaP-Connected | | 1 | s | 5 | Used to determine if low mobility relaxed criterion is fulfilled |
| T1 | | 1 | s | [6] | The UE shall be fully synchronized to cell 1 during T1. UE is performing relaxed measurements for BFD. |
| T2 | | 1 | s | [3.6] |  |
| T3 | | 1 | s | [9.64] |  |
| T4 | | 1 | s | 0 |  |
| T5 | | 1 | s | 0.31 |  |
| D1 | | 1 | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.7.5.5.8.1-3: Cell specific test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| 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\_CSI-RS of set q0 | Config 1 | dB | 5 Note 11 | 5 Note 11 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q1 | Config 1 | dBm/SCS | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 1 | dBm/120 KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for 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: Void  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 REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.4.1-1.  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 A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

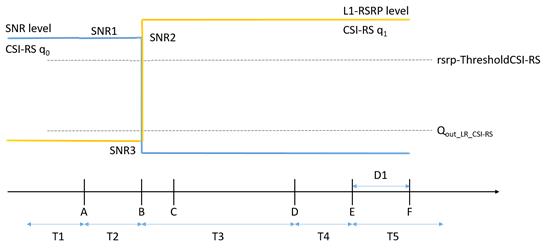


Figure A.7.5.5.8.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

##### A.7.5.5.8.2 Test Requirements

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 initiat link recovery, and exit from relaxed measurements. 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 = 260+10 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%.

#### A.7.5.5.9 TRP specific Beam Failure Detection and Link Recovery Test for FR2 SCell configured with CSI-RS-based BFD and LR in DRX mode

##### A.7.5.5.9.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects TRP specific CSI-RS-based beam failure and link recovery in the sets and for TRP1 when DRX is used for an FR2 active Scell requirements in clause 8.18.

The test parameters are given in Tables A.7.5.5.9.1-1, A.7.5.5.9.1-2 and A.7.5.5.9.1-3. There are two cell, cell 1 is the active PCell and cell 2 is the active SCell, in the test. SCell is configured with two TRPs. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.9.1-1shows the variation of the downlink SNR of the CSI-RS in set and in the active SCell for TRP1 and TRP2 respectively. Figure A.7.5.5.9.11-1additionally shows the variation of the downlink L1-RSRP of the CSI-RS in for TPR1. 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. 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.

Table A.7.5.5.9.1-1: Supported test configurations for FR2 PCell and SCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |

Table A.7.5.5.9.1-2: General test parameters for FR2 SCell for beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value | Comment |
|  | | |  | Test 1 |  |
| Active PCell | | |  | Cell 1 |  |
| RF Channel Number for PCell | | |  | 1 |  |
| Active SCell | | |  | Cell 2 |  |
| RF Channel Number for SCell | | |  | 2 |  |
| Duplex mode | | Config 1 |  | TDD |  |
| BW channel | | Config 1 |  | 100: NRB,c = 66 |  |
| 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.3.1 |  |
| CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD | A.3.1.2 |
| SSB Configuration | | Config 1 |  | SSB.3 FR2 | A.3.11 |
| SMTC Configuration | | Config 1 |  | SMTC.3 | A.3.10 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 120 KHz |  |
| PRACH Configuration | | Config 1 |  | Table A.3.8.3.1-1 |  |
| CSI-RS configuration for TRP0 | | Config 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS configuration for TRP1 | | Config 1 |  | CSI-RS.3.6 TDD | A.3.14.2 |
| CSI-RS configuration for CSI reporting | | Config 1 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| TRS configuration | | Config 1 |  | TRS.2.1 TDD |  |
| TCI configuration | | Config 1 |  | CSI-RS.Config.0 |  |
| OCNG parameters | |  |  | OP.1 |  |
| CP length | |  |  | Normal |  |
| Correlation Matrix and Antenna Configuration | |  |  | 2x2 Low |  |
| OCNG parameters | | |  | OP.1 | A.3.2.1 |
| 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 CSI-RS RE energy | dB | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |  |
|  | | DMRS precoder granularity |  | REG bundle size |  |
|  | | REG bundle size |  | 6 |  |
| DRX | | |  | DRX.3 |  |
| Gap pattern ID | | |  | N.A. |  |
| schedulingRequestID-BFR-SCell-r16 | | |  | Configured |  |
| Periodicity of PUCCH for SR configuration for BFR on SCell | | | Slot | 40 | 5ms |
| Offset of PUCCH for SR configuration for BFR on SCell | | | Slot | 5 |  |
| PUCCH parameters for SR configuration for BFR on SCell | | |  | Table 8.3.3.1.2-1 in [13] |  |
| csi-RS-Index assigned as BFD RS in set (q00) | | |  | 0 |  |
| csi-RS-Index assigned as BFD RS in set (q01) | | |  | 2 |  |
| CSI-RS index assigned as RLM RS | | |  | 0, 1 |  |
| CSI-RS Index assigned as CBD RS in set (q10) | | |  | 1 |  |
| CSI-RS Index assigned as CBD RS in set (q11) | | |  | 3 |  |
| SSB index assigned as RLM RS | | |  | 0, 1 |  |
| rlmInSyncOutOfSyncThreshold | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdBFR | Config 1 | | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| T310 Timer | | | ms | 1000 |  |
| N310 | | |  | 2 |  |
| T1 | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | s | 10.81 |  |
| T3 | | | s | 10.28 |  |
| T4 | | | s | 0 |  |
| T5 | | | s | 0.57 |  |
| D1 | | | s | 0.53 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.7.5.5.9.1-3: Cell specific test parameters for FR2 SCell for beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | **Cell1** | Cell2 | | | | |
|  | **T1 to T5** | T1 | T2 | T3 | T4 | T5 |
| AoA setup |  | Setup 3 as specified in clause A.3.15 Note 11 | | | | | |
| Assumption for UE beams Note 10 |  | Rough | Rough | | | | |
| 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 | 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\_CSI-RS of set q0,0 | dB | 5 | 5 | -3 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1,0 | dB | 5 | 5 | 5 | 5 | 5 | 5 |
| SNR\_CSI-RS of set q0,1 | dB | 0.2 | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q0,1 | dBm/  SCS kHz | -104.5 | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
| Noc | dBm/120 kHz | -104.7 | -104.7 | | | | |
| Propagation condition |  | TDL-A 30ns 75Hz | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for 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: Void  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 REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.7.1-1.  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 A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: AoA1 for PCell and TRP1 of SCell , AoA2 for TRP2 of SCell | | | | | | | |



Figure A.7.5.5.9.1-1: SNR and L1-RSRP variation for beam failure detection and link recovery testing for SCell in DRX mode

##### A.7.5.5.9.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 in A.7.5.5.9.1 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 for TRP1 and TRP2.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 TRP1 and TRP2 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3, T4, T5, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1 for TRP2.

During T3 the UE shall detect beam failure and initiate link recovery for TRP1. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q0,1.

No later than time point F occurring no later than D1 = [520]+10 ms after the start of T5, the UE shall transmit PUCCH with LRR, followed by BFR MAC CE containing a beam associated with the candidate beam set q0,1. The UE shall not transmit PUCCH with an LRR with the candidate beam set q0,1 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%.

#### A.7.5.5.10 TRP specific Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

##### A.7.5.5.10.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects TRP specific SSB-based beam failure and link recovery in the sets and for TRP1 with *schedulingRequestID-BFR-r17* configured, when no DRX is used for an FR2 serving cell requirements in clause 8.18.

The test parameters are given in Tables A.7.5.5.10.1-1, A.7.5.5.10.1-2, A.7.5.5.10.1-3 and A.7.5.5.10.1-4 below. There is one active serving cell configured with two TRPs in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.10.1-1 shows the variation of the downlink SNR of the SSB in set and for TRP1 and TRP2 respectively. Figure A.7.5.5.10.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set for TPR1.

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. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 1.

Table A.7.5.5.10.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |
| 2 | TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR2 | |

Table A.7.5.5.10.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value | Comment |
|  | | |  | Test 1 | Same configuration for both TRP whereever applicbale |
| Active PCell | | |  | Cell 1 |  |
| RF Channel Number for PCell | | |  | 1 |  |
| Duplex mode | | Config 1,2 |  | TDD |  |
| TDD Configuration | | Config 1,2 |  | TDDConf.3.1 |  |
| BW channel | | Config 1,2 |  | 100: NRB,c = 66 |  |
| Data RBs allocated | | Config 1,2 |  | 66 |  |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 120 |  |
| 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 |  |
| PDSCH Reference Channel | | Config 1 |  | SR.3.2 TDD |  |
| Config 2 |  | SR.3.3 TDD |  |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD |  |
| Config 2 |  | CR.3.2 TDD |  |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.3.1 TDD | A.3.1.2 |
| Config 2 |  | CCR.3.7 TDD |  |
| OCNG parameters | | Config 1,2 |  | OP.1 |  |
| CP length | | Config 1,2 |  | Normal |  |
| PDSCH/PDCCH TCI state | | Config 1,2 |  | TCI.State.0 |  |
| CSI-RS for tracking | | Config 1,2 |  | TRS.2.1 TDD |  |
| CSI-RS configuration for CSI reporting | | Config 1,2 |  | CSI-RS.3.1 TDD |  |
| reportConfigType | | Config 1,2 |  | periodic |  |
| reportQuantity | | Config 1,2 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | Config 1,2 | slot | 40 |  |
| CSI reporting offset | | Config 1,2 | slot | 4 |  |
| SSB Configuration for TRP0 | | Config 1 |  | SSB.1 FR2 |  |
| Config 2 |  | SSB.2 FR2 |  |
| SSB Configuration for TRP1 | | Config 1 |  | SSB.9 FR2 |  |
| Config 2 |  | SSB.10 FR2 |  |
| SMTC Configuration | | Config 1,2 |  | SMTC.3 | A.3.10 |
| PRACH Configuration | | Config 1,2 |  | FR2 PRACH configuration 2 | A.3.8.3.2 |
| DRX configuration | | Config 1,2 |  | OFF |  |
| SSB Index assigned as BFD RS (q0,0) | | Config 1,2 |  | 0 |  |
| SSB Index assigned as CBD RS (q1,0) | | Config 1,2 |  | 1 |  |
| SSB Index assigned as BFD RS (q0,1) | | Config 1,2 |  | 2 |  |
| SSB Index assigned as CBD RS (q1,1) | | Config 1,2 |  | 3 |  |
| SSB Index assigned as RLM RS | | Config 1,2 |  | 0,1,2,3 |  |
| 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 CSI-RS RE energy | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |  |
| DMRS precoder granularity |  | REG bundle size |  |
| REG bundle size |  | 6 |  |
| Gap pattern ID | | |  | gp0 |  |
| gapOffset | | |  | 0 |  |
| schedulingRequestID-BFR- r17 | | |  | Configured |  |
| Periodicity of PUCCH for SR configuration for BFR on PCell | | | slot | 40 | 5ms |
| rlmInSyncOutOfSyncThreshold | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdBFR | Config 1 | | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| Config 2 | | -92 |
| powerControlOffsetSS | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| T310 Timer | | | ms | 1000 |  |
| N310 | | |  | 2 |  |
| T1 | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | s | 2.61 |  |
| T3 | | | s | 1.64 |  |
| T4 | | | s | 0 |  |
| T5 | | | s | 1.01 |  |
| D1 | | | s | 0.97 |  |
| 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. | | | | | |

Table A.7.5.5.10.13: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 3 as specified in clause A.3.15 Note 12 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| 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 q0,0 | Config 1-2 | dB | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_SSB of set q1,0 | Config 1-2 | dB | 5Note 11 | 5Note 11 | 5Note 11 | 5Note 11 | 5Note 11 |
| SNR\_SSB of set q0,1 | Config 1-2 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
|  | Config 1 | dBm/  SCS | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
| SSB\_RP of set q0,1 |
|  | Config 2 | -101.5 | -101.5 | -81.5 | -81.5 | -81.5 |
|  | Config 1,2 | dBm/120 KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for 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 SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.1.1-1.  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 A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband  Note 12: AoA1 for TRP1 and AoA2 for TRP2 | | | | | | | |

Table A.7.5.5.10.1-4: Void



Figure A.7.5.5.10.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

##### A.7.5.5.10.2 Test Requirements

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 for TRP 1 and TRP2.

During the period from time point A to time point B the UE shall transmit uplink signal for TRP 1 and TRP2 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3, T4, T5, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission for TRP 2.

During T3 the UE shall detect beam failure and initiate link recovery for TRP 1. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q0,1.

No later than time point F occurring no later than D1 = 960+10 ms after the start of T5, the UE shall transmit PUCCH with LRR, followed by BFR MAC CE containing a beam associated with the candidate beam set q1,0. The UE shall not transmit PUCCH with an LRR with the candidate beam set q1,0 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%.

#### A.7.5.5.11 Beam Failure Detection and Link Recovery Test for FR2-2 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

##### A.7.5.5.11.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate 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 CSI-RS based beam failure detection and link recovery for an FR2-2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.11.1-1, A.7.5.5.11.1-2, and A.7.5.5.11.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.11.1-1 shows the variation of the downlink SNR of the CSI-RS in set q0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.11.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. 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. In the test, DRX configuration is not enabled.

Table A.7.5.5.11.1-1: Supported test configurations for FR2-2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |
| 2 | TDD duplex mode, 480 kHz SSB SCS, 400 MHz bandwidth |
| 3 | TDD duplex mode, 960 kHz SSB SCS, 400 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR2-2 | |

Table A.7.5.5.11.1-2: General test parameters for FR2-2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Test  Config. | Unit | Value | Comment |
|  | |  |  | Test 1 |  |
| Active PCell | | 1,2,3 |  | Cell 1 |  |
| RF Channel Number | | 1,2,3 |  | 1 |  |
| Duplex mode | | 1,2,3 |  | TDD |  |
| TDD Configuration | | 1,2,3 |  | TDDConf.3.1 |  |
| BWchannel | | 1 |  | 100: NRB,c = 66 |  |
| 2 |  | 400: NRB,c = 66 |  |
| 3 |  | 400: NRB,c = 33 |  |
| Data RBs allocated | | 1 |  | 66 |  |
| 2 |  | 66 |  |
| 3 |  | 33 |  |
| PDSCH/PDCCH subcarrier spacing | | 1 | kHz | 120 |  |
| 2 | kHz | 480 |  |
| 3 | kHz | 960 |  |
| DL initial BWP configuration | | 1,2,3 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1,2,3 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1,2,3 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1,2,3 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1,2,3 |  | SR.3.2 TDD |  |
| RMSI CORESET Reference Channel | | 1,2,3 |  | CR.3.1 TDD |  |
| Dedicated CORESET Reference Channel | | 1,2,3 |  | CCR.3.1 TDD |  |
| OCNG parameters | | 1,2,3 |  | OP.1 |  |
| CP length | | 1,2,3 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1,2,3 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1,2,3 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1,2,3 |  | SSB.1 FR2 |  |
| SMTC Configuration | | 1,2,3 |  | SMTC.3 |  |
| PRACH Configuration | | 1,2,3 |  | FR2 PRACH configuration 4 | A.3.8.3.4 |
| DRX configuration | | 1,2,3 |  | OFF |  |
| CSI-RS configuration for BFD/CBD/RLM | | 1,2,3 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS index assigned as BFD RS (q0) | | 1,2,3 |  | 0 |  |
| CSI-RS index assigned as CBD RS (q1) | | 1,2,3 |  | 1 |  |
| CSI-RS index assigned as RLM RS | | 1,2,3 |  | 0,1 |  |
| Beam failure detection transmission parameters | DCI format | 1,2,3 |  | 1-0 |  |
| Number of Control OFDM symbols | 1,2,3 |  | 2 |  |
| Aggregation level | 1,2,3 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1,2,3 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1,2,3 | dB | 0 |  |
| DMRS precoder granularity | 1,2,3 |  | REG bundle size |  |
| REG bundle size | 1,2,3 |  | 6 |  |
| Gap pattern ID | | 1,2,3 |  | N/A |  |
| rlmInSyncOutOfSyncThreshold | | 1,2,3 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1,2,3 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | 1,2,3 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1,2,3 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1,2,3 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1,2,3 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| reportConfigType | | 1,2,3 |  | periodic |  |
| reportQuantity | | 1,2,3 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1,2,3 | slot | 40 |  |
| CSI reporting offset | | 1,2,3 | slot | 4 |  |
| T310 | | 1,2,3 | ms | 1000 |  |
| N310 | | 1,2,3 |  | 2 |  |
| T1 | | 1,2,3 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1,2,3 | s | 1.17 |  |
| T3 | | 1,2,3 | s | 0.9 |  |
| T4 | | 1,2,3 | s | 0 |  |
| T5 | | 1,2,3 | s | 0.31 |  |
| D1 | | 1,2,3 | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.7.5.5.11.1-3: Cell specific test parameters for FR2-2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumptpion for UE beams Note 10 | |  | Rough | | | | |
| 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\_CSI-RS of set q0 | Config 1,2,3 | dB | 5 Note 11 | -3 Note 11 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1,2,3 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q1 | Config 1,2,3 | dBm/SCS | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 1,2,3 | dBm/120 KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for 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: Void  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 REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.11.1-1.  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 A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

Table A.7.5.5.11.1-4: Void

Table A.7.5.5.11.1-5: Void

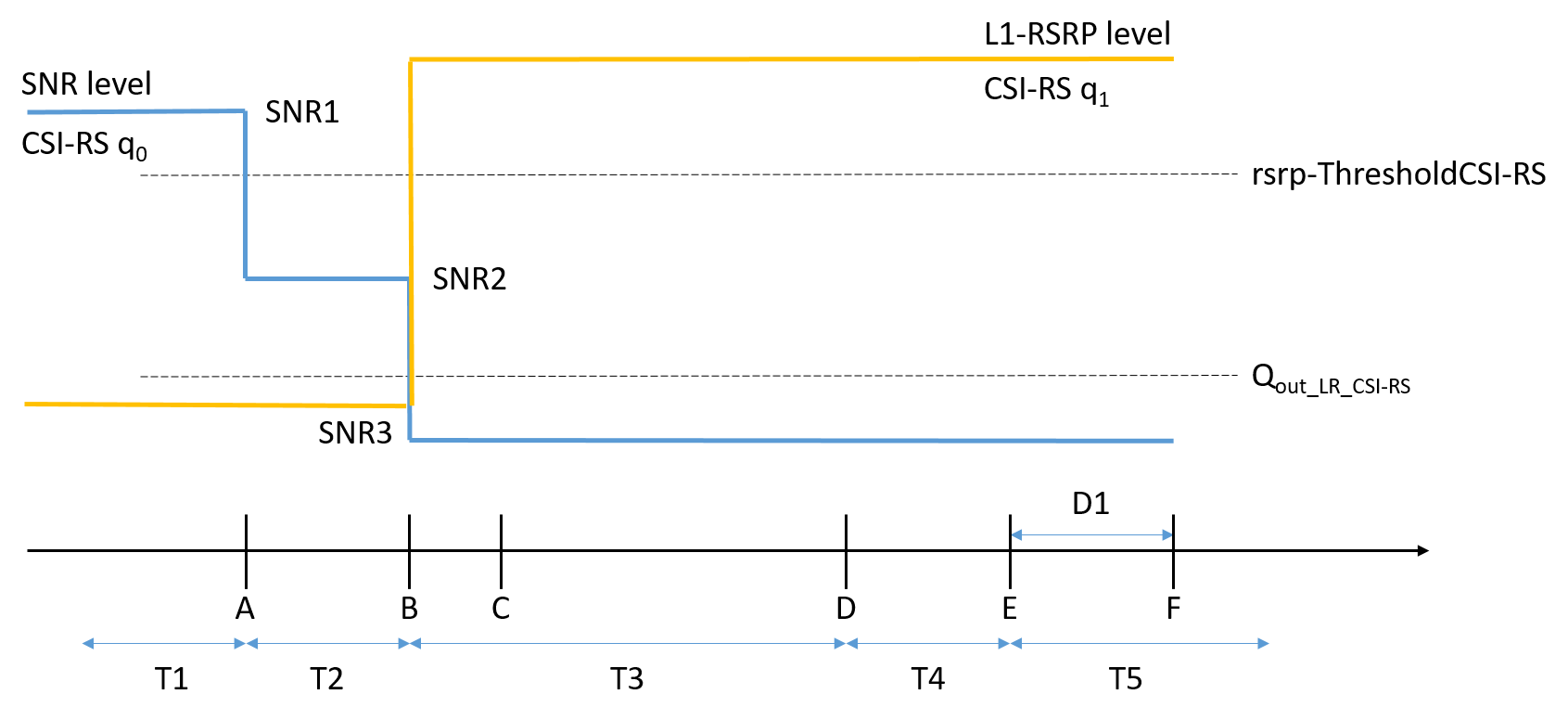


Figure A.7.5.5.11.1-1: SNR and L1-RSRP variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

##### A.7.5.5.11.2 Test Requirements

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 shall detect beam failure and initiat 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 = 260+10 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%.

#### A.7.5.5.12 Beam Failure Detection and Link Recovery Test for FR2-2 PCell configured with CSI-RS-based BFD and LR in DRX mode

##### A.7.5.5.12.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate 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 CSI-RS based beam failure detection and link recovery for an FR2-2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.12.1-1, A.7.5.5.12.1-2, A.7.5.5.12.1-3, and A.7.5.5.12.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.12.1-1 shows the variation of the downlink SNR of the CSI-RS in set q0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.12.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. 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. 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.

Table A.7.5.5.12.1-1: Supported test configurations for FR2-2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |
| 2 | TDD duplex mode, 480 kHz SSB SCS, 400 MHz bandwidth |
| 3 | TDD duplex mode, 960 kHz SSB SCS, 400 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR2-2 | |

Table A.7.5.5.12.1-2: General test parameters for FR2-2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Test  Config. | Unit | Value | Comment |
|  | |  |  | Test 1 |  |
| Active PCell | | 1,2,3 |  | Cell 1 |  |
| RF Channel Number | | 1,2,3 |  | 1 |  |
| Duplex mode | | 1,2,3 |  | TDD |  |
| TDD Configuration | | 1,2,3 |  | TDDConf.3.1 |  |
| BWchannel | | 1 |  | 100: NRB,c = 66 |  |
| 2 |  | 400: NRB,c = 66 |  |
| 3 |  | 400: NRB,c = 33 |  |
| Data RBs allocated | | 1 |  | 66 |  |
| 2 |  | 66 |  |
| 3 |  | 33 |  |
| PDSCH/PDCCH subcarrier spacing | | 1 | kHz | 120 |  |
| 2 | kHz | 480 |  |
| 3 | kHz | 960 |  |
| DL initial BWP configuration | | 1,2,3 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1,2,3 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1,2,3 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1,2,3 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1,2,3 |  | SR.3.2 TDD |  |
| RMSI CORESET Reference Channel | | 1,2,3 |  | CR.3.1 TDD |  |
| Dedicated CORESET Reference Channel | | 1,2,3 |  | CCR.3.1 TDD |  |
| OCNG parameters | | 1,2,3 |  | OP.1 |  |
| CP length | | 1,2,3 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1,2,3 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1,2,3 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1,2,3 |  | SSB.1 FR2 |  |
| SMTC Configuration | | 1,2,3 |  | SMTC.3 |  |
| PRACH Configuration | | 1,2,3 |  | FR2 PRACH configuration 4 | A.3.8.3.4 |
| DRX configuration | | 1,2,3 |  | DRX.3 | A.3.3.3 |
| CSI-RS configuration for BFD/CBD/RLM | | 1,2,3 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS index assigned as BFD RS (q0) | | 1,2,3 |  | 0 |  |
| CSI-RS index assigned as CBD RS (q1) | | 1,2,3 |  | 1 |  |
| CSI-RS index assigned as RLM RS | | 1,2,3 |  | 0,1 |  |
| Beam failure detection transmission parameters | DCI format | 1,2,3 |  | 1-0 |  |
| Number of Control OFDM symbols | 1,2,3 |  | 2 |  |
| Aggregation level | 1,2,3 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1,2,3 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1,2,3 | dB | 0 |  |
| DMRS precoder granularity | 1,2,3 |  | REG bundle size |  |
| REG bundle size | 1,2,3 |  | 6 |  |
| Gap pattern ID | | 1,2,3 |  | N/A |  |
| rlmInSyncOutOfSyncThreshold | | 1,2,3 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1,2,3 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | 1,2,3 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1,2,3 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1,2,3 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1,2,3 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| reportConfigType | | 1,2,3 |  | periodic |  |
| reportQuantity | | 1,2,3 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1,2,3 | slot | 40 |  |
| CSI reporting offset | | 1,2,3 | slot | 4 |  |
| T310 | | 1,2,3 | ms | 1000 |  |
| N310 | | 1,2,3 |  | 2 |  |
| T1 | | 1,2,3 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1,2,3 | s | 5.43 |  |
| T3 | | 1,2,3 | s | 5.16 |  |
| T4 | | 1,2,3 | s | 0 |  |
| T5 | | 1,2,3 | s | 0.31 |  |
| D1 | | 1,2,3 | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.7.5.5.12.1-3: Cell specific test parameters for FR2-2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| 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\_CSI-RS of set q0 | Config 1,2,3 | dB | 5 Note 11 | -3 Note 11 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1,2,3 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q1 | Config 1,2,3 | dBm/SCS | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 1,2,3 | dBm/120 KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for 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: Void  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 REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.12.1-1.  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 A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

Table A.7.5.5.12.1-4: Void

Table A.7.5.5.12.1-5: Void

Table A.7.5.5.12.1-6: Void

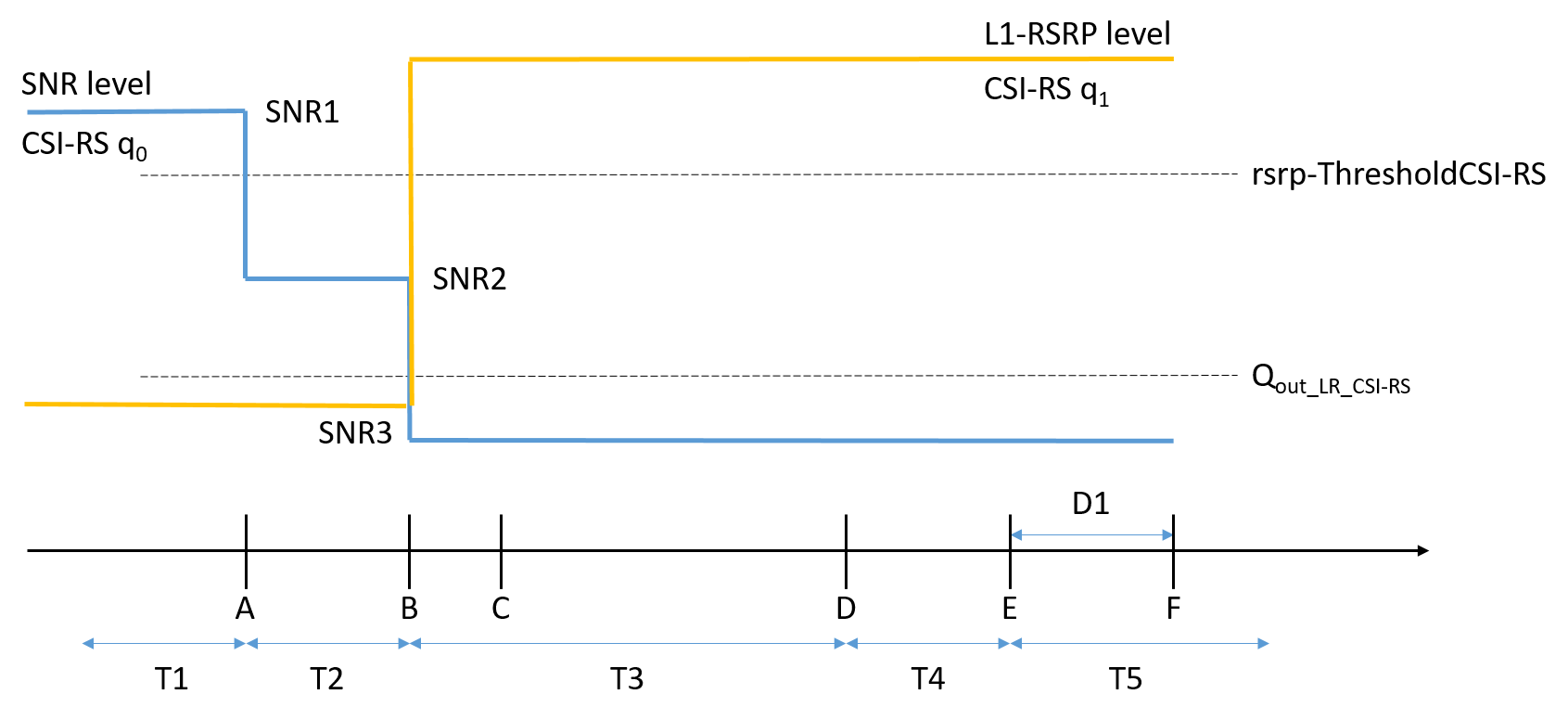


Figure A.7.5.5.12.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

##### A.7.5.5.12.2 Test Requirements

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 initiat 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 = 260+10 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%.

#### A.7.5.5.13 Scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2-2 PCell configured with SSB-based BFD and LR in non-DRX mode

##### A.7.5.5.13.1 Test Purpose and Environment

The purpose is to test scheduling availability restrictions when the UE is performing beam failure detection or when the UE is performing L1-RSRP measurement for candidate beam detection, when no DRX is used. This test will verify the scheduling availability restriction requirements in clause 8.5.7 and 8.5.8.

The test parameters are given in Tables A.7.5.5.13.1-1, A.7.5.5.13.1-2 and A.7.5.5.13.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.13.1-1 shows the variation of the downlink SNR of the SSB in set q0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.13.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery. 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 5ms. This test will focus on the scheduling availability during beam failure detection) and candidate beam detection. In the test, DRX configuration is not enabled. Test is to test the scheduling availability restriction of UE performing beam failure detection and candidate beam detection when SSB RS configured for Beam failure detection and candidate beam detection. During the test the UE is scheduled to transmit continuously in UL.

Table A.7.5.513.1-1: Supported test configurations for FR2-2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | NR 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.5.5.13.1-2: General test parameters for FR2-2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Test  Config. | Unit | Value | Comment |
|  | |  |  | Test 1 |  |
| Active PCell | | 1-2 |  | Cell 1 |  |
| RF Channel Number | | 1-2 |  | 1 |  |
| Duplex mode | | 1-2 |  | TDD |  |
| TDD Configuration | | 1-2 |  | TDDConf.3.1 |  |
| BWchannel | | 1-2 |  | 100: NRB,c = 66 |  |
| Data RBs allocated | | 1-2 |  | 66 |  |
| PDSCH/PDCCH subcarrier spacing | | 1-2 | kHz | 120 |  |
| DL initial BWP configuration | | 1-2 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1-2 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1-2 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1-2 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1 |  | SR.3.2 TDD |  |
| 2 | SR.3.3 TDD |  |
| RMSI CORESET Reference Channel | | 1 |  | CR.3.1 TDD |  |
| 2 | CR.3.2 TDD |  |
| Dedicated CORESET Reference Channel | | 1 |  | CCR.3.1 TDD |  |
| 2 | CCR.3.7 TDD |  |
| OCNG parameters | | 1-2 |  | OP.1 |  |
| CP length | | 1-2 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1-2 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1-2 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1 |  | SSB.1 FR2 |  |
| 2 | SSB.2 FR2 |  |
| SMTC Configuration | | 1-2 |  | SMTC.1 |  |
| PRACH Configuration | | 1-2 |  | FR2 PRACH configuration 2 | A.3.8.3.2 |
| DRX configuration | | 1-2 |  | OFF |  |
| SSB index assigned as BFD RS (q0) | | 1-2 |  | 0 |  |
| SSB index assigned as CBD RS (q1) | | 1-2 |  | 1 |  |
| Beam failure detection transmission parameters | DCI format | 1-2 |  | 1-0 |  |
| Number of Control OFDM symbols | 1-2 |  | 2 |  |
| Aggregation level | 1-2 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1-2 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1-2 | dB | 0 |  |
| DMRS precoder granularity | 1-2 |  | REG bundle size |  |
| REG bundle size | 1-2 |  | 6 |  |
| Gap pattern ID | | 1-2 |  | N/A |  |
| rlmInSyncOutOfSyncThreshold | | 1-2 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| 2 | -92 |
| powerControlOffsetSS | | 1-2 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1-2 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1-2 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1-2 |  | CSI-RS.3.1 TDD |  |
| reportConfigType | | 1-2 |  | periodic |  |
| reportQuantity | | 1-2 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1-2 | slot | 40 |  |
| CSI reporting offset | | 1-2 | slot | 4 |  |
| T310 | | 1-2 | ms | 1000 |  |
| N310 | | 1-2 |  | 2 |  |
| T1 | | 1-2 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1-2 | s | 2.6 |  |
| T3 | | 1-2 | s | 1.64 |  |
| T4 | | 1-2 | s | 0 |  |
| T5 | | 1-2 | s | 1.01 |  |
| D1 | | 1-2 | s | 0.97 |  |
| 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. | | | | | |

Table A.7.5.5.13.1-3: Cell specific test parameters for FR2-2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA Setup | |  | Setup1 defined in A.3.15.1 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| 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 1-2 | dB | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1-2 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| SSB\_RP of set q1 | Config 1 | dBm/SCS | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
| Config 2 | -101.5 | -101.5 | -81.5 | -81.5 | -81.5 |
|  | Config 1-2 | dBm/120 kHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for 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: Void  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 SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.13.1-1.  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 A.3.6.  Note 10: Information about types of UE beam given in B.2.1.3 and does not limit UE implementation or test system implementation  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband. | | | | | | | |



Figure A.7.5.5.13.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

##### A.7.5.5.13.2 Test Requirements

The UE behaviour during time duration T3 follows the requirements defined in clause 8.5.7.3:

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on BFD-RS symbols to be measured for beam failure detection.

The UE behaviour during time durations T4 and T5 follows the requirements defined in clause 8.5.8.3:

- The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on reference symbols to be measured for candidate beam detection.

### A.7.5.6 Active BWP switch

#### A.7.5.6.1 DCI-based and Timer-based Active BWP Switch

##### A.7.5.6.1.1 NR FR2- NR FR2 DL active BWP switch of SCell with non-DRX in SA

A.7.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.7.5.6.1.1.1-1 below. The test scenario comprises of one PCell (Cell 1) and one SCell (Cell 2) as given in Table A.7.5.6.1.1.1-2. NR Cell-specific parameters are specified in Table A.7.5.6.1.1.1-3 below. OTA related test parameters are shown in table A.7.5.6.1.1.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on SCell (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.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

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 SCell, 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 configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PSCell, BWP-0 in Cell 1 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 BWPis BWP-0 in PCell.

UE is configured with a bwp-InactivityTimer timer value for SCell.

All cells have constant signal levels throughout the test.

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 SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell’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 SCell’s DL slot (*i+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on 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 SCell’s BWP-2 no later than the first DL slot that occurs after the beginning of slot (*i+TBWPswitchDelay*).

The starting time of PCell (Cell 1) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won’t transmit DCI format for PDSCH reception on SCell(Cell 2).

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the half 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 SCell’s DL slot (*j+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell at latest on the first UL slot that occurs after the beginning of slot (*j+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on SCell’s BWP-1 no later than the first DL slot that occurs after the beginning of slot (*j+TBWPswitchDelay*).

The starting time of PCell (Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment 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 test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of SCell, respectively.

Table A.7.5.6.1.1.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD -TDD duplex mode |
| Note 1: Void | |

**Table A.7.5.6.1.1.1-2: General test parameters for DL BWP switch in SA**

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 1, 2 | Two NR radio channels are used for 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 |
| *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 | Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |
| T3 | s | 0.2 |  |

Table A.7.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | **Cell2** |
| Frequency Range |  | FR2 | FR2 |
| Duplex mode |  | TDD | |
| TDD configuration |  | TDDConf.3.1 | |
| BWchannel |  | 100 MHz: NRB,c = 66 | |
| Active BWP ID |  | 0 | 0 |
| Downlink initial BWP Configuration |  | DLBWP.0.2 | |
| Uplink initial BWP Configuration |  | ULBWP.0.2 | N.A. |
| Downlink active BWP-0 Configuration |  | DLBWP.0.2 | N.A. |
| Downlink active BWP-1 Configuration |  | N.A. | DLBWP.1.1 |
| Downlink active BWP-2 Configuration |  | N.A. | DLBWP.1.3 |
| Uplink active BWP-0 Configuration |  | ULBWP.0.2 | N.A. |
| Uplink active BWP-1 Configuration |  | N.A. | N.A. |
| Uplink active BWP-2 Configuration |  | N.A. | N.A. |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | |
| TRS configuration |  | TRS.2.1 TDD | |
| TCI state |  | TCI.State.0 | |
| RMSI CORESET parameters |  | CR.3.1 TDD | |
| Dedicated CORESET parameters |  | CCR.3.1 TDD | |
| OCNG Patterns |  | OP.1 | |
| SSB Configuration |  | SSB.1 FR2 | |
| SMTC Configuration |  | SMTC.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) |  |  |  |
| 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. | | | |

Table A.7.5.6.1.1.1-4: OTA related test parameters for BWP switching test case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 defined in clause A.3.15.1 | Setup 1 defined in clause A.3.15.1 |
| Assumtion for UE beams Note 6 |  | Fine | Fine |
| Note1 | dBm/15kHz | -112 | -112 |
| Note1 | dBm/SCS | -103 | -103 |
| SS-RSRPNote2 | dBm/SCS Note3 | -85 | -85 |
|  | dB | 18 | 18 |
| IoNote4 | dBm/95.04 MHz Note4 | -56 | -56 |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | |

A.7.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for SCell on 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 SCell on 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 Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed SCell 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 PCell interruption during SCell 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 8.2.2.2.5.

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 first UL 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.

##### A.7.5.6.1.2 NR FR1- NR FR2 DL active BWP switch of SCell with non-DRX in SA

A.7.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.7.5.6.1.2.1-1 below. The test scenario comprises of one NR PCell (Cell 1) and one NR SCell (Cell 2). The general parameters are given in Table A.7.5.6.1.2.1-2. NR Cell-specific parameters are specified in Table A.7.5.6.1.2.1-3 below. OTA related test parameters are shown in table A.7.5.6.1.2.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on SCell (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.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

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 SCell, 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 configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PCell, BWP-0 in Cell 1 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 PCell.

UE is configured with a bwp-InactivityTimer timer value for SCell.

All cells have constant signal levels throughout the test.

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 SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell’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 SCell’s DL slot (*i+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell no later than the first UL slot that occurs after the begining of slot (*i+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on SCell’s BWP-2 no later than the first DL slot that occurs after the beginning of slot (*i+TBWPswitchDelay*).

The starting time of PCell (Cell 1) interruption due to BWP switch on SCell shall occur within the BWP switch delay if the UE doesn’t support per-FR gap, otherwise no interruption due to BWP switch on PCell is allowed.

During T2, the test equipment won’t transmit DCI format for PDSCH reception on SCell (Cell 2).

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the half 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 SCell’s DL slot (*j+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell at latest on the first UL slot that occurs after the beginning of slot (*j+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on SCell’s BWP-1 no later than the first DL slot that occurs after the beginning of slot (*j+TBWPswitchDelay*).

The starting time of PCell (Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay if the UE doesn’t support per-FR gap, otherwise no interruption due to BWP switch on PCell is allowed.

The test equipment 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 test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of SCell, respectively.

Table A.7.5.6.1.2.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | PCell: NR 30 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.5.6.1.2.1-2: General test parameters for DL BWP switch in SA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 2 | Two NR radio channel is used for 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 |
| *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 [13] clause 6.5.3.1. |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |
| T3 | s | 0.2 |  |

Table A.7.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell2 |
| Frequency Range | |  | FR1 | FR2 |
| Duplex mode | Config 1 |  | FDD | TDD |
|  | Config 2,3 |  | TDD |  |
| TDD configuration | Config 1 |  | Not Applicable | TDDConf.3.1 |
|  | Config 2 |  | TDDConf.1.1 |  |
|  | Config 3 |  | TDDConf.2.1 |  |
| BWchannel | Config 1,2 | MHz | 10 MHz: NRB,c = 52 | 100 MHz: NRB,c = 66 |
|  | Config 3 |  | 40 MHz: NRB,c = 106 |  |
| Active BWP ID | |  | 0 | 1, 2 |
| Downlink initial BWP Configuration | |  | DLBWP.0.2 | |
| Uplink initial BWP Configuration | |  | ULBWP.0.2 | N.A. |
| Downlink active BWP-0 Configuration | |  | DLBWP.0.2 | N.A. |
| Downlink active BWP-1 Configuration | |  | N.A. | DLBWP.1.1 |
| Downlink active BWP-2 Configuration | |  | N.A. | DLBWP.1.3 |
| Uplink active BWP-0 Configuration | |  | ULBWP.0.2 | N.A. |
| Uplink active BWP-1 Configuration | |  | N.A. | N.A. |
| Uplink active BWP-2 Configuration | |  | N.A. | N.A. |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | SR.3.1 TDD |
|  | Config 2 |  | SR.1.1 TDD |  |
|  | Config 3 |  | SR.2.1 TDD |  |
| RMSI CORESET parameters | Config 1 |  | CR.1.1 FDD | CR.3.1 TDD |
|  | Config 2 |  | CR.1.1 TDD |  |
|  | Config 3 |  | CR.2.1 TDD |  |
| Dedicated CORESET parameters | Config 1 |  | CCR.1.1 FDD | CCR.3.1 TDD |
|  | Config 2 |  | CCR.1.1 TDD |  |
|  | Config 3 |  | CCR.2.1 TDD |  |
| OCNG Patterns | |  | OP.1 | |
| SSB Configuration | Config 1,2 |  | SSB.1 FR1 | SSB.1 FR2 |
| Config 3 | SSB.2 FR1 |
| TRS configuration | Config 1,2,3 |  | - | TRS.2.1 TDD |
| TCI state | Config 1,2,3 |  | TCI.State.0 | TCI.State.0 |
| SMTC Configuration | |  | SMTC.1 | |
| Correlation Matrix and Antenna Configuration | |  | NA  Link only, see clause A.3.7A | 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) | |  |  |  |
| Propagation Condition | |  | NA  Link only, see clause A.3.7A | 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 SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

Table A.7.5.6.1.2.1-4: OTA related test parameters for BWP switching test case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | -NA  Link only, see clause A.3.7A | Setup 1 defined in clause A.3.15.1 |
| Assumption for UE beams Note 6 |  |  | Fine |
| Note1 | dBm/15kHz |  | -112 |
| Note1 | dBm/SCS |  | -103 |
| SS-RSRPNote2 | dBm/SCS Note3 |  | -85 |
|  | dB |  | 18 |
| IoNote4 | dBm/95.04 MHz Note4 |  | -56 |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | |

A.7.5.6.1.2.2 Test Requirements

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 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%.

If the UE doesn’t support per-FR gap,

- 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 8.2.2.2.5.

Otherwise no interruption due to BWP switch on SCell is allowed.

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 UL 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.

##### A.7.5.6.1.3 NR FR2 DL active BWP switch with non-DRX in SA

###### A.7.5.6.1.3.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6. Supported test configurations are shown in Table A.7.5.6.1.3.1-1.

The test scenario comprises of one cell (Cell 1) as given in Table A.7.5.6.1.3.1-2. Cell-specific parameters of NR PCell is specified in Table A.7.5.6.1.3.1-3 below. The OTA related test parameters for FR2 is shown in Table A.7.5.6.1.3.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

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.

All cells have constant signal levels throughout the test.

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 Cell 1’s slot # denoted *i*. The UE should 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 Cell 1’s DL slot (*i+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell 1 no later than the first UL slot that occurs after the beginning of slot (*i+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on Cell 1’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 Cell 1.

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the half 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 on the first DL slot that occurs after the beginning of Cell 1’s DL slot (*j+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell 1 at latest on the first UL slot that occurs after the beginning of slot (*j+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on Cell 1’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 is received.

Table A.7.5.6.1.3.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: Void.  Note 2: A UE which fulfils the requirements in test case A.7.5.6.1.1 or A.7.5.6.1.2 can skip the test cases in A.7.5.6.1.3. | |

Table A.7.5.6.1.3.1-2: General test parameters for DL BWP switch in SA

|  |  |  |  |
| --- | --- | --- | --- |
| 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 |  |
| DRX |  | OFF | For both PCell and PSCell |
| *bwp-InactivityTimer* | ms | [200] |  |
| T1 | s | [0.2] |  |
| T2 | s | [0.2] |  |
| T3 | s | [0.2] |  |

Table A.7.5.6.1.3.1-3: NR Cell specific test parameters for DL BWP switch in SA

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell 1 |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| Active BWP ID |  | 1, 2 |
| Initial DL BWP Configuration |  | DLBWP.0.2 Note 2 |
| Active DL BWP-1 Configuration |  | DLBWP.1.1 Note 2 |
| Active DL BWP-2 Configuration |  | DLBWP.1.3 Note 2 |
| Initial UL BWP Configuration |  | ULBWP.0.2 Note 2 |
| Active UL BWP-1 Configuration |  | ULBWP.1.1 Note 2 |
| Active UL BWP-2 Configuration |  | ULBWP.1.3 Note 2 |
| PDSCH Reference measurement channel |  | SR.3.1 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP.1 |
| SSB Configuration |  | SSB.1 FR2 |
| SMTC Configuration |  | SMTC.1 |
| TCI State |  | TCI.State.0 |
| TRS Configuration |  | TRS.2.1 TDD |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low |
| 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) |  |  |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: 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]. | | |

Table A.7.5.6.1.3.1-4: OTA related test parameters for DL BWP switch in SA

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell 2 |
| Angle of arrival configuration |  | Setup 1 defined in clause A.3.15.1 |
| Assumption for UE beams Note 6 |  | Fine |
| NocNote 1 | dBm/15 kHz | -112 |
| NocNote 1 | dBm/SCS | -103 |
| SS-RSRP Note 2 | dBm/120 kHz Note3 | -85 |
| Ês/Iot | dB | 18 |
| Ês/Noc Note 5 | dB | 18 |
| IoNote2 | dBm/95.04 MHz Note4 | -56 |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | |

###### A.7.5.6.1.3.2 Test Requirements

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 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%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL 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.

##### A.7.5.6.1.4 NR FR2-2- NR FR2-2 DL active BWP switch of SCell with non-DRX in SA

###### A.7.5.6.1.4.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.7.5.6.1.4.1-1 below. The test scenario comprises of one PCell (Cell 1) and one SCell (Cell 2) as given in Table A.7.5.6.1.4.1-2. NR Cell-specific parameters are specified in Table A.7.5.6.1.4.1-3 below. OTA related test parameters are shown in table A.7.5.6.1.4.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on SCell (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.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

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 SCell, 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 configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PSCell, BWP-0 in Cell 1 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 BWPis BWP-0 in PCell.

UE is configured with a bwp-InactivityTimer timer value for SCell.

All cells have constant signal levels throughout the test.

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 SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell’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 SCell’s DL slot (*i+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on 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 SCell’s BWP-2 no later than the first DL slot that occurs after the beginning of slot (*i+TBWPswitchDelay*).

The starting time of PCell (Cell 1) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won’t transmit DCI format for PDSCH reception on SCell(Cell 2).

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the half 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 SCell’s DL slot (*j+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell at latest on the first UL slot that occurs after the beginning of slot (*j+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on SCell’s BWP-1 no later than the first DL slot that occurs after the beginning of slot (*j+TBWPswitchDelay*).

The starting time of PCell (Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment 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 test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of SCell, respectively.

Table A.7.5.6.1.4.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.5.6.1.4.1-2: General test parameters for DL BWP switch in SA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 1, 2 | Two NR radio channels are used for 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 |
| *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 | Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |
| T3 | s | 0.2 |  |

Table A.7.5.6.1.4.1-3: NR Cell specific test parameters for DL BWP switch in SA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 1** | **Cell2** |
| Frequency Range |  | 1,2,3 | FR2-2 | FR2-2 |
| Duplex mode |  | 1,2,3 | TDD | |
| TDD configuration |  | 1 | TDDConf.3.1 | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| BWchannel |  | 1 | 100 MHz: NRB,c = 66 | |
|  | 2 | 400 MHz: NRB,c = 66 | |
|  | 3 | 400 MHz: NRB,c = 33 | |
| Active BWP ID |  | 1,2,3 | 0 | 0 |
| Downlink initial BWP Configuration |  | 1,2,3 | DLBWP.0.2 | |
| Uplink initial BWP Configuration |  | 1,2,3 | ULBWP.0.2 | N.A. |
| Downlink active BWP-0 Configuration |  | 1,2,3 | DLBWP.0.2 | N.A. |
| Downlink active BWP-1 Configuration |  | 1,2,3 | N.A. | DLBWP.1.1 |
| Downlink active BWP-2 Configuration |  | 1,2,3 | N.A. | DLBWP.1.3 |
| Uplink active BWP-0 Configuration |  | 1,2,3 | ULBWP.0.2 | N.A. |
| Uplink active BWP-1 Configuration |  | 1,2,3 | N.A. | N.A. |
| Uplink active BWP-2 Configuration |  | 1,2,3 | N.A. | N.A. |
| PDSCH Reference measurement channel |  | 1 | SR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| TRS configuration |  | 1 | TRS.2.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| TCI state |  | 1,2,3 | TCI.State.0 | |
| RMSI CORESET parameters |  | 1 | CR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| Dedicated CORESET parameters |  | 1 | CCR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| OCNG Patterns |  | 1,2,3 | OP.1 | |
| SSB Configuration |  | 1 | SSB.1 FR2 | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| SMTC Configuration |  | 1,2,3 | SMTC.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) |  |  |  |  |
| 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. | | | | |

Table A.7.5.6.1.4.1-4: OTA related test parameters for BWP switching test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | 1,2,3 | Setup 1 defined in clause A.3.15.1 | Setup 1 defined in clause A.3.15.1 |
| Assumtion for UE beams Note 6 |  | 1,2,3 | Fine | Fine |
| Note1 | dBm/15kHz |  | -112 | -112 |
| Note1 | dBm/SCS | 1 | -103 | -103 |
| 2 | -97 | -97 |
| 3 | -94 | -94 |
| SS-RSRPNote2 | dBm/SCS Note3 | 1 | -85 | -85 |
| 2 | -79 | -79 |
| 3 | -76 | -76 |
|  | dB |  | 18 | 18 |
| IoNote4 | dBm/95.04 MHz Note4 | 1 | -56 | -56 |
| dBm/380.16 MHz Note4 | 2,3 | -50.0 | -50.0 |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | |

###### A.7.5.6.1.4.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for SCell on 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 SCell on 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 Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed SCell 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 PCell interruption during SCell 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 8.2.2.2.5.

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 first UL 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.

#### A.7.5.6.2 RRC-based Active BWP Switch

A.7.5.6.2.1 NR FR2 DL active BWP switch of PCell with non-DRX in SA

###### A.7.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.7.5.6.2.1.1-1.

The test scenario comprises of one PCell (Cell 1) as given in Table A.7.5.6.2.1.1-2. Cell-specific parameters of PCell are specified in Table A.7.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PCell).

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 of initial condition in PCell.

All cells have constant signal levels throughout the test.

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 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 completely receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot as defined in clause 8.6.3 and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot. The UE shall be continuously scheduled on PCell’s BWP-1 starting from the first DL slot that occurs after the beginning of DL slot .

*TRRCprocessingDelay* and *TBWPswitchDelayRRC* are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PCell by counting the time from the time when the RRC Reconfiguration message including updated BWP configurationis sent till the time when RRC Reconfiguration Complete message is received.

Table A.7.5.6.2.1.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

**Table A.7.5.6.2.1.1-2: General test parameters for DL BWP switch in SA**

|  |  |  |  |
| --- | --- | --- | --- |
| 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 |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| T1 | s | 0.2 |  |

**Table A.7.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in SA**

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 |
| Frequency Range | |  | FR2 |
| Duplex mode | |  | TDD |
| TDD configuration | |  | TDDConf.3.1 |
| BWchannel | |  | 100 MHz: NRB,c = 66 |
| Active BWP ID | |  | 1 |
| Initial DL BWP Configuration | |  | DLBWP.0.2 |
| Initial UL BWP Configuration | |  | ULBWP.0.2 |
| Initial Condition | Active DL BWP-1 Configuration |  | DLBWP.1.3 |
|  | Active UL BWP-1 Configuration |  | ULBWP.1.3 |
| Final  Condition | Active DL BWP-1 Configuration |  | DLBWP.1.1 |
|  | Active UL BWP-1 Configuration |  | ULBWP.1.1 |
| 'PDSCH Reference measurement channel | |  | SR.3.1 TDD |
| RMSI CORESET parameters | |  | CR.3.1 TDD |
| Dedicated CORESET parameters | |  | CCR.3.1 TDD |
| OCNG Patterns | |  | OP.1 |
| SSB Configuration | |  | SSB.1 FR2 |
| SMTC Configuration | |  | SMTC.1 |
| TCI State | |  | TCI.State.0 |
| TRS Configuration | |  | TRS.2.1 TDD |
| Antenna Configuration | |  | 1x2 |
| 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) | |  |  |
| 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: 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]. | | | |

Table A.7.5.6.2.1.1-4: OTA related test parameters for BWP switching test case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 |
| Angle of arrival configuration | |  | Setup 1 according to table A.3.15 |
| Assumption for UE beams Note 5 | |  | Fine |
| Note1 | NR\_TDD\_FR2\_A | dBm/15kHz | -112 |
|  | NR\_TDD\_FR2\_B |  |  |
|  | NR\_TDD\_FR2\_F |  |  |
|  | NR\_TDD\_FR2\_G |  |  |
|  | NR\_TDD\_FR2\_T |  |  |
|  | NR\_TDD\_FR2\_Y |  |  |
| Note1 | NR\_TDD\_FR2\_A | dBm/SCS | -103 |
|  | NR\_TDD\_FR2\_B |  |  |
|  | NR\_TDD\_FR2\_F |  |  |
|  | NR\_TDD\_FR2\_G |  |  |
|  | NR\_TDD\_FR2\_T |  |  |
|  | NR\_TDD\_FR2\_Y |  |  |
| SS-RSRPNote2 | NR\_TDD\_FR2\_A | dBm/SCS Note3 | -85 |
|  | NR\_TDD\_FR2\_B |  |  |
|  | NR\_TDD\_FR2\_F |  |  |
|  | NR\_TDD\_FR2\_G |  |  |
|  | NR\_TDD\_FR2\_T |  |  |
|  | NR\_TDD\_FR2\_Y |  |  |
|  | | dB | 18 |
| IoNote2 | NR\_TDD\_FR2\_A | dBm/95.04 MHz Note4 | -56 |
|  | NR\_TDD\_FR2\_B |  |  |
|  | NR\_TDD\_FR2\_F |  |  |
|  | NR\_TDD\_FR2\_G |  |  |
|  | NR\_TDD\_FR2\_T |  |  |
|  | NR\_TDD\_FR2\_Y |  |  |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  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. | | | |

###### A.7.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell from the first DL slot that occurs after the beginning of slot and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot.

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

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%.

##### A.7.5.6.2.2 NR FR2-2 DL active BWP switch of PCell with non-DRX in SA

###### A.7.5.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.7.5.6.2.2.1-1.

The test scenario comprises of one PCell (Cell 1) as given in Table A.7.5.6.2.2.1-2. Cell-specific parameters of PCell are specified in Table A.7.5.6.2.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PCell).

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 of initial condition in PCell.

All cells have constant signal levels throughout the test.

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 received at the UE side in PSCell’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 completely receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot as defined in clause 8.6.3 and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot. The UE shall be continuously scheduled on PSCell’s BWP-1 starting from the first DL slot that occurs after the beginning of DL slot .

*TRRCprocessingDelay* and *TBWPswitchDelayRRC* are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRC Reconfiguration message including updated BWP configurationis sent till the time when RRC Reconfiguration Complete message is received.

Table A.7.5.6.2.2.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.5.6.2.2.1-2: General test parameters for DL BWP switch in SA

|  |  |  |  |
| --- | --- | --- | --- |
| 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 |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| T1 | s | [0.2] |  |

Table A.7.5.6.2.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 1** | **Cell2** |
| Frequency Range |  | 1,2,3 | FR2-2 | FR2-2 |
| Duplex mode |  | 1,2,3 | TDD | |
| TDD configuration |  | 1 | TDDConf.3.1 | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| BWchannel |  | 1 | 100 MHz: NRB,c = 66 | |
|  | 2 | 400 MHz: NRB,c = 66 | |
|  | 3 | 400 MHz: NRB,c = 33 | |
| Active BWP ID |  | 1,2,3 | 0 | 0 |
| Downlink initial BWP Configuration |  | 1,2,3 | DLBWP.0.2 | |
| Uplink initial BWP Configuration |  | 1,2,3 | ULBWP.0.2 | N.A. |
| Downlink active BWP-0 Configuration |  | 1,2,3 | DLBWP.0.2 | N.A. |
| Downlink active BWP-1 Configuration |  | 1,2,3 | N.A. | DLBWP.1.1 |
| Downlink active BWP-2 Configuration |  | 1,2,3 | N.A. | DLBWP.1.3 |
| Uplink active BWP-0 Configuration |  | 1,2,3 | ULBWP.0.2 | N.A. |
| Uplink active BWP-1 Configuration |  | 1,2,3 | N.A. | N.A. |
| Uplink active BWP-2 Configuration |  | 1,2,3 | N.A. | N.A. |
| PDSCH Reference measurement channel |  | 1 | SR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| TRS configuration |  | 1 | TRS.2.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| TCI state |  | 1,2,3 | TCI.State.0 | |
| RMSI CORESET parameters |  | 1 | CR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| Dedicated CORESET parameters |  | 1 | CCR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| OCNG Patterns |  | 1,2,3 | OP.1 | |
| SSB Configuration |  | 1 | SSB.1 FR2 | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| SMTC Configuration |  | 1,2,3 | SMTC.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) |  |  |  |  |
| 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. | | | | |

Table A.7.5.6.2.2.1-4: OTA related test parameters for BWP switching test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | 1,2,3 | Setup 1 defined in clause A.3.15.1 | Setup 1 defined in clause A.3.15.1 |
| Assumtion for UE beams Note 6 |  | 1,2,3 | Fine | Fine |
| Note1 | dBm/15kHz |  | -112 | -112 |
| Note1 | dBm/SCS | 1 | -103 | -103 |
| 2 | -97 | -97 |
| 3 | -94 | -94 |
| SS-RSRPNote2 | dBm/SCS Note3 | 1 | -85 | -85 |
| 2 | -79 | -79 |
| 3 | -76 | -76 |
|  | dB |  | 18 | 18 |
| IoNote4 | dBm/95.04 MHz Note4 | 1 | -56 | -56 |
| dBm/380.16 MHz Note4 | 2,3 | -50.0 | -50.0 |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | |

###### A.7.5.6.2.2.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell from the first DL slot that occurs after the beginning of slot and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot.

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

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%.

#### A.7.5.6.3 Simultaneous DCI-based and Timer-based Active BWP Switch on multiple CCs

A.7.5.6.3.1 Active BWP switch on multiple SCells with non-DRX in SA

###### A.7.5.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify fulfillment of DL BWP switch delay requirement defined in clauses 8.6.2A.1 and 8.6.2B.1, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.7.5.6.3.1.1-1 below. The test scenario comprises one PCell (Cell 1) and two SCells (Cell 2 and Cell 3) as given in Table A.7.5.6.3.1.1-2. NR cell-specific parameters are provided in Table A.7.5.6.3.1.1-3, and OTA related test parameters in Table A.7.5.6.3.1.1-4 below.

The test consists of three consecutive time periods with durations T1, T2 and T3, respectively.

PDCCHs indicating new transmissions shall be transmitted in PCell, SCell1 and SCell2 throughout time periods T1 and T3 to ensure that UE sends ACK/NACKs for PDSCH reception in PCell, SCell1 and SCell2. During T2, there shall be scheduling on PDSCH in PCell only.

Before the test starts,

UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), Cell 2 (SCell1) on radio channel 2 (SCC1), and Cell 3 (SCell2) on radio channel 3 (SCC2).

UE is configured with a single UE-specific downlink bandwidth part, BWP-0, for Cell 1 (PCell). BWP-0 includes the bandwidth of the initial DL BWP and SSB.

UE is configured with two different UE-specific downlink bandwidth parts, BWP-1 and BWP-2, for Cell 2 (SCell1). BWP-1 and BWP-2 include the bandwidth of the initial DL BWP and SSB.

UE is configured with two different UE-specific downlink bandwidth parts, BWP-3 and BWP-4, for Cell 3 (SCell2). BWP-3 and BWP-4 include the bandwidth of the initial DL BWP and SSB.

UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-0 in PCell.

UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 in SCell1.

UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-3 in SCell2.

UE is configured with a *bwp-InactivityTimer* timer value for SCell1 and SCell2, respectively.

All cells have constant signal levels throughout the test.

Time period T1 starts when the UE simultaneously receives DCI format 1\_1 commands for DL BWP switch in SCell1 and SCell2, respectively, in a slot # denoted *m*. The UE shall switch its SCell1 bandwidth part from BWP-1 to BWP-2, and its SCell2 bandwidth part from BWP-3 to BWP-4. The UE shall be able to receive PDSCH in SCell1 and SCell2 starting from the first DL slot that occurs after slot (*m+TMultipleBWPswitchDelay*) as defined in clause 8.6.2A.1, and to transmit ACK/NACKs in SCell1 and SCell2 from the first UL slot that occurs after (*m+TBWPswitchDelay+k1*) where *k1* is specified in [7]. The UE shall be continuously scheduled in SCell1 BWP-2 and SCell2 BWP-4 no later than in the first DL slot that occurs after slot (*m+TMultipleBWPswitchDelay*). The starting time of any interruption on PCell due to DL BWP switching of SCell1 and SCell2 shall occur within the BWP switching delay. The length of any interruption on PCell due to DL BWP switching of SCell1 and SCell2 shall fulfill requirements in clause 8.2.2.2.5.

Time period T2 starts when the test equipment ceases to schedule the UE on PDSCH in SCell1 and SCell2, thereby causing the *bwp-InactivityTimer* timers for SCell1 and SCell2 to be running until expiry.

Time period T3 starts at the beginning of the first DL half-subframe immediately after the earliest of the *bwp-InactivityTimer* timers expires, in a slot # denoted *n.* The UE shall switch its SCell1 bandwidth part from BWP-2 to BWP-1, and its SCell2 bandwidth part from BWP-4 to BWP-3. The UE shall be able to receive PDSCH in SCell1 and SCell2 starting from the first DL slot that occurs after slot (*n+TMultipleBWPswitchDelay*) as defined in clause 8.6.2B.1, and to transmit ACK/NACKs in SCell1 and SCell2 from the first UL slot that occurs after slot (*n+TMultipleBWPswitchDelay+k1*). The UE shall be continuously scheduled in SCell1 BWP-1 and SCell2 BWP-3 no later than in the first DL slot that occurs after slot (*n+TMultipleBWPswitchDelay*). The starting time of any interruption on PCell due to DL BWP switching of SCell1 and SCell2 shall occur within the BWP switching delay. The length of any interruption on PCell due to DL BWP switching of SCell1 and SCell2 shall fulfill requirements in clause 8.2.2.2.5.

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch commands are received or *bwp-InactivityTimer* timers expire until ACK/NACKs are sent in SCell1 and SCell2, respectively.

The test equipment verifies that potential interruptions of PCell due to DL BWP switching on SCell1 and SCell2 are carried out within the correct time span, and are within the correct length, by monitoring ACK/NACKs sent in PCell for PCell.

**Table A.7.5.6.3.1.1-1: DL BWP switch supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD -TDD duplex mode |

**Table A.7.5.6.3.1.1-2: General test parameters for DL BWP switch in SA**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NR RF Channel Number |  | 1, 2, 3 | Three NR radio channels are used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active SCell1 |  | Cell 2 | SCell1 on RF channel number 2. |
| Active SCell2 |  | Cell 3 | SCell2 on RF channel number 3. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| *sCellDeactivationTimer* | ms | --- | Same value applies for SCell1 and SCell2. The value infinity is applied. |
| *bwp-InactivityTimer* | ms | 200 | Same value applies for SCell1 and SCell2. |
| Cell2 timing offset to Cell1 | μs | 0 | Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. |
| Cell3 timing offset to Cell1 | μs | 0 |
| T1 | s | 0.2 | During T1, DCI-based simultaneous BWP switching of SCell1 and SCell2 is carried out. |
| T2 | s | 0.2 | During T2 bwp-InactivityTimer timers shall run to expiry. |
| T3 | s | 0.2 | During T3, timer-based simultaneous BWP switching of SCell1 and SCell2 is carried out. |

**Table A.7.5.6.3.1.1-3: NR Cell specific test parameters for DL BWP switch in SA**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | **Cell 2** | **Cell 3** |
| Frequency Range |  | FR2 | | |
| NR RF channel |  | 1 | 2 | 3 |
| Duplex mode |  | TDD | | |
| TDD configuration |  | TDDConf.3.1 | | |
| BWchannel | MHz | 100: NRB,c = 66 | | |
| Active Downlink BWP ID |  | 0 | 1, 2 | 3, 4 |
| Downlink initial BWP Configuration |  | DLBWP.0.2 | DLBWP.0.2 | DLBWP.0.2 |
| Uplink initial BWP Configuration |  | ULBWP.0.2 | ULBWP.0.2 | ULBWP.0.2 |
| Downlink active BWP-0 Configuration |  | DLBWP.1.1 | --- | --- |
| Downlink active BWP-1 Configuration |  | --- | DLBWP.1.1 | --- |
| Downlink active BWP-2 Configuration |  | --- | DLBWP.1.3 | --- |
| Downlink active BWP-3 Configuration |  | --- | --- | DLBWP.1.1 |
| Downlink active BWP-4 Configuration |  | --- | --- | DLBWP.1.3 |
| Uplink active BWP-0 Configuration |  | ULBWP.1.1 | ULBWP.1.1 | ULBWP.1.1 |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | | |
| TRS configuration |  | TRS.2.1 TDD | | |
| TCI state |  | TCI.State.0 | | |
| RMSI CORESET parameters |  | CR.3.1 TDD | | |
| Dedicated CORESET parameters |  | CCR.3.1 TDD | | |
| OCNG Patterns |  | OP.1 | | |
| SSB Configuration |  | SSB.3 FR2 | | |
| SMTC Configuration |  | SMTC.1 | | |
| 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 Note1 |
| EPRE ratio of OCNG to OCNG DMRS Note1 |
| Propagation Condition |  | AWGN | AWGN | AWGN |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low | 1x2 Low | 1x2 Low |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | |

**Table A.7.5.6.3.1.1-4: OTA related test parameters for BWP switching test case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | **Cell 2** | **Cell 3** |
| Angle of arrival configuration |  | Setup 1 defined in clause A.3.15.1 | | |
| Assumtion for UE beams Note4 |  | Fine | Fine | Fine |
| *Noc* Note1 | dBm/15kHz | [-111.7] | [-111.7] | [-111.7] |
| *Noc* Note1 | dBm/SCS | [-102.7] | [-102.7] | [-102.7] |
| *Ês/Noc* | dB | [7] | [7] | [7] |
| SSB-RPNote2 | dBm/SCS | [-95.7] | [-95.7] | [-95.7] |
| *Ês/Iot* | dB | [7] | [7] | [7] |
| IoNote3 | dBm/95.04 MHz | [-65.9] | [-65.9] | [-65.9] |
| 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 Noc to be fulfilled.  Note 2: SSB-RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  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. | | | | |

###### A.7.5.6.3.1.2 Test Requirements

During T1, the UE shall start to send ACK/NACKs in SCell1 and SCell2 from the first UL slot that occurs after the beginning of DL slot (*m+TMultipleBWPswitchDelay*+*k1*).

During T3, the UE shall start to send ACK/NACKs in SCell1 and SCell2 from the first UL slot that occurs after the beginning of DL slot (*n+TMultipleBWPswitchDelay*+*k1*).

During T1 and T3, the start of any interruption on PCell due to active BWP switching on SCell1 and SCell2 shall not happen outside the BWP switching delay *TMultipleBWPswitchDelay*, and the length of any interruption shall not exceed the length specified in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed active BWP switch delays in SCell1 and SCell2 to be considered correct.

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

#### A.7.5.6.4 SCell dormancy switch

##### A.7.5.6.4.1 NR FR2 PCell SCell dormancy switch of single FR2 SCell inside active time

###### A.7.5.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the Dormant SCell BWP switch delay requirements are within the requirements stated in section 8.6 for UE configured with a single downlink SCell, when the dormancy indication is received in any of the first 3 OFDM symbols or is received after the first 3 OFDM symbols.

The Supported test configurations are given in Table A.7.5.6.4.1.1-1. The test parameters are given in Tables A.7.5.6.4.1.1-2 and cell-specific parameters in A.7.5.6.4.1.1-3 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 A6 is used The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. There are two carriers both in FR2, with one cell on the PCC and 2 cells on SCC. Cell 1, Cell 2 and Cell 3 operate in either FDD or TDD duplex mode according to test configuration. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) with configured and activated SCell (SCell1) on radio channel 2 (SCC1). The UE is not aware of Cell 3 on radio channel 2 (SCC1). The UE is reporting CSI and shall not report CQI index 0 (out-of-range) in the available uplink resources to report CQI for the SCell. The UE shall be continuously scheduled in the PCell throughout the whole test.

The UE receives a DCI-based BWP switch command by which the SCell1 (Cell 2) is requested to switch the active BWP to the dormant BWP.

The point in time at which the DCI message is received at the UE antenna connector, in a subframe # denoted n, defines the start of time period T1. The UE shall accomplish the BWP switch to the dormant BWP latest in subframe (n + TBWPswitchDelay + X). The UE shall continue to shall report valid CQI if the UE has available uplink resources to report CQI for the dormant SCell. The UE shall continue to shall report L1-RSRP if the UE has available uplink resources to report L1-RSRP for the Dormant SCell. Any PCell interruption due to BWP switch on the SCell shall occur in the subframes n to (n+ TBWPswitchDelay + X).

Time T2 start at T1 + (TBWPswitchDelay + X). During T2 the UE shall continue to measure and report CQI and L1-RSRP in the available uplink resources to report CQI and L1-RSRP for the SCell.

Time T3 starts at T2 + 500ms. During T3 the UE shall continue to measure and report CQI and L1-RSRP in the available uplink resources to report CQI and L1-RSRP for the SCell.

Starting at T4 = T3 + 500ms, Cell 3 becomes detectable. During T3 the UE shall continue to measure and report CQI and L1-RSRP in the available uplink resources to report CQI and L1-RSRP for the SCell. The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 1000 ms from the beginning of time period T4. The UE is not required to read the neighbour cell SSB index in this test.

At time T5 starting at T4 + 1500ms a a DCI-based BWP switch command by which the SCell1 (Cell 2) is requested to switch the active BWP to the non-dormant BWP.

The point in time at which the DCI message is received at the UE antenna connector, in a subframe # denoted n, defines the start of time period T6. The UE shall accomplish the BWP switch to the non-dormant BWP latest in subframe (n + TBWPswitchDelay + X). The UE shall continue to shall report valid CQI if the UE has available uplink resources to report CQI for the non-dormant SCell. The UE shall continue to shall report L1-RSRP if the UE has available uplink resources to report L1-RSRP for the non-dormant SCell. Any PCell interruption due to BWP switch on the SCell shall occur in the subframes n to (n+ TBWPswitchDelay + X).

During T2, T3 and T4 the total rate of ACK/NACK feedback loss on any non-dormant serving cell resulting from CQI measurements and RRM measurements, clause 8.2.2.2.12.3, on dormant SCells, shall not exceed [0.5]%.

During T2, T3 and T4 the total rate of ACK/NACK feedback loss on any non-dormant serving cell resulting from L1-RSRP measurements and RRM measurements, clause 8.2.2.2.12.x, on dormant SCells, shall not exceed [0.5]%.

During T2, T3 and T4 the total rate of ACK/NACK feedback loss on any non-dormant serving cell resulting from RRM measurements and RRM measurements, clause 8.2.2.2.12.3, on dormant SCells, shall not exceed [0.5]%

During T1, T2, T3, T4, T5 and T6, the UE shall be continuously scheduled in the SCell1.

Table A.7.5.6.4.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.5.6.4.1.1-2: General test parameters for dormancy SCell in NR SA with PCell and SCell in FR2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| Test 1 | Test 2 | Test 3 | Test 4 |
| PCell |  | 1 | Cell 1 | | | |  |
| SCell |  | 1 | Cell 2 | | | |  |
| Neighbour cell |  | 1 | Cell 3 | | | | Cell to be identified. |
| RF Channel Number |  | 1 | 1 | | | | cell 1 |
| RF Channel Number |  | 1 | 2 | | | | Cell 2 and Cell 3 |
| Measurement gap type |  | 1 |  | | | | No measurement gaps configured |
| SSB configuration |  | 1 | SSB.1 FR2 | | | | for all cells |
| SMTC configuration |  | 1 | SMTC.1 | | | | all cells |
| CSI-RS parameters |  | 1 | CSI-RS.3.2 FDD | | | |  |
| CSI reporting periodicity, Non-dormant BWP | ms |  | 2 | | | |  |
| CSI reporting periodicity, Dormant BWP | ms |  | 40 | | | |  |
| Timing offset between the cells | ms |  | 0 | | | |  |
| Triggering DCI format |  |  | 1\_1 | 0\_1 | 1\_1 | 0\_1 | Triggering DCI format |
| OFDM symbol range in slot for transmission of DCI with dormancy indication |  |  | 0 – 2 | | 3 – 11 | | Test1 and Test3 are based on that triggering DCI is received within the first three OFDM symbols of a slot. Test2 and Test4 are based on that the triggering DCI is received after the first three OFDM symbols of a slot |
| 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 | | | |  |
| T1 | s | 1 | 5 | | | |  |
| T2 | s | 1 | 5 | | | |  |

Table A.7.5.6.4.1.1-3: NR Cell specific test parameters for dormancy SCell in NR SA with PCell and SCell in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1, Cell 2 | | Cell 3 | |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | SR.3.1 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | CR.3.1 TDD | |
| Dedicated CORESET RMC configuration, Test 1,2 |  | 1 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| Dedicated CORESET RMC configuration, Test 3,4 |  |  | CCR.3.2 TDD | | CCR.3.1 TDD | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| Downlink initial BWP configuration |  | 1 | DLBWP.0.1 | | N/A | |
| Uplink initial BWP configuration |  | 1 | ULBWP.0.1 | N/A | N/A | |
| Downlink active non-dormant BWP configuration |  | 1 | N/A | DLBWP.1.2 | N/A | |
| Downlink active dormant BWP configuration |  | 1 | DLBWP.1.2 | | N/A | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | N/A | N/A | |
| RLM-RS |  | 1 | CSI-RS | | N/A | |
| 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 SSSNote 4 |  |
| EPRE ratio of OCNG to OCNG DMRSNote 4 |  |
| Note 2 | dBm/SCS | 1 | -98 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  | dB | 1 | 4 | -1.46 | -Infinity | -1.46 |
|  | dB | 1 | 4 | 4 | -Infinity | 4 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -94 | -94 | -Infinity | -94 |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | --64.60 | -62.25 |
| 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.  Note 4: OCNG shall be used such that the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols | | | | | | |

###### A.7.5.6.4.1.2 Test Requirements

During T1 the UE shall switch to the dormant BWP.

During T2, T3, T4 and T5 the UE shall not send ACK/NACK for the PDSCH data scheduled on the SCell.

During T2, T3, T4 and T5 the UE shall continue to send CSI reports for SCell1 with non-zero CQI index.

During T2, T3, T4 and T5 the UE shall continue to send L1-RSRP reports for SCell.

During T4 the UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 1000 ms from the beginning of time period T4.

During T2, T3, T4 and T5, the missing ACK/NACK sent in PCell shall be less than 1.5% of the total number of the expected ACK/NACK.

During T6, the UE shall send ACK/NACK for the PDSCH data scheduled after subframe (n+ TBWPswitchDelay + X) for the SCell1.

All of the above test requirements shall be fulfilled in order for the observed SCell1 BWP switch delays, Pcell interruption rate, correct CSI and L1-RSRP reporting and event triggeres reporting. The rate of correct observed SCell1 hibernation delay, activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

##### A.7.5.6.4.2 NR FR1 PCell SCell dormancy switch of two FR2 SCells outside active time

###### A.7.5.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify fulfillment of SCell dormancy switching delay requirements in clause 8.6.2A when the UE is triggered to switch between non-dormancy and dormancy outside DRX active time. In the tested scenario, the UE is connected to PCell in FR1and two SCells in FR2, and the SCells are switched from non-dormancy to dormancy, and vice versa, at a point in time before start of *onDuration*. The UE is configured to monitor PDCCH for DCI format 2\_6 at *ps-Offset* before the start of *onDuration*. Two tests are specified, where a UE that only supports triggering within the first three OFDM symbols of a slot shall undergo Test1 only, and a UE that supports triggering also in remaining OFDM symbols of a slot shall undergo both Test1 and Test2. In the tested scenario, *ps-Offset* is selected to correspond to the dormancy switching time specified in clause 8.6.2A.

The supported test configurations are provided in Table A.7.5.6.4.2.1-1 below. General test parameters are provided in Table A.7.5.6.4.2.1-2, and cell-specific parameters are provided in Table A.7.5.6.4.2.1-3 below. OTA-related test parameters are provided in Table A.7.5.6.4.2.1-4.

The tests consist of four consecutive time periods, T1, T2, T3 and T4, respectively.

Three carriers are used in the test. Cell 1 (PCell) is on RF channel 1 (PCC) in FR1, and Cell 2 (SCell1) and Cell 3 (SCell2) are on RF channels 2 (SCC1) and 3 (SCC2) in FR2, respectively. All three cells have constant signal levels throughout the test.

Before the test starts,

- UE is connected to Cell 1 (PCell), Cell 2 (SCell1) and Cell 3 (SCell2).

- UE is configured with a single UE-specific downlink bandwidth part, BWP-0, for Cell 1. BWP-0 includes the bandwidth of the initial DL BWP and SSB.

- UE is configured with one non-dormant and one dormant UE-specific downlink bandwidth part, BWP-0 and BWP-1, respectively, for Cell 2 and Cell 3. BWP-0 includes the bandwidth of the initial DL BWP and SSB.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP in Cell 1 is BWP-0.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPin Cell 2 is BWP-0.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPin Cell 3 is BWP-0.

- UE is configured with DRX.

- UE is configured to monitor DCI format 2\_6, and to be active during *onDuration* even when no DCI format 2\_6 is detected (*ps-WakeUp*).

Time period T1 starts when the UE at *ps-Offset* before *onDuration* detects a DCI format 2\_6 carrying dormancy indication that indicates that SCell1 and SCell2 are to be switched from non-dormancy to dormancy. The UE shall switch active bandwidth parts for SCell1 and SCell2, respectively, from non-dormant BWP-0 to dormant BWP-1. The UE shall complete the switching before the start of *onDuration*. The test equipment schedules the UE continuously with new data indications in PCell starting from beginning of *onDuration*. The test equipment verifies that the UE is transmitting HARQ feedback for PCell from the beginning of *onDuration* and thus verifies that the UE has completed interruptions due to dormancy switching before the start of *onDuration.*

Time period T2 starts when T1 is completed. The test equipment continues to schedule the UE continuously in PCell. The UE shall carry out CSI and RRM measurements on the dormant SCells. The UE shall report ACK/NACK in PCell in response to scheduled PDSCH, with the maximum loss of transmitted ACK/NACKs fulfilling the requirement in clause 8.2.2.2.12. The test equipment verifies that the loss of ACK/NACKs is no larger than 1.5%.

Time period T3 starts when T2 is completed. During T3, the test equipment does not schedule the UE, by which the inactivity timer expires and the UE stops monitoring PDCCH except for signalling using DCI format 2\_6 at wake-up signalling occasions.

Time period T4 starts when the UE at *ps-Offset* before *onDuration* detects a DCI format 2\_6 carrying dormancy indication that indicates that SCell1 and SCell2 are to be switched from dormancy to non-dormancy. The UE shall switch active bandwidth parts for SCell1 and SCell2, respectively, from dormant BWP-1 to non-dormant BWP-0. The UE shall complete the switching before the start of *onDuration*. The test equipment schedules the UE with new data indication in PCell, SCell1 and SCell2 during *onDuration*. The UE shall receive in PCell, SCell1 and SCell2 and send HARQ feedback for PCell, SCell1 and SCell2 via PCell. The test equipment verifies that the UE is transmitting HARQ feedback for PCell, SCell1 and SCell2 from the beginning of *onDuration*, and thus verifies that the UE has completed interruptions due to dormancy switching before the start of *onDuration*.

Table A.7.5.6.4.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | PCell: 15kHz SSB SCS, 10MHz bandwidth, FDD duplex mode  SCells: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | PCell: 15kHz SSB SCS, 10MHz bandwidth, TDD duplex mode  SCells: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  SCells: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to undergo test for one of the supported test configurations. | |

Table A.7.5.6.4.2.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | Comment |
| Test1 | Test2 |
| NR RF Channel Number |  | 1, 2, 3 | | Three NR radio channels are used for this test |
| Active PCell |  | Cell 1 | | PCell on RF channel number 1 in FR1 |
| Active SCell1 |  | Cell 2 | | SCell1 on RF channel number 2 in FR2 |
| Active SCell2 |  | Cell 3 | | SCell2 on RF channel number 3 in FR2 |
| CSI reporting periodicity, Non-dormant BWP | ms | 2 | | CSI reporting periodicity for periodic reporting of CQI for PCell and non-dormant SCells |
| CSI reporting periodicity, Dormant BWP | ms | 40 | | CSI reporting periodicity for periodic reporting of CQI for dormant SCells |
| CP length |  | Normal | |  |
| DRX |  | DRX.8 | | For both PCell and SCells. See clause A.3.3.8. |
| ps-Offset |  | Depending on UE capability | | Monitoring of DCI 2\_6 ahead of start of drx-onDurationTimer. Value of ps-Offset shall correspond to SCell dormancy switching time for switching of two SCells, as specified in clause 8.6.2A. Actual value depends on reported UE capabilities. |
| ps-WakeUp |  | true | | Wake up for onDuration in case DCI format 2\_6 is not detected. |
| Cell 2 timing offset to Cell 1 | µs | <24 | | Timing offset shall be less than MRTD for FR1-FR2 CA, and leave margin for timing difference between Cell2 and Cell3. |
| Cell 3 timing offset to Cell 2 | ns | <260 | | Timing offset shall be less than MRTD for FR2 intra-band non-contiguous CA. |
| OFDM symbol range in slot for transmission of DCI with dormancy indication |  | 0 – 2 | 3 – 11 | Test1 is based on that triggering DCI is received within the first three OFDM symbols of a slot.Test2 is based on that the triggering DCI is received later than within the first three OFDM symbols of a slot. |
| T1 | s | 0.2 | | During this time the SCells are switched from non-dormancy to dormancy. |
| T2 | s | 10 | | During this time the SCells are dormant. |
| T3 | s | 0.2 | | During this time the UE is not scheduled in PCell. |
| T4 | s | 0.2 | | During this time the SCells are switched from dormancy to non-dormancy. |

Table A.7.5.6.4.2.1-3: Cell specific test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell2 | Cell 3 |
| Frequency Range | |  | FR1 | FR2 | FR2 |
| NR RF channel | |  | 1 | 2 | 3 |
| Duplex mode | Config 1 |  | FDD | TDD | TDD |
| Config 2,3 |  | TDD |
| TDD configuration | Config 1 |  | --- | TDDConf.3.1 | TDDConf.3.1 |
| Config 2 |  | TDDConf.1.1 |
| Config 3 |  | TDDConf.2.1 |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | 100: NRB,c = 66 | 100: NRB,c = 66 |
| Config 3 | 40: NRB,c = 106 |
| Downlink initial BWP Configuration | |  | DLBWP.0.2 | DLBWP.0.2 | DLBWP.0.2 |
| Uplink initial BWP Configuration | |  | ULBWP.0.2 | --- | --- |
| Downlink active non-dormant BWP-0 Configuration | |  | DLBWP.1.1 | DLBWP.1.1 | DLBWP.1.1 |
| Downlink active dormant BWP-1 Configuration | |  | --- | DLBWP.1.1 | DLBWP.1.1 |
| Uplink active BWP-0 Configuration | |  | ULBWP.0.2 | --- | --- |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | SR.3.1 TDD | SR.3.1 TDD |
| Config 2 |  | SR.1.1 TDD |
| Config 3 |  | SR.2.1 TDD |
| CSI-RS configuration for CSI reporting, Non-dormant BWP | Config 1 |  | CSI-RS.1.1 FDD | CSI-RS.3.1 TDD | CSI-RS.3.1 TDD |
| Config 2 |  | CSI-RS.1.1 TDD |
| Config 3 |  | CSI-RS.2.1 TDD |
| CSI-RS configuration for CSI reporting, Dormant BWP | |  | --- | CSI-RS.3.5 TDD | CSI-RS.3.5 TDD |
| TRS configuration | Config 1 |  | TRS.1.1 FDD | TRS.2.1 TDD | TRS.2.1 TDD |
| Config 2 |  | TRS.1.1 TDD |
| Config 3 |  | TRS.1.2 TDD |
| TCI state | |  | TCI.State.0 | TCI.State.0 | TCI.State.0 |
| RMSI CORESET parameters | Config 1 |  | CR.1.1 FDD | --- | --- |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET parameters, Test 1,2 | Config 1 |  | CCR.1.1 FDD | CCR.3.1 TDD | CCR.3.1 TDD |
| Config 2 |  | CCR.1.1 TDD |
| Config 3 |  | CCR.2.1 TDD |
| Dedicated CORESET parameters, Test 3,4 | Config 1 |  | CCR.1.5 FDD | CCR.3.1 TDD | CCR.3.1 TDD |
| Config 2 |  | CCR.1.5 TDD |
| Config 3 |  | CCR.2.3 TDD |
| OCNG Patterns | |  | OP.1 | OP.1 | OP.1 |
| SSB Configuration | Config 1,2 |  | SSB.1 FR1 | SSB.1 FR2 | SSB.1 FR2 |
|  | Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | |  | SMTC.1 | SMTC.1 | SMTC.1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | | |
| 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 SSSNote1 | |
| EPRE ratio of OCNG to OCNG DMRSNote1 | |
| Propagation Condition | |  | N/A  Link only, see clause A.3.7A | AWGN | AWGN |
| Note 1: OCNG shall be used such that the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | |

Table A.7.5.6.4.2.1: OTA related test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
| Angle of arrival configuration |  | N/A  Link only, see clause A.3.7A | Setup 1 defined in clause A.3.15.1 | |
| Assumtion for UE beams Note6 |  | Fine | Fine |
| *Noc* Note1 | dBm/15kHz | -112 | -112 |
| *Noc* Note1 | dBm/SCS | -103 | -103 |
| SS-RSRPNote2 | dBm/SCS Note3 | -85 | -85 |
| *Ês/Iot* | dB | 18 | 18 |
| IoNote4 | dBm/95.04 MHz Note4 | -56 | -56 |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | |

###### A.7.5.6.4.2.2 Test Requirements

Starting from *onDuration* in time period T1, the UE shall transmit ACK/NACK in response to scheduling in PCell. There shall be no loss of ACK/NACK.

During time period T2, the UE shall transmit ACK/NACKs in response to scheduling in PCell and the rate of missed ACK/NACKs shall be no more than 1.5%.

Starting from *onDuration* in time period T4, the UE shall transmit ACK/NACK in response to scheduling in PCell, SCell1 and SCell2. There shall be no loss of ACK/NACK.

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

#### A.7.5.6.5 Simultaneous RRC-based Active BWP Switch on multiple CCs

##### A.7.5.6.5.1 Active BWP switch on multiple SCells with non-DRX in SA

A.7.5.6.5.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for simultaneous RRC-based BWP switch on multiple CCs defined in clause 8.6.3A.

The supported test configurations are shown in Table A.7.5.6.5.1.1-1. The test scenario comprises one PCell (Cell 1) and one SCell (Cell 2) as given in Table A.7.5.6.5.1.1-2. NR cell-specific parameters are provided in Table A.7.5.6.5.1.1-3, and OTA related test parameters in Table A.7.5.6.5.1.1-4.

PDCCHs indicating new transmissions shall be transmitted in PCell and SCell throughout to ensure that UE sends ACK/NACKs for PDSCH reception in PCell, SCell.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), to Cell 2 (SCell) on radio channel 2 (SCC).

- UE has bandwidth part BWP-1 in its RRC-configuration for Cell1 (PCell), Cell 2 (SCell).

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 of initial condition on Cell1 (PCell), Cell 2 (SCell).

All cells have constant signal levels throughout the test.

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 in Cell1 and Cell2, sent from the test equipment to the UE, is 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 in Cell1 and Cell2.

The UE shall be able to receive PDSCH on Cell 1 and Cell 2 at the beginning of the DL slot right after PCell’s DL slot (*i+*) as defined in clause 8.6.3A and be ready for the reception of uplink grant for the PCell no later than at the beginning of the DL slot right after slot (*i+*). The UE shall be continuously scheduled on Cell 1’s BWP-1and Cell 2’s BWP-1 starting from the beginning of the DL slot right after slot (*i+*).

*TRRCprocessingDelay* , *TBWPswitchDelayRRC* and *DRRC* are defined in clause 8.6.3A.

The test equipment verifies the DL BWP switch time in Cell 1 and Cell 2 by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when RRC Reconfiguration Complete message is received.

Table A.7.5.6.5.1.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD -TDD duplex mode |

Table A.7.5.6.5.1.1-2: General test parameters for DL BWP switch in SA

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NR RF Channel Number |  | 1, 2, 3 | Three NR radio channels are used for 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 |  |
| Cell2 timing offset to Cell1 | μs | 0 | Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. |
| T1 | s | [0.2] | During T1, RRC-based simultaneous BWP switching of PCell and SCell is carried out. |

Table A.7.5.6.5.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | **Cell 2** | |
| Frequency Range | |  | FR2 | | |
| NR RF channel | |  | 1 | 2 | |
| Duplex mode | |  | TDD | | |
| TDD configuration | |  | TDDConf.3.1 | | |
| BWchannel | | MHz | 100: NRB,c = 66 | | |
| Active Downlink BWP ID | |  | 0 | 1 | |
| Downlink initial BWP Configuration | |  | DLBWP.0.2 | DLBWP.0.2 | |
| Uplink initial BWP Configuration | |  | ULBWP.0.2 | ULBWP.0.2 | |
| Initial Condition | Active DL BWP-1 Configuration |  | DLBWP.1.3 | DLBWP.1.3 |
|  | Active UL BWP-1 Configuration |  | ULBWP.1.3 | ULBWP.1.3 |
| Final Condition | Active DL BWP-1 Configuration |  | DLBWP.1.1 | DLBWP.1.1 |
|  | Active UL BWP-1 Configuration |  | ULBWP.1.1 | ULBWP.1.1 |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD | | |
| TRS configuration | |  | TRS.2.1 TDD | | |
| TCI state | |  | TCI.State.0 | | |
| RMSI CORESET parameters | |  | CR.3.1 TDD | | |
| Dedicated CORESET parameters | |  | CCR.3.1 TDD | | |
| OCNG Patterns | |  | OP.1 | | |
| SSB Configuration | |  | SSB.3 FR2 | | |
| SMTC Configuration | |  | SMTC.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 Note1 | |
| EPRE ratio of OCNG to OCNG DMRS Note1 | |
| Propagation Condition | |  | AWGN | AWGN | |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: 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]. | | | | | |

Table A.7.5.6.3.1.1-4: OTA related test parameters for BWP switching test case

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | **Cell 2** |
| Angle of arrival configuration |  | Setup 1 defined in clause A.3.15.1 | |
| Assumtion for UE beams Note4 |  | Fine | Fine |
| *Noc* Note1 | dBm/15kHz | [-111.7] | [-111.7] |
| *Noc* Note1 | dBm/SCS | [-102.7] | [-102.7] |
| *Ês/Noc* | dB | [7] | [7] |
| SSB-RPNote2 | dBm/SCS | [-85] | [-85] |
| *Ês/Iot* | dB | [18] | [18] |
| IoNote3 | dBm/95.04 MHz | [-56] | [-56] |
| 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: SSB-RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Equivalent power received by an antenna with 0 dBi gain at the center of the quiet zone  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. | | | |

A.7.5.6.5.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell and SCell in the beginning of the DL slot right after slot (*i+*).

All of the above test requirements shall be fulfilled in order for the observed PCell and SCell active BWP switch delay to be counted as correct.

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

##### A.7.5.6.5.2 NR FR2-2 Active BWP switch on multiple SCells with non-DRX in SA

###### A.7.5.6.5.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for simultaneous RRC-based BWP switch on multiple CCs defined in clause 8.6.3A.

The supported test configurations are shown in Table A.7.5.6.5.2.1-1. The test scenario comprises one PCell (Cell 1) and one SCell (Cell 2) as given in Table A.7.5.6.5.2.1-2. NR cell-specific parameters are provided in Table A.7.5.6.5.2.1-3, and OTA related test parameters in Table A.7.5.6.5.2.1-4.

PDCCHs indicating new transmissions shall be transmitted in PCell and SCell throughout to ensure that UE sends ACK/NACKs for PDSCH reception in PCell, SCell.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), to Cell 2 (SCell) on radio channel 2 (SCC).

- UE has bandwidth part BWP-1 in its RRC-configuration for Cell1 (PCell), Cell 2 (SCell).

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 of initial condition on Cell1 (PCell), Cell 2 (SCell).

All cells have constant signal levels throughout the test.

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 in Cell1 and Cell2, sent from the test equipment to the UE, is 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 in Cell1 and Cell2.

The UE shall be able to receive PDSCH on Cell 1 and Cell 2 at the beginning of the DL slot right after PCell’s DL slot (*i+*) as defined in clause 8.6.3A and be ready for the reception of uplink grant for the PCell no later than at the beginning of the DL slot right after slot (*i+*). The UE shall be continuously scheduled on Cell 1’s BWP-1and Cell 2’s BWP-1 starting from the beginning of the DL slot right after slot (*i+*).

*TRRCprocessingDelay* , *TBWPswitchDelayRRC* and *DRRC* are defined in clause 8.6.3A.

The test equipment verifies the DL BWP switch time in Cell 1 and Cell 2 by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when RRC Reconfiguration Complete message is received.

Table A.7.5.6.5.2.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.5.6.5.2.1-2: General test parameters for DL BWP switch in SA

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NR RF Channel Number |  | 1, 2 | Two NR radio channels are used for 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 |  |
| Cell2 timing offset to Cell1 | μs | 0 | Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. |
| T1 | s | [0.2] | During T1, RRC-based simultaneous BWP switching of PCell and SCell is carried out. |

Table A.7.5.6.5.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 1** | **Cell2** |
| Frequency Range |  | 1,2,3 | FR2-2 | FR2-2 |
| Duplex mode |  | 1,2,3 | TDD | |
| TDD configuration |  | 1 | TDDConf.3.1 | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| BWchannel |  | 1 | 100 MHz: NRB,c = 66 | |
|  | 2 | 400 MHz: NRB,c = 66 | |
|  | 3 | 400 MHz: NRB,c = 33 | |
| Active BWP ID |  | 1,2,3 | 0 | 0 |
| Downlink initial BWP Configuration |  | 1,2,3 | DLBWP.0.2 | |
| Uplink initial BWP Configuration |  | 1,2,3 | ULBWP.0.2 | N.A. |
| Downlink active BWP-0 Configuration |  | 1,2,3 | DLBWP.0.2 | N.A. |
| Downlink active BWP-1 Configuration |  | 1,2,3 | N.A. | DLBWP.1.1 |
| Downlink active BWP-2 Configuration |  | 1,2,3 | N.A. | DLBWP.1.3 |
| Uplink active BWP-0 Configuration |  | 1,2,3 | ULBWP.0.2 | N.A. |
| Uplink active BWP-1 Configuration |  | 1,2,3 | N.A. | N.A. |
| Uplink active BWP-2 Configuration |  | 1,2,3 | N.A. | N.A. |
| PDSCH Reference measurement channel |  | 1 | SR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| TRS configuration |  | 1 | TRS.2.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| TCI state |  | 1,2,3 | TCI.State.0 | |
| RMSI CORESET parameters |  | 1 | CR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| Dedicated CORESET parameters |  | 1 | CCR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| OCNG Patterns |  | 1,2,3 | OP.1 | |
| SSB Configuration |  | 1 | SSB.1 FR2 | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| SMTC Configuration |  | 1,2,3 | SMTC.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) |  |  |  |  |
| 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. | | | | |

Table A.7.5.6.5.2.1-4: OTA related test parameters for BWP switching test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | 1,2,3 | Setup 1 defined in clause A.3.15.1 | Setup 1 defined in clause A.3.15.1 |
| Assumtion for UE beams Note 6 |  | 1,2,3 | Fine | Fine |
| Note1 | dBm/15kHz |  | -112 | -112 |
| Note1 | dBm/SCS | 1 | -103 | -103 |
| 2 | -97 | -97 |
| 3 | -94 | -94 |
| SS-RSRPNote2 | dBm/SCS Note3 | 1 | -85 | -85 |
| 2 | -79 | -79 |
| 3 | -76 | -76 |
|  | dB |  | 18 | 18 |
| IoNote4 | dBm/95.04 MHz Note4 | 1 | -56 | -56 |
| dBm/380.16 MHz Note4 | 2,3 | -50.0 | -50.0 |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | |

###### A.7.5.6.5.2.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell and SCell in the beginning of the DL slot right after slot (*i+*).

All of the above test requirements shall be fulfilled in order for the observed PCell and SCell active BWP switch delay to be counted as correct.

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

### A.7.5.7 PSCell addition and release delay

#### A.7.5.7.1 Addition and Release Delay of known NR PSCell in FR2-2

##### A.7.5.7.1.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell addition and release delay requirements defined in clauses 8.9.2 and 8.9.3, respectively, for the case where the PSCell is known to the UE at the time of addition.

The supported test configurations are given in Table A.7.5.7.1.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.7.1.1-2, A.7.5.7.1.1-3 and A.7.5.7.1.1-4 below. The test consists of five time periods with durations T1, T2, T3, T4 and T5, respectively.

At the start of T1, the UE shall be connected to Cell 1 (PCell) on radio channel 1 (PCC) and shall only monitor PCC and hence be unaware of Cell 2 (PSCell-to-be) on radio channel 2. Before the start of T2, the test system shall send measurement control information including measurement gap configuration and event-triggered reporting configuration for measurements on radio channel 2.

During T2, the Cell2 becomes known to the UE. Therefore, during T2 the UE shall report Event triggered report.

The point in time at which the RRC message to release measurement gap is transmitted from the test system defines the start of period T3. During T3, after measurement gap is released, the test system transmits the RRC message to the UE to add PSCell on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added.

The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T4.

During T4, the UE shall carry out random access towards the PSCell. Reception by the test system of the PRACH preamble defines the start of T5.

During T5, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send a RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T6.

During T6, the UE shall release the PSCell.

Table A.7.5.7.1.1-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Config | Description |
| 1 | FR1 FDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz |
| 2 | FR1 TDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz |
| 3 | FR1 TDD SSB SCS 30kHz BW 40MHz – FR2 TDD SSB SCS 240kHz BW 100MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.5.7.1.1-2: General test parameters for PSCell addition and release delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | |  | 1, 2 | Two radio channels are used for this test |
| Active PCell | |  | Cell 1 | PCell on RF channel number 1 in FR1 |
| Neighbour cell | |  | Cell 2 | Neighbour cell (PSCell-to-be) on RF channel number 2 in FR2 |
| A4 | Hysteresis | dB | 0 | Hysteresis for event A4 |
|  | Threshold RSRP | dBm | -118 | Threshold for event A4 |
|  | Time to Trigger | S | 0 | Time to trigger for event A4 |
| DRX | |  | OFF | For both PCell and PSCell once activated |
| Measurement gap pattern ID | |  | 0 | Gaps are configured before T2 and released before T3. |
| PRACH configuration in Cell 2 | |  | FR2 PRACH configuration 2 | PRACH configuration as specified in Clause A.3.8.3.2. |
| CSI reporting periodicity and offset configuration for Cell 2 | | ms | 2 |  |
| T1 | | s | 5 | During this time the PCell is known and Cell 2 is unknown. |
| T2 | | s | 1 | During this time the UE shall identify neighbour cell 2 and report event B1. |
| T3 | | s | 3.5 | During this time the test system transmits the RRC messages to release measurement gap and add PSCell. |
| T4 | | s | 1 | During this time the UE adds the PSCell. |
| T5 | | s | 1 | During this time the UE sends CSI reports for PSCell. |
| T6 | | s | 1 | During this time the UE releases the PSCell. |

Table A.7.5.7.1.1-3: NR Cell specific test parameters for PSCell addition and release delay

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell2 | | | | |
|  |  |  |  | T1 | T2 | T3 | T4 | T5 |
| Frequency Range |  | 1,2,3 | FR1 | FR2 | | | | |
| Duplex mode |  | 1 | FDD | TDD | | | | |
|  |  | 2,3 | TDD |  | | | | |
| TDD configuration |  | 1 | – | TDDConf.3.1 | | | | |
|  |  | 2 | TDDConf.1.1 |  | | | | |
|  |  | 3 | TDDConf.2.1 |  | | | | |
| BWchannel | MHz | 1,2 | 10: NRB,c = 52 | 100: NRB,c = 66 | | | | |
|  |  | 3 | 40: NRB,c = 106 |  | | | | |
| Data RBs allocated |  | 1,2 | 52 | 48 | | | | |
| 3 | 106 |
| Initial Downlink BWP configuration |  | 1,2,3 | DLBWP.0.1 | DLBWP.0.1 | | | | |
| Initial Uplink BWP configuration |  | 1,2,3 | ULBWP.0.1 | ULBWP.0.1 | | | | |
| Dedicated Downlink BWP configuration |  | 1,2,3 | DLBWP.1.1 | DLBWP.1.1 | | | | |
| Dedicated Uplink BWP configuration |  | 1,2,3 | ULBWP.1.1 | ULBWP.1.1 | | | | |
| PDSCH Reference Measurement Channel |  | 1 | SR.1.1 FDD | SR.3.3 TDD | | | | |
|  |  | 2 | SR.1.1 TDD |  | | | | |
|  |  | 3 | SR.2.1 TDD |  | | | | |
| TRS configuration |  | 1,2,3 | – | TRS.2.1 TDD | | | | |
| TCI state |  | 1,2,3 | – | TCI.State.0 | | | | |
| RMSI CORESET parameters |  | 1 | CR.1.1 FDD | CR.3.2 TDD | | | | |
|  |  | 2 | CR.1.1 TDD |  | | | | |
|  |  | 3 | CR.2.1 TDD |  | | | | |
| Dedicated CORESET parameters |  | 1 | CCR.1.1 FDD | CCR.3.7 TDD | | | | |
|  |  | 2 | CCR.1.1 TDD |  | | | | |
|  |  | 3 | CCR.2.1 TDD |  | | | | |
| OCNG PatternsNote1 |  | 1,2,3 | OP.1 | OP.3 | | | | |
| SSB configuration |  | 1,2 | SSB.1 FR1 | SSB.2 FR2 | | | | |
|  |  | 3 | SSB.2 FR1 |
| SMTC configuration |  | 1,2,3 | SMTC.2 | SMTC.1 | | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2 | 15 | 120 | | | | |
| 3 | 30 |
| EPRE ratio of PSS to SSS | dB | 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 |  |  |  |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS |  |  |  |  | | | | |
| Propagation Condition |  | 1,2,3 | N/A | 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: Void  Note 4: Void  Note 5: Void | | | | | | | | |

Table A.7.5.7.1.1-4: OTA related test parameters for PSCell addition and release delay

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell 2 | | | | |
| T1 | T2 | T3 | T4 | T5 |
| Angle of arrival configuration |  | 1,2,3 | Link only, see clause A.3.7A | Setup 2a according to clause A.3.15.2.1 | | | | |
| Assumption for UE beams Note 3 |  |  | Rough | | | | |
| Ês | dBm/SCS | 1,2,3 | -∞ | -81 | | | |
| SSB\_RP Note1, Note2 | dBm/SCS | 1,2,3 | -∞ | -81 | | | |
| BB Note1, Note 4 | dB | 1,2,3 | -∞ | 4.88 | | | |
| Io Note 1, Note2 | dBm/95.04 MHz | 1,2,3 | N/A | -56.41 | | | |
| Note 1: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.  Note 3: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 4: 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | |

##### A.7.5.7.1.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest 112 ms into T3.

The UE shall transmit at least one periodic CSI report for PSCell during T4.

The UE shall stop transmitting CSI reports for PSCell at latest 20 ms into T5.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

#### A.7.5.7.2 Addition and Release Delay of unknown NR PSCell in FR2-2

##### A.7.5.7.2.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell addition and release delay requirements defined in clauses 8.9.2 and 8.9.3, respectively, for the case where the PSCell is unknown to the UE at the time of addition.

The supported test configurations are given in Table A.7.5.7.2.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.7.2.1-2, A.7.5.7.2.1-3 and A.7.5.7.2.1-4 below. The test consists of four time periods with durations T1, T2, T3 and T4, respectively.

At the start of T1, the UE shall be connected to Cell 1 (PCell) on radio channel 1 (PCC) and shall only monitor PCC and hence be unaware of Cell 2 (PSCell-to-be) on radio channel 2. At the end of T1, the test system shall send a RRC message instructing the UE to add PSCell (Cell 2), and further instructing the UE to report CSI periodically in the PSCell once it has been added. Reception by the UE of this RRC message defines the start of T2.

During T2, the UE shall identify PSCell and carry out random access towards the PSCell. Reception by the test system of the PRACH preamble defines the start of T3.

During T3, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send a RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T4.

During T4, the UE shall release the PSCell.

Table A.7.5.7.2.1-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Config | Description |
| 1 | FR1 FDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz |
| 2 | FR1 TDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz |
| 3 | FR1 TDD SSB SCS 30kHz BW 40MHz – FR2 TDD SSB SCS 240kHz BW 100MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.5.7.2.1-2: General test parameters for PSCell addition and release delay

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 | Two radio channels are used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1 in FR1 |
| Neighbour cell |  | Cell 2 | Neighbour cell (PSCell-to-be) on RF channel number 2 in FR2 |
| DRX |  | OFF | For both PCell and PSCell once activated |
| PRACH configuration in Cell 2 |  | FR2 PRACH configuration 2 | PRACH configuration as specified in Clause A.3.8.3.2. |
| CSI reporting periodicity and offset configuration for Cell 2 | ms | [2] |  |
| T1 | s | 5 | During this time the PCell is known and Cell 2 is unknown. |
| T2 | s | 1 | During this time the UE adds the PSCell. |
| T3 | s | 1 | During this time the UE sends CSI reports for PSCell. |
| T4 | s | 1 | During this time the UE releases the PSCell. |

Table A.7.5.7.2.1-3: NR Cell specific test parameters for PSCell addition and release delay

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell2 | | | |
|  |  |  |  | T1 | T2 | T3 | T4 |
| Frequency Range |  | 1,2,3 | FR1 | FR2 | | | |
| Duplex mode |  | 1 | FDD | TDD | | | |
|  |  | 2,3 | TDD |  | | | |
| TDD configuration |  | 1 | – | TDDConf.3.1 | | | |
|  |  | 2 | TDDConf.1.1 |  | | | |
|  |  | 3 | TDDConf.2.1 |  | | | |
| BWchannel | MHz | 1,2 | 10: NRB,c = 52 | 100: NRB,c = 66 | | | |
|  |  | 3 | 40: NRB,c = 106 |  | | | |
| Data RBs allocated |  | 1,2 | 52 | 48 | | | |
| 3 | 106 |
| Initial Downlink BWP configuration |  | 1,2,3 | DLBWP.0.1 | DLBWP.0.1 | | | |
| Initial Uplink BWP configuration |  | 1,2,3 | ULBWP.0.1 | ULBWP.0.1 | | | |
| Dedicated Downlink BWP configuration |  | 1,2,3 | DLBWP.1.1 | DLBWP.1.1 | | | |
| Dedicated Uplink BWP configuration |  | 1,2,3 | ULBWP.1.1 | ULBWP.1.1 | | | |
| PDSCH Reference Measurement Channel |  | 1 | SR.1.1 FDD | SR.3.3 TDD | | | |
|  |  | 2 | SR.1.1 TDD |  | | | |
|  |  | 3 | SR.2.1 TDD |  | | | |
| TRS configuration |  | 1,2,3 | – | TRS.2.1 TDD | | | |
| TCI state |  | 1,2,3 | – | TCI.State.0 | | | |
| RMSI CORESET parameters |  | 1 | CR.1.1 FDD | CR.3.2 TDD | | | |
|  |  | 2 | CR.1.1 TDD |  | | | |
|  |  | 3 | CR.2.1 TDD |  | | | |
| Dedicated CORESET parameters |  | 1 | CCR.1.1 FDD | CCR.3.7 TDD | | | |
|  |  | 2 | CCR.1.1 TDD |  | | | |
|  |  | 3 | CCR.2.1 TDD |  | | | |
| OCNG PatternsNote1 |  | 1,2,3 | OP.1 | OP.3 | | | |
| SSB configuration |  | 1,2 | SSB.1 FR1 | SSB.2 FR2 | | | |
| 3 | SSB.2 FR1 |
| SMTC configuration |  | 1,2,3 | SMTC.2 | SMTC.1 | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2 | 15 | 120 | | | |
| 3 | 30 |
| EPRE ratio of PSS to SSS | dB | 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 |  |  |  |  | | | |
| EPRE ratio of OCNG to OCNG DMRS |  |  |  |  | | | |
| Propagation Condition |  | 1,2,3 | AWGN | 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: Void  Note 4: Void  Note 5: Void | | | | | | | |

Table A.7.5.7.2.1-4: OTA related test parameters for PSCell addition and release delay

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell 2 | | | |
| T1 | T2 | T3 | T4 |
| Angle of arrival configuration |  | 1,2,3 | Link only, see clause A.3.7A | Setup 2a according to clause A.3.15.2.1 | | | |
| Assumption for UE beams Note 3 |  |  | Rough | | | |
| Ês | dBm/SCS | 1,2,3 | -∞ | -81 | | |
| SSB\_RP Note1, Note 2 | dBm/SCS | 1,2,3 | -∞ | -81 | | |
| BB Note1, Note 4 | dB | 1,2,3 | -∞ | 4.88 | | |
| Io Note 1, Note 2 | dBm/95.04 MHz | 1,2,3 | N/A | -56.41 | | |
| Note 1: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.  Note 3: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 4: 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |

##### A.7.5.7.2.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest 572 ms into T2.

The UE shall transmit at least one periodic CSI report for PSCell during T3.

The UE shall stop transmitting CSI reports for PSCell at latest 20 ms into T4.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

### A.7.5.8 Active TCI state switch delay

#### A.7.5.8.1 MAC-CE based active TCI state switch

A.7.5.8.1.1 NR PCell FR2 active TCI state switch for a known TCI state

A.7.5.8.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3. Supported test configuration is shown in Table A.7.5.8.1.1.1-1.

The test scenario comprises of one NR PCell (Cell 1) as given in Table A.7.5.8.1.1.1-2. Cell-specific parameters of NR PCell are specified in Table A.7.5.8.1.1.1-3 below. The OTA related test parameters for FR2 are shown in Table A.7.5.8.1.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

- UE is configured with 2 different TCI states for PCell, PDCCH TCI state 0 (QCL’d to SSB0) and TCIstate 1 (QCL’d to SSB1), in Cell 1 before starting the test.

- UE is indicated in TCI state 0 as the active PDCCH TCI state

The test consists of two time periods, T1 and T2. Figure A.7.5.8.1.1.1-1 and Figure A.7.5.8.1.1.1-2 show the Time multiplexed (allocation in Frequency is symbolic) downlink transmissions from each Angle of Arrival. During T1 only SSB to which PDCCH-TCI-state0 is QCL’d is transmitted. At the beginning of T2, the SSB corresponding to TCI state 1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a MAC-CE command indicating a switch to TCI state 1. *tci-PresentInDCI* is not configured in the PDSCH configuration, i.e. TCI state for the PDSCH is identical to the PDCCH TCI state.

The test equipment verifies that UE can be scheduled on PCell on TCI state 0 till n+ THARQ +3 ms. The test equipment also verifies the TCI state switch time in PCell by scheduling the UE on TCI state 1 after n+ THARQ +3 ms + (Tfirst-SSB + TSSB-proc).

Table A.7.5.8.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.5.8.1.1.1-2: General test parameters for TCI state switch

|  |  |  |  |
| --- | --- | --- | --- |
| 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 |  |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |

Table A.7.5.8.1.1.1-3: NR Cell specific test parameters for TCI state switch

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell 1 |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| Data RBs allocated |  | 66 |
| Initial DL BWP Configuration |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration |  | DLBWP.1.1 |
| Initial UL BWP Configuration |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration |  | ULBWP.1.1 |
| PDSCH Reference measurement channel |  | SR.3. 2 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP. 5 |
| SSB Configuration |  | SSB.1 FR2 |
| SMTC Configuration |  | SMTC.1 |
| TCI State 0 |  | TC. State.2 |
| TCI State 1 |  | TCI.State.3 |
| TRS Configuration |  | TRS.2.1 TDD  TRS.2.2 TDD |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low |
| 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) |  |  |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

Table A.7.5.8.1.1.1-4: OTA related test parameters for TCI state switch

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | |
|  |  | SSB0 | | SSB1 | | |
|  |  | T1 | T2 | T1 | | T2 |
| Angle of arrival configuration |  | Setup 3 according to clause A.3.15.3 | | | | |
|  |  | AoA1 | | | AoA2 | |
| Assumption for UE beams Note 6 |  | Rough | | | | |
| Ês | dBm/SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| SS B\_RP Note 2 | dBm/ SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| BB Note 7 | dB | 8.3 | 8.3 | -Infinity | | 8.3 |
| IoNote2 | dBm/95.04 MHz Note4 | -56.0 | -56.0 | - Infinity | | -56.0 |
| Note 1: Void  Note 2: SS B\_RP 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: As observed with 0dBi gain antenna at the center of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  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 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. | | | | | | |



Figure A.7.5.8.1.1.1-1: Time multiplexed downlink transmissions during T1



Figure A.7.5.8.1.1.1-2: Time multiplexed downlink transmissions during T2

A.7.5.8.1.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with results for both SSB0 and SSB1.

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to receive on TCI state 0 till n+ THARQ +3 ms

- be able to start receiving on TCI state 1 after n+ THARQ +5 ms + Tfirst-SSB

#### A.7.5.8.2 RRC based active TCI state switch

A.7.5.8.2.1 NR PCell FR2 active TCI state switch for a known TCI state

A.7.5.8.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3. Supported test configuration is shown in Table A.7.5.8.2.1.1-1.

The test scenario comprises of one NR PCell as given in Table A.7.5.8.2.1.1-2. Cell-specific parameters of NR PCell is specified in Table A.7.5.8.2.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.7.5.8.2.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

- UE is configured with 1 TCI state for PCell, PDCCH-TCI-state0 (QCL’d to SSB0)

- UE is indicated in TCI state0 as the active TCI state

The test consists of two time periods, T1 and T2. Figure A.7.5.8.2.1.1-1 and Figure A.7.5.8.2.1.1-2 show the Time multiplexed (allocation in Frequency is symbolic) downlink transmissions from each Angle of Arrival. During T1 only SSB to which TCI-state0 is QCL’d is transmitted. At the beginning of T2, the SSB corresponding to TCI-state1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280 ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a RRC command indicating a switch to TCI-state1.

The test equipment verifies the TCI state switch time in PCell by scheduling the UE on TCI state 1 after n+ TRRC\_processing  + Tfirst-SSB + 2ms.

Table A.7.5.8.2.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.5.8.2.1.1-2: General test parameters for TCI state switch

|  |  |  |  |
| --- | --- | --- | --- |
| 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 |  |
| T1 | s | 0.2 |  |
| T2 | s | 2 |  |

Table A.7.5.8.2.1.1-3: NR Cell specific test parameters for TCI state switch

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell 1 |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| Data RBs allocated |  | 66 |
| Initial DL BWP Configuration |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration |  | DLBWP.1.1 |
| Initial UL BWP Configuration |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration |  | ULBWP.1.1 |
| PDSCH Reference measurement channel |  | SR.3. 2 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP. 5 |
| SSB Configuration |  | SSB.1 FR2 |
| SMTC Configuration |  | SMTC.1 |
| TCI State 0 |  | TC. State.2 |
| TCI State 1 |  | TCI.State.3 |
| reportConfigType |  | ssb-Index-RSRP |
| reportConfigType |  | periodic |
| Number of reported RS |  | 2 |
| L1-RSRP reporting period | slot | 640 |
| timeRestrictionForChannelMeasurements |  | configured |
| TRS Configuration |  | TRS.2.1 TDD  TRS.2.2 TDD |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low |
| 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) |  |  |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

Table A.7.5.8.2.1.1-4: OTA related test parameters for TCI state switch

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | |
|  |  | SSB0 | | SSB1 | | |
|  |  | T1 | T2 | T1 | | T2 |
| Angle of arrival configuration |  | Setup 3 according to clause A.3.15.3 | | | | |
|  |  | AoA1 | | | AoA2 | |
| Assumption for UE beams Note 6 |  | Rough | | | | |
| Ês | dBm/SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| SS B\_RP Note 2 | dBm/ SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| BB Note 7 | dB | 8.3 | 8.3 | -Infinity | | 8.3 |
| IoNote2 | dBm/95.04 MHz Note4 | -6.0 | -56.0 | - Infinity | | -56.0 |
| Note 1: Void  Note 2: SS B\_RP 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: As observed with 0dBi gain antenna at the center of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  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 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. | | | | | | |



Figure A.7.5.8.2.1.1-1: Time multiplexed downlink transmissions during T1



Figure A.7.5.8.2.1.1-2: Time multiplexed downlink transmissions during T2

A.7.5.8.2.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with both SSB0 and SSB1.

After receiving RRC command in slot n, UE shall be able to start receiving on TCI state 1 after n+ TRRC\_processing  + Tfirst-SSB + 2ms.

#### A.7.5.8.3 MAC-CE based active TCI state switch for HST FR2 scenario

##### A.7.5.8.3.1 NR PCell FR2 HST active TCI state switch for a known TCI state

###### A.7.5.8.3.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3A for FR2 power class 6 UE. Supported test configuration is shown in Table A.7.5.8.3.1.1-1.Furthermore, the purpose of this test is also to verify the one shot large timing adjustment requirement specified in clause 7.1.2.3 provided *highSpeedMeasFlagFR2-r17* is configured and *highSpeedLargeOneStepUL-TimingFR2-r17* is enabled for UE supporting FR2 power class 6 and *largeOneStepUL-timingFR2-r17* capability.

The test scenario comprises of one NR PCell (Cell 1) as given in Table A.7.5.8.3.1.1-2. Cell-specific parameters of NR PCell are specified in Table A.7.5.8.3.1.1-3 below. The OTA related test parameters for FR2 are shown in Table A.7.5.8.3.1.1-4. During the test, *highSpeedMeasFlagFR2-r17* is configured to be *set2* and broadcast to UE.

PDCCHs indicating new transmissions shall be sent continuously on PCell to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

- UE is configured with 2 different TCI states for PCell, PDCCH TCI state 0 (QCL’d to SSB0) and TCI state 1 (QCL’d to SSB1), in Cell 1 before starting the test.

- UE is indicated in TCI state 0 as the active PDCCH TCI state

The test consists of two time periods, T1 and T2. Figure A.7.5.8.3.1.1-1 and Figure A.7.5.8.3.1.1-2 show the Time multiplexed (allocation in Frequency is symbolic) downlink transmissions from each Angle of Arrival. During T1 only SSB to which PDCCH-TCI-state0 is QCL’d is transmitted. At the beginning of T2, the SSB corresponding to TCI state 1 starts transmitting, which has the relative timing delay compared to TCI state 0 by the absolute value of the one-way differential propagation time []. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a MAC-CE command indicating a switch to TCI state 1. *tci-PresentInDCI* is not configured in the PDSCH configuration, i.e. TCI state for the PDSCH is identical to the PDCCH TCI state. After the TCI state switch, the UE transmit timing accuracy shall be measured by the test equipment by using the SRS defined in Table A.7.5.8.3.1-5.

The test equipment verifies that

- UE can be scheduled on PCell on TCI state 0 till n+ THARQ +3 ms.

- the TCI state switch time in PCell by scheduling the UE on TCI state 1 after slot n + THARQ + 3 ms + Tfirst-SSB + TSSB-proc + Trs + Trs-proc.

- the UE transmission timing immediately after TCI state switch shall follow the requirements as specified in clause 7.1.2.3.

Table A.7.5.8.3.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.5.8.3.1.1-2: General test parameters for TCI state switch

|  |  |  |  |
| --- | --- | --- | --- |
| 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 |  |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |

Table A.7.5.8.3.1.1-3: NR Cell specific test parameters for TCI state switch

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell 1 |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| Data RBs allocated |  | 66 |
| Initial DL BWP Configuration |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration |  | DLBWP.1.1 |
| Initial UL BWP Configuration |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration |  | ULBWP.1.1 |
| PDSCH Reference measurement channel |  | SR.3. 2 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP. 5 |
| SSB Configuration |  | SSB.1 FR2 |
| SMTC Configuration |  | SMTC.1 |
| TCI State 0 |  | TCI.State.0 |
| TCI State 1 |  | TCI.State.1 |
| TRS Configuration |  | TRS.2.1 TDD |
| Correlation Matrix and Antenna Configuration |  | 1x2 |
| 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) |  |  |
| Propagation Condition |  | AOA1: AWGN  AOA2: AWGN with 19444 Hz frequency offset |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

Table A.7.5.8.3.1.1-4: OTA related test parameters for TCI state switch

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | |
|  |  | SSB0 | | SSB1 | | |
|  |  | T1 | T2 | T1 | | T2 |
| Angle of arrival configuration |  | Setup 3 according to clause A.3.15.3 | | | | |
|  |  | AoA1 | | | AoA2 | |
| Assumption for UE beams Note 6 |  | Rough | | | | |
| Ês | dBm/SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| SS B\_RP Note 2 | dBm/ SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| BB Note 7 | dB | 8.3 | 8.3 | -Infinity | | 8.3 |
| IoNote2 | dBm/95.04 MHz Note4 | -56.0 | -56.0 | - Infinity | | -56.0 |
| Note 1: Void  Note 2: SS B\_RP 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: As observed with 0dBi gain antenna at the center of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  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 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.6-4. | | | | | | |

Table A.7.5.8.3.1.1-5: Sounding Reference Symbol Configuration

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| c-SRS | 16 | 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=0 | 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 [2]. | | |



Figure A.7.5.8.3.1.1-1: Time multiplexed downlink transmissions during T1



Figure A.7.5.8.3.1.1-2: Time multiplexed downlink transmissions during T2

###### A.7.5.8.3.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with results for both SSB0 and SSB1.

After the TCI state switch, the UE transmission timing immediately after TCI state switch shall follow the requirements as specified in clause 7.1.2.3.

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to receive on TCI state 0 till n+ THARQ +3 ms

- be able to start receiving on TCI state 1 after n+ THARQ +7 ms + Tfirst-SSB+ Trs

### A.7.5.9 Uplink spatial relation switch delay

A.7.5.9.1 MAC-CE based Spatial Relation switch

A.7.5.9.1.1 NR PCell FR2 spatial relation associated with known DL-RS

###### A.7.5.9.1.1.1 Test Purpose and Environment

The purpose of this test is to verify fulfillment of the uplink spatial relation switch delay requirement defined in clause 8.12.3 by a UE capable of beam correspondence without the need for UL beam sweeping. The supported test configurations are shown in Table A.7.5.9.1.1.1-1.

The test scenario comprises one PCell (Cell 1) as outlined in Table A.7.5.9.1.1.1-2. Cell-specific parameters are provided in Table A.7.5.9.1.1.1-3. OTA-related test parameters are provided in Table A.7.5.9.1.1.1-4.

Throughout the test, PDCCH indicating new transmissions shall ge sent continuously on PCell to ensure that the UE will send ACK/NACKs on PUCCH.

Before the test starts,

* UE is connected to Cell 1 on radio channel 1.
* UE is configured with a single TCI state, TCI State-0, which is QCLed with SSB0.
* UE is configured with two spatial relation information configurations Spatial Relation Info-0 and Spatial Relation Info-1 for PUCCH, each associated with SSB0 and SSB1, respectively.
* UE is indicated via MAC-CE activation of *PUCCH-SpatialRelationInfoId* corresponding to Spatial Relation Info-0
* UE is configured with a CSI measurement configuration indicating L1-RSRP measurements on SSB0 and SSB1 with periodic reporting. The L1-RSRP measurement period is influenced by the following: the higher layer parameter *timeRestrictionForChannelMeasurement* is configured, measured SSBs are fully overlapping with SMTC window, and there are no conflicts with measurement gaps.

The test consists of two time periods, T1 and T2. During T1 only the SSB associated with PDCCH TCI state-0 and PUCCH Spatial Relation Info-0 is transmitted. At the beginning of T2, transmission of the SSB associated with PUCCH Spatial Relation Info-1 starts. The UE conducts periodic L1-RSRP measurements and *SSB-Index-RSRP* reporting for SSB0 and SSB1. In slot *n*, which is within 1280ms after UE receiving both SSB0 and SSB1, and after reporting valid results for both the SSB0 and the SSB1, the UE receives a MAC-CE indicating a switch of spatial relation to PUCCH Spatial Relation Info 1.

The test equipment verifies that the UE transmits according to PUCCH Spatial Relation Info 0 up until slot *n* + THARQ/NR slot length + , and according to PUCCH Spatial Relation Info 1 from slot *n* + THARQ/NR slot length + + 1 and onwards.

**Table A.7.5.9.1.1.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

**Table A.7.5.9.1.1.1-2: General test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |  |
| L1-RSRP reporting period | slot | 160 | Periodic L1-RSRP reporting configured |
| L1-RSRP measured RS |  | SSB0, SSB1 | L1-RSRP measurements of SSB0 and SSB1. |
| Number of reported RS |  | 2 | L1-RSRP reporting of measurements on SSB0 and SSB1. |
| T1 | s | [0.2] |  |
| T2 | s | [2] |  |

**Table A.7.5.9.1.1.1-3: NR Cell specific test parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| Initial DL BWP Configuration |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration |  | DLBWP.1.1 |
| Initial UL BWP Configuration |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration |  | ULBWP.1.1 |
| PDSCH Reference measurement channel |  | SR.3.1 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP.1 |
| SSB Configuration |  | SSB.1 FR2 |
| SMTC Configuration |  | SMTC.1 |
| TCI State-0 Configuration |  | TCI.State.0 |
| reportConfigType |  | ssb-Index-RSRP |
| reportConfigType |  | periodic |
| timeRestrictionForChannelMeasurements |  | configured |
| TRS Configuration |  | TRS.2.1 TDD |
| Spatial Relation Info-0 Configuration |  | PUCCH.SRI.0 |
| Spatial Relation Info-1 Configuration |  | PUCCH.SRI.1 |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low |
| 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 SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRSNote 1 |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

**Table A.7.5.9.1.1.1-4: OTA related test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | | |
| **SSB0** | | **SSB1** | | |
| **T1** | **T2** | **T1** | **T2** | |
| Angle of arrival configuration |  | Setup 3 according to clause A.3.15.3 | | | | |
| AoA1 | | AoA2 | | |
| Assumption for UE beams Note 6 |  | Rough | | | | |
| NocNote 1 | dBm/15 kHz | -92.1 | | | | |
| NocNote 1 | dBm/SCS | -83.1 | | | | |
| Ês/Noc | dB | 1 | | -infinity | | 1 |
| SS-RSRP Note 2 | dBm/120 kHz Note3 | -82.1 | | -infinity | | -82.1 |
| IoNote2 | dBm/95.04 MHz Note4 | -50.6 | | -54.1 | | -50.6 |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | |

###### A.7.5.9.1.1.2 Test Requirements

During T2, the UE shall send L1-RSRP report with results for SSB0 and SSB1.

After receiving MAC-CE command in slot *n*, the UE shall:

* Continue transmitting using PUCCH spatial relation associated with SSB0 up to and including slot *n* + THARQ/NR slot length +
* Start transmitting using PUCCH spatial relation associated with SSB1 from slot *n* + THARQ/NR slot length + + 1 and onwards.

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

#### A.7.5.9.2 RRC based spatial relation switch

##### A.7.5.9.2.1 NR PCell FR2 spatial relation switch associated with a known DL-RS

###### A.7.5.9.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the RRC based spatial relation switch delay requirement defined in clause 8.12.5 by a UE capable of beam correspondence without the need for UL beam sweeping. In the test the higher layer parameter *timeRestrictionForChannelMeasurements* is configured. Supported test configuration is shown in Table A.7.5.9.2.1.1-1.

The test scenario comprises of one PCell (Cell 1) as given in Table A.7.5.9.2.1.1-2. Cell-specific parameters of PCell is specified in Table A.7.5.9.2.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.7.5.9.2.1.1-4.

Periodic SRS is transmitted on PCell (Cell 1), and the SRS configuration is SRSConf.1 given in Table A.5.4.1.1.1-3.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

- UE is configured with 1 SRS-SpatialRelation0 associated with SSB0.

- UE is indicated SRS-SpatialRelation0 as the active SRS spatial relation.

The test consists of two time periods, T1 and T2. During T1 only SSB0 to which SRS-SpatialRelation0 associated is transmitted. UE shall transmit periodic SRS with SRS-SpatialRelation0 on the UL of the PCell.

T2 start when the tester initiates transmission of SSB1 corresponding to SRS-SpatialRelation1. The UE is configured to transmit periodic L1-RSRP reports.

In slot n, which is within [1280]ms of UE providing the L1-RSRP report with results for both SSB0 and SSB1, the UE receives an RRC command indicating a switch to transmit periodic SRS with target SRS-SpatialRelation1. The UE shall be able to transmit periodic SRS with target spatial relation (SRS-SpatialRelation1) on PCell in slot n + TRRC\_processing/NR slot length +1.

Table A.7.5.9.2.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.5.9.2.1.1-2: General test parameters for spatial relation switch associated with a known DL-RS

|  |  |  |  |
| --- | --- | --- | --- |
| 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 |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| timeRestrictionForChannelMeasurements |  | configured | Time domain measurement restriction for the channel (signal) measurements (see TS 38.214 [19], clause 5.2.1.1) |
| T1 | s | 0.5 |  |
| T2 | s | 1.5 |  |

Table A.7.5.9.2.1.1-3: NR Cell specific test parameters for spatial relation switch associated with a known DL-RS

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell 1 |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| Initial DL BWP Configuration |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration |  | DLBWP.1.1 |
| Initial UL BWP Configuration |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration |  | ULBWP.1.1 |
| PDSCH Reference measurement channel |  | SR.3.1 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP.1 |
| SSB Configuration |  | SSB.1 FR2 |
| SMTC Configuration |  | SMTC.1 |
| SRS-SpatialRelation0 |  | SRS.SRI0 |
| SRS-SpatialRelation1 |  | SRS.SRI1 |
| reportConfigType |  | ssb-Index-RSRP |
| reportConfigType |  | periodic |
| Number of reported RS |  | 2 |
| L1-RSRP reporting period | slot | 160 |
| TRS Configuration |  | TRS.2.1 TDD |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low |
| 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) |  |  |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

Table A.7.5.9.2.1.1-4: OTA related test parameters for spatial relation switch associated with a known DL-RS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | |
|  |  | SSB0 | | SSB1 | |
|  |  | T1 | T2 | T1 | T2 |
| Angle of arrival |  | Setup 3 according to clause A.3.15.3 | | | |
| configuration |  | **AoA1** | | **AoA2** | |
| Assumption for UE beamsNote 6 |  | Rough | | Rough | |
| NocNote 1 | dBm/15 kHz | -92.1 | | | |
| NocNote 1 | dBm/SCS | -83.1 | | | |
| Ês/Noc | dB | 1 | 1 | -Infinity | 1 |
| SS-RSRP Note 2 | dBm/120 kHz Note3 | -82.1 | -82.1 | -Infinity | -82.1 |
| IoNote2,Note6 | dBm/95.04 MHz Note4 | -50.6 | -50.6 | -54.1 | -50.6 |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

###### A.7.5.9.2.1.2 Test Requirements

During T1 UE shall send L1-RSRP report with SSB0 to which SRS-SpatialRelation0 is associated. During T2, UE shall send L1-RSRP report with SSB1 to which SRS-SpatialRelation1 is associated.

After receiving RRC command in slot n, UE shall be able to transmit target periodic SRS with SRS-SpatialRelation1 on the PCell in the slot n + TRRC\_processing/*NR slot length* + 1.

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

### A.7.5.10 UE specific CBW change

#### A.7.5.10.1 NR FR2 UE specific CBW change of PCell with non-DRX in SA

##### A.7.5.10.1.1 Test Purpose and Environment

The purpose of this test is to verify the UE specific CBW change delay requirement defined in clause 8.13. Supported test configurations are shown in Table A.7.5.10.1.1-1.

The test scenario comprises of one PCell (Cell 1) as given in Table A.7.5.10.1.1-2. Cell-specific parameters of PCell are specified in Table A.7.5.10.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK transmission.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PCell).

- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 of initial condition in PCell.

- UE has been configured with UE-specific CBW (CBW-1)

- UE is indicated in SCS-SpecificCarrier [2] that the UE-specific CBW is CBW-1 as the initial condition in Cell 1 (PCell).

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated CBW configuration, sent from the test equipment to the UE, is received at the UE side in PCell’s slot # denoted *i*. The UE shall reconfigure its CBW with the updated CBW of final condition.

The UE shall be able to completely receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot as defined in clause 8.13.2 and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot. The UE shall be continuously scheduled on PCell’s new CBW starting from the first DL slot that occurs after the beginning of DL slot .

*TRRCprocessingDelay* and *TCBWchangeDelayRRC* are defined in clause 8.13.

The test equipment verifies the UE specific CBW switch time in PCell by counting the time from the time when the RRC Reconfiguration message including updated CBW configurations sent till the time when RRC Reconfiguration Complete message is received.

**Table A.7.5.10.1.1-1: UE specific CBW change supported test configurations**

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

**Table A.7.5.10.1.1-2: General test parameters for UE specific CBW change in NR SA**

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| T1 | s | [0.2] |  |

**Table A.7.5.10.1.1-3: NR Cell specific test parameters for UE specific CBW change in NR SA**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** |
| Frequency Range | |  | FR2 |
| Duplex mode | |  | TDD |
| TDD configuration | |  | TDDConf.3.1 |
| BWchannel | |  | 100 MHz: NRB,c = 66 |
| Active DL BWP ID | |  | 1 |
| Initial DL BWP Configuration (BWP-1) | |  | DLBWP.0.2 |
| Initial UL BWP Configuration | |  | ULBWP.0.2 |
| Initial Condition | Active DL CBW-1 Configuration |  | DLCBW.1.1 |
|  | Active UL CBW-1 Configuration |  | ULCBW.1.1 |
| Final Condition | Active DL CBW-1 Configuration |  | DLCBW.1.2 |
|  | Active UL CBW-1 Configuration |  | ULCBW.1.2 |
| 'PDSCH Reference measurement channel | |  | SR.3.1 TDD |
| RMSI CORESET parameters | |  | CR.3.1 TDD |
| Dedicated CORESET parameters | |  | CCR.3.1 TDD |
| OCNG Patterns | |  | OP.1 |
| SSB Configuration | |  | SSB.1 FR2 |
| SMTC Configuration | |  | SMTC.1 |
| TCI State | |  | TCI.State.0 |
| TRS Configuration | |  | TRS.2.1 TDD |
| Antenna Configuration | |  | 1x2 |
| 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) | |
| 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. | | | |

**Table A.7.5.10.1.1-4: OTA related test parameters for UE specific CBW change test case**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 2** |
| Angle of arrival configuration | |  | Setup 1 according to table A.3.15 |
| Assumption for UE beams Note 5 | |  | Fine |
| Note1 | NR\_TDD\_FR2\_A | dBm/15kHz | -112 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| Note1 | NR\_TDD\_FR2\_A | dBm/SCS | -103 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| SS-RSRPNote2 | NR\_TDD\_FR2\_A | dBm/SCS Note3 | -85 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
|  | | dB | 18 |
| IoNote2 | NR\_TDD\_FR2\_A | dBm/95.04 MHz Note4 | -56 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  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. | | | |

##### A.7.5.10.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell from the first DL slot that occurs after the beginning of slot and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot.

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed PCell UE specific CBW change delay to be counted as correct.

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

### A.7.5.11 UE UL carrier RRC reconfiguration Delay

#### A.7.5.11.1 UE UL carrier RRC reconfiguration Delay

##### A.7.5.11.1.1 Test Purpose and Environment

The purpose of this test is to verify that when the UE receives a RRC message implying NR UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within the time limits specified in clause 8.4.2 and 8.4.3 for configuring and deconfiguring, respectively. The test will also verify the interruption at UL carrier configuration requirements on PCell in clause 8.2.2.2.4.

There are two cells: FR2 PCell (Cell 1) on NR RF channel 1 and FR2 SCell (Cell 2) on NR RF channel 2. NR uplink is broadcast by *ServingCellConfigCommonSIB.* The test parameters for PCell and SCell are given in Table A.7.5.11.1.1-1, Table A.7.5.11.1.1-2 and Table A.7.5.11.1.1-3 below. The test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, NR uplink of Cell 2 is not configured to UE*.* At the start of T2, a NR uplink of Cell 2 is configured to UE through *RRCReconfiguration*, then UE shall start transmission on the NR uplink of Cell 2. At the start of T3, the NR uplink is released through *RRCReconfiguration*.

The test equipment also verifies that potential interruption of PCell due to UL carrier configuration on SCell is carried out within the correct time span and within the correct length by monitoring ACK/NACK sent in PCell.

**Table A.7.5.11.1.1-1: Supported test configurations**

|  |  |  |
| --- | --- | --- |
| **Configuration** | **PCell (Cell 1)** | **SCell (Cell 2)** |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | DL and UL: 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

**Table A.7.5.11.1.1-2: General test parameters for SA UE UL carrier RRC reconfiguration Delay for FR2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| RF Channel Number |  | Config 1 | 1, 2 | Two NR RF channels |
| Active cell |  | Config 1 | Cell 1: FR2 PCell  Cell 2: FR2 SCell | PCell on RF channel number 1  FR2 SCell on RF channel number 2 |
| CP length |  | Config 1 | Normal |  |
| DRX |  | Config 1 | OFF |  |
| Measurement gap pattern Id |  | Config 1 | OFF |  |
| Filter coefficient |  | Config 1 | 0 | L3 filtering is not used |
| Cell 2 timing offset to Cell 1 | μs | Config 1 | 3 | Synchronous cells. |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 5 |  |
| T3 | s | Config 1 | 5 |  |

**Table A.7.5.11.1.1-3: NR Cell specific test parameters for SA UE UL carrier RRC reconfiguration Delay for FR2**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | | Rough | | |
| Frequency Range | |  | Config 1 | FR2 | | | FR2 | | |
| NR RF Channel Number | |  | Config 1 | 1 | | | 2 | | |
| Duplex mode | |  | Config 1 | TDD | | | TDD | | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated | |  | Config 1 | 66 | | | 66 | | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP |  | ULBWP.0.1 | | | ULBWP.0.1 | | |
| Dedicated DL BWP |  | DLBWP.1.1 | | | DLBWP.1.1 | | |
| Dedicated UL BWP |  | ULBWP.1.1 | | | ULBWP.1.1 | | |
| OCNG Patterns | |  | Config 1 | OP.1 | | | OP.1 | | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | | SR.3.1 TDD | | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| SSB configuration | |  | Config 1 | SSB.1 FR2 | | | SSB.1 FR2 | | |
| SMTC configuration | |  | Config 1 | SMTC.1 | | | SMTC.1 | | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | | TRS.2.1 TDD | | |
| TCI state | |  | Config 1 | TCI.State.0 | | | TCI.State.0 | | |
| PUSCH parameters for NR UL carrier | |  | Config 1 | N/A | | | N/A | G-FR2-A3-4 in [13] | N/A |
| PUCCH parameters for NR UL carriers | |  | Config 1 | N/A | | | N/A | Table 11.3.2.3.1.2-2 in [13] | N/A |
| 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 Note5 | Config 1 | -104.7 | | | -104.7 | | |
| Note2 | | dBm/SCS Note4 | Config 1 | -95.7 | | | -95.7 | | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -88.7 | | | -88.7 | | |
|  | | dB | Config 1 | 7 | | | 7 | | |
|  | | dB | Config 1 | 7 | | | 7 | | |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -58.92 | | | -58.92 | | |
| 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: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | |

##### A.7.5.11.1.2 Test Requirements

The UE shall be ready to start transmission on the NR uplink carrier on SCell within 20ms from the start of T2.

The UE shall stop the transmission on the NR uplink carrier on SCell within 20ms from the start of T3.

During T2 and T3, the start of interruption of PCell due to UL carrier configuration or de-configuration on SCell shall not happen outside the UL carrier configuration delay which is 20ms in this test, and the length of interruption shall not exceed the length specified in clause 8.2.2.2.4.

All of the above test requirements shall be fulfilled in order for the observed UE UL carrier configuration delay and UE UL carrier release delay to be counted as correct. The rate of correct observed UE UL carrier configuration delay and UE UL carrier release delay during repeated tests shall be at least 90%.

### A.7.5.12 Conditional PSCell addition and release delay (FR2 SA)

#### A.7.5.12.1 Addition and Release Delay of PSCell

##### A.7.5.12.1.1 Test purpose and environment

The purpose of this test is to verify that the conditional PSCell addition and release delays under SA are within the requirements stated in clause 8.9A.2.

##### A.7.5.12.1.2 Test Parameters

The supported test configurations are given in Table A.7.5.15.1.2-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.15.1.2-2 and A.7.5.15.1.2-3 below. The test consists of four successive time periods, with time durations of T1, T2, T3, T4, respectively.

At the start of time duration T1, the UE does not have any timing information of cell 2. NR shall configure a condition implying addition to cell 2 during T1, at a time earlier than TRRC before the beginning of T2.

At the start of T2, cell 2 becomes detectable and meets the addition condition. Reception by the test system of the PRACH preamble defines the start of T3.

During T3, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send an RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T4.

During T4, the UE shall release the PSCell.

Table A.7.5.15.1.2-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Config | Description |
| 1 | FR1 FDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz |
| 2 | FR1 TDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz |
| 3 | FR1 TDD SSB SCS 30kHz BW 40MHz – FR2 TDD SSB SCS 240kHz BW 100MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.5.15.1.2-2: General test parameters for conditional PSCell addition and release delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | |  | 1, 2 | Two radio channels are used for this test |
| Active PCell | |  | Cell 1 | PCell on RF channel number 1 in FR1 |
| Neighbour cell | |  | Cell 2 | Neighbour cell (PSCell-to-be) on RF channel number 2 in FR2 |
| A4 | Hysteresis | dB | 0 | Hysteresis for event A4 |
|  | Threshold RSRP | dBm | -118 | Threshold for event A4 |
|  | Time to Trigger | S | 0 | Time to trigger for event A4 |
| DRX | |  | OFF | For both PCell and PSCell once activated |
| Measurement gap pattern ID | |  | 0 | Gaps are configured before T2 and released before T3. |
| PRACH configuration in Cell 2 | |  | FR2 PRACH configuration 2 | PRACH configuration as specified in Clause A.3.8.3.2. |
| CSI reporting periodicity and offset configuration for Cell 2 | | ms | 2 |  |
| T1 | | s | 5 | During this time the PCell is known and Cell 2 is unknown. |
| T2 | | s | ≤7 | During this time Cell 2 meets the addition condition and UE adds this PSCell. |
| T3 | | s | 1 | During this time the UE sends CSI reports for Cell 2. |
| T4 | | s | 1 | During this time the UE releases the Cell 2. |

Table A.7.5.15.1.2-3: NR Cell specific test parameters for conditional PSCell addition and release delay

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell2 | | | |
|  |  |  |  | T1 | T2 | T3 | T4 |
| Frequency Range |  | 1,2,3 | FR1 | FR2 | | | |
| Duplex mode |  | 1 | FDD | TDD | | | |
|  |  | 2,3 | TDD |  | | | |
| TDD configuration |  | 1 | – | TDDConf.3.1 | | | |
|  |  | 2 | TDDConf.1.1 |  | | | |
|  |  | 3 | TDDConf.2.1 |  | | | |
| BWchannel | MHz | 1,2 | 10: NRB,c = 52 | 100: NRB,c = 66 | | | |
|  |  | 3 | 40: NRB,c = 106 |  | | | |
| Data RBs allocated |  | 1,2 | 52 | 48 | | | |
| 3 | 106 |
| Initial Downlink BWP configuration |  | 1,2,3 | DLBWP.0.1 | DLBWP.0.1 | | | |
| Initial Uplink BWP configuration |  | 1,2,3 | ULBWP.0.1 | ULBWP.0.1 | | | |
| Dedicated Downlink BWP configuration |  | 1,2,3 | DLBWP.1.1 | DLBWP.1.1 | | | |
| Dedicated Uplink BWP configuration |  | 1,2,3 | ULBWP.1.1 | ULBWP.1.1 | | | |
| PDSCH Reference Measurement Channel |  | 1 | SR.1.1 FDD | SR.3.3 TDD | | | |
|  |  | 2 | SR.1.1 TDD |  | | | |
|  |  | 3 | SR.2.1 TDD |  | | | |
| TRS configuration |  | 1,2,3 | – | TRS.2.1 TDD | | | |
| TCI state |  | 1,2,3 | – | TCI.State.0 | | | |
| RMSI CORESET parameters |  | 1 | CR.1.1 FDD | CR.3.2 TDD | | | |
|  |  | 2 | CR.1.1 TDD |  | | | |
|  |  | 3 | CR.2.1 TDD |  | | | |
| Dedicated CORESET parameters |  | 1 | CCR.1.1 FDD | CCR.3.7 TDD | | | |
|  |  | 2 | CCR.1.1 TDD |  | | | |
|  |  | 3 | CCR.2.1 TDD |  | | | |
| OCNG PatternsNote1 |  | 1,2,3 | OP.1 | OP.3 | | | |
| SSB configuration |  | 1,2 | SSB.1 FR1 | SSB.2 FR2 | | | |
|  |  | 3 | SSB.2 FR1 |
| SMTC configuration |  | 1,2,3 | SMTC.2 | SMTC.1 | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2 | 15 | 120 | | | |
| 3 | 30 |
| EPRE ratio of PSS to SSS | dB | 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 |  |  |  |  | | | |
| EPRE ratio of OCNG to OCNG DMRS |  |  |  |  | | | |
| Propagation Condition |  | 1,2,3 | N/A | AWGN | | | |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | | | |

Table A.7.5.15.1.2-4: OTA related test parameters for conditional PSCell addition and release delay

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell 2 | | | | |
| T1 | | T2 | T3 | T4 |
| Angle of arrival configuration |  | 1,2,3 | Link only, see clause A.3.7A | Setup 2a according to clause A.3.15.2.1 | | | | |
| Assumption for UE beams Note 3 |  |  | Rough | | | | |
| Ês | dBm/SCS | 1,2,3 | -∞ | -81 | | | |
| SSB\_RP Note1, Note2 | dBm/SCS | 1,2,3 | -∞ | -81 | | | |
| BB Note1, Note 4 | dB | 1,2,3 | -∞ | 4.88 | | | |
| Io Note 1, Note2 | dBm/95.04 MHz | 1,2,3 | N/A | -56.41 | | | |
| Note 1: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.  Note 3: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 4: 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | |

##### A.7.5.12.1.3 Test Requirements

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

The UE shall start to transmit the PRACH to Cell 2 less than Tmeasure + TUE\_preparation + Tprocessing + T∆ + TPSCell\_ DU + 2 ms = 6720+10+62ms=6792 ms (power class 1) or 4160+10+62ms =4232ms (power classes 2,3 and 4) from the start of T2.

The UE shall transmit at least one periodic CSI report for PSCell during T3.

The UE shall stop transmitting CSI reports for PSCell at latest 20 ms into T4.

All of the above test requirements shall be fulfilled in order for the observed conditional PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

### A.7.5.13 Unified TCI state switching delay

#### A.7.5.13.1 MAC-CE based active joint TCI state switching

##### A.7.5.13.1.1 NR PCell FR2 active joint TCI state switch for a known TCI state

###### A.7.5.13.1.1.1 Test Purpose and Environment

The purpose of this test is to verify both active downlink and uplinke TCI state switch delay requirement defined in clause 8.15 and 8.16, respectively, by using joint TCI state of unified TCI state switch framework. In this test, the target TCI state is not in the active TCI state list for PDSCH/PDCCH, and UE is capable of beam correspondence without the need for UL beam sweeping, i.e. *beamCorrespondenceWithoutUL-BeamSweeping* is set to 1. Supported test configuration is shown in Table A.7.5.13.1.1.1-1.

The test scenario comprises of one NR PCell (Cell 1) as given in Table A.7.5.13.1.1.1-2. Cell-specific parameters of NR PCell are specified in Table A.7.5.13.1.1.1-1 below. The OTA related test parameters for FR2 are shown in Table A.7.5.13.1.1.1-2.

Table A.7.5.13.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.5.13.1.1.1-2: General test parameters for TCI state switch

|  |  |  |  |
| --- | --- | --- | --- |
| 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 |  |
| L1-RSRP reporting period | slot | 160 | Periodic L1-RSRP reporting configured |
| Number of RS for L1-RSRP reporting |  | 2 | Two source RSs in TCI state 0 and 1. |
| T1 | s | 0.2 |  |
| T2 | s | 2 |  |

###### A.7.5.13.1.1.2 Test parameters

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

- PDCCHs indicating new transmissions shall be sent continuously on PCell to ensure that the UE would have ACK/NACK sending.

- UE is provided with *dl-OrJoint-TCIStateList-r17* and UE’s higher layer signalling *unifiedTCI-StateType-r17* in IE *MIMOParam-r17* is set to *joint*;

- UE is configured with 2 different joint TCI states for PCell, TCI state 0 (QCL’d to SSB0) and TCI state 1 (QCL’d to SSB1), and the TCI state 1 is not in the active TCI state list for PDSCH/PDCCH.

- UE is indicated TCI state 0 as the active PDCCH TCI state

The test consists of two time periods, T1 and T2. During T1 only source RS in TCI state 0 is transmitted. At the beginning of T2, source RS in TCI state 1 start transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280ms after the slot in which UE provides L1-RSRP report with results for both source RSs in TCI state 0 and 1, UE receives a MAC-CE command indicating a switch to TCI state 1. *tci-PresentInDCI* is not configured in the PDSCH configuration, i.e. TCI state for the PDSCH is identical to the PDCCH TCI state.

The test equipment verifies the following UE behavior for joint TCI state switch:

- UE shall be able to receive and transmit with TCI state 0 until slot slot *n* + THARQ + , and

- receive and transmit with TCI state 1 from slot n+THARQ + + (Tfirst\_target-PL-RS + 4\*Ttarget\_PL-RS + 2ms) / *NR slot length*

Table A.7.5.13.1.1.2-1: NR Cell specific test parameters for TCI state switch

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell 1 |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| Data RBs allocated |  | 66 |
| Initial DL BWP Configuration |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration |  | DLBWP.1.1 |
| Initial UL BWP Configuration |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration |  | ULBWP.1.1 |
| PDSCH Reference measurement channel |  | SR.3. 2 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP. 5 |
| SSB Configuration |  | SSB.1 FR2 |
| SMTC Configuration |  | SMTC.1 |
| PL-RS Configuration  (CSI-RS#1) |  | Resource #4 in TRS.2.1 TDD for DLorJoint TCI.State.2 and DLorJoint TCI.State.3 |
| TCI State 0 |  | DLorJoint TCI.State.2 |
| TCI State 1 |  | DLorJoint TCI.State.3 |
| TRS Configuration |  | TRS.2.1 TDD for DLorJoint TCI.State.2  TRS 2.2 TDD for DLorJoint TCI.State.3 |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low |
| 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) |  |  |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

Table A.7.5.13.1.1.2-2: OTA related test parameters for TCI state switch

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | |
|  |  | Source RS in TCI state 0 | | Source RS in TCI state 1 | | |
|  |  | T1 | T2 | T1 | | T2 |
| Angle of arrival configuration |  | Setup 3 according to clause A.3.15.3 | | | | |
|  |  | AoA1 | | | AoA2 | |
| Assumption for UE beams Note 6 |  | Rough | | | | |
| Ês | dBm/SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| SS B\_RP Note 2 | dBm/ SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| BB Note 7 | dB | 8.3 | 8.3 | -Infinity | | 8.3 |
| IoNote2 | dBm/95.04 MHz Note4 | -56.0 | -56.0 | - Infinity | | -56.0 |
| Note 1: Void  Note 2: SS B\_RP 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: As observed with 0dBi gain antenna at the center of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  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 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. | | | | | | |

###### A.7.5.13.1.1.3 Test Requirements

The test verifies that UE can be scheduled by PCell on TCI state 0 and TCI state 1.

During T2, UE shall send L1-RSRP report with results for source RSs in both TCI state 0 and 1.

After receiving MAC-CE command in slot n, UE shall:

- be able to receive and transmit with TCI state 0 until slot n + THARQ +

- be able to start receiving and transmitting with TCI state 1 after slot n + THARQ + 3 + (Tfirst\_target-PL-RS + 4\*Ttarget\_PL-RS + 2ms) / *NR slot length*

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

#### A.7.5.13.2 MAC-CE based active uplink TCI state switch

##### A.7.5.13.2.1 NR FR2 PCell uplink TCI state switch for a known TCI state

###### A.7.5.13.2.1.1 Test Purpose and Environment

The purpose of this test is to verify fulfillment of the uplink TCI switch delay requirement defined in clause 8.16.3 by a UE capable of beam correspondence without the need for UL beam sweeping. The test scenario comprises one PCell (Cell 1).

Throughout the test, PDCCH indicating new transmissions shall be sent continuously on PCell to ensure that the UE will send ACK/NACKs on PUCCH.

Before the test starts,

UE is connected to Cell 1 on radio channel 1.

UE is configured with a unified DL TCI state, TCI State-0, and SSB0 is configured as QCL source for the TCI state. At the start of test UE is connected to DL TCI state 0.

UE is configured with 2 UL TCI states, UL TCI state 0 and UL TCI state 1. QCL info to UL TCI state 0 and 1 is provided by SSB0 and SSB1, respectively. Initially only UL TCI 0 is in the active TCI states.

PL-RS is configured for each of the UL TCI states. CSI-RS 0 and CSI-RS 1 are associated with UL TCI state 0 and 1 respectively as PL-RS.

AT the start of the test UE connected to DL TCI state 0 and UL TCI state 0.

Index of CSI-RS#1 is configured for UE as PUSCH-PathlossReferenceRS-Id-r17 which is indicated in TCI-UL-State-r17 of uplink TCI state 1. CSI-RS#1 is QCLed typeD with SSB#1. UE does not maintain CSI-RS#1 as pathloss RS before the uplink TCI state switching.

The test consists of two time periods, T1 and T2. During T1, only the SSB associated with DL TCI state-0 and UL TCI state 0 is transmitted. At the beginning of T2, transmission of the SSB 1 associated with UL TCI state 1 starts. The UE conducts periodic L1-RSRP (i.e., *SSB-Index-RSRP)* reporting for SSB0 and SSB1. In slot *n*, which is within 1280ms after UE receiving both SSB0 and SSB1, and after reporting valid results for both the SSB0 and the SSB1, the UE receives a MAC-CE indicating a TCI state switch to UL TCI state 1.

The test equipment verifies that the UE transmits according to UL TCI state 0 up until slot *n* + THARQ/NR slot length + , and according to UL TCI state 1 from slot *n* + THARQ/NR slot length + + NM*\** (Tfirst\_target-PL-RS + 4\*Ttarget\_PL-RS + 2ms and onwards. NM is equal to 1. Where, THARQ (in ms) is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3].

###### A.7.5.13.2.1.2 Test parameters

The supported test configurations are provided in Table A.7.5.13.2.1.2-1.

General test parameters are provided in Table A.7.5.13.2.1.2-2.

Cell-specific parameters are provided in Table A.7.5.13.2.1.2-3.

OTA-related test parameters are provided in Table A.7.5.13.2.1.2-4.

Table A.7.5.13.2.1.2-1: Supported test configurations

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.5.13.2.1.2-2: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |  |
| L1-RSRP reporting period | slot | 160 | Periodic L1-RSRP reporting configured |
| L1-RSRP measured RS |  | SSB0, SSB1 | L1-RSRP measurements of SSB0 and SSB1. |
| Number of reported RS |  | 2 | L1-RSRP reporting of measurements on SSB0 and SSB1. |
| T1 | s | 0.2 |  |
| T2 | s | 2 |  |

Table A.7.5.13.2.1.2-3: NR Cell specific test parameters

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| Initial DL BWP Configuration |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration |  | DLBWP.1.1 |
| Initial UL BWP Configuration |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration |  | ULBWP.1.1 |
| PDSCH Reference measurement channel |  | SR.3.1 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP.1 |
| SSB Configuration |  | SSB.1 FR2 |
| SMTC Configuration |  | SMTC.1 |
| DL TCI State |  | DLorJoint TCI.State.0 |
| PL-RS Configuration for CSI-RS#0 |  | Resource #4 in TRS.2.1 TDD for UL TCI.State.2 |
| PL-RS Configuration for CSI-RS#1 |  | Resource #4 in TRS.2.2 TDD for UL TCI.State.3 |
| UL TCI State-0 Configuration |  | UL TCI.State.2 |
| UL TCI State-1 Configuration |  | UL TCI.State.3 |
| reportConfigType |  | ssb-Index-RSRP |
| reportConfigType |  | periodic |
| timeRestrictionForChannelMeasurements |  | configured |
| TRS Configuration |  | TRS.2.1 TDD |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low |
| 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 SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRSNote 1 |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

Table A.7.5.13.2.1.2-4: OTA related test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | | |
| **SSB0** | | **SSB1** | | |
| **T1** | **T2** | **T1** | **T2** | |
| Angle of arrival configuration |  | Setup 3 according to clause A.3.15.3 | | | | |
| AoA1 | | AoA2 | | |
| Assumption for UE beams Note 6 |  | Rough | | | | |
| NocNote 1 | dBm/15 kHz | -92.1 | | | | |
| NocNote 1 | dBm/SCS | -83.1 | | | | |
| Ês/Noc | dB | 1 | | -infinity | | 1 |
| SS-RSRP Note 2 | dBm/120 kHz Note3 | -82.1 | | -infinity | | -82.1 |
| IoNote2 | dBm/95.04 MHz Note4 | -50.6 | | -54.1 | | -50.6 |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | |

###### A.7.5.13.2.1.3 Test Requirements

During T2, the UE shall send L1-RSRP report with results for SSB0 and SSB1.

After receiving MAC-CE command in slot *n*, the UE shall:

- Continue transmitting using UL TCI state 0 up to and including slot *n* + THARQ/NR slot length +

- Start transmitting using UL TCI state 1, from slot *n* + THARQ + + (Tfirst\_target-PL-RS + 4\*Ttarget\_PL-RS + 2ms) / *NR slot length* and onwards.

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

#### A.7.5.13.3 MAC-CE based active downlink TCI state switch

##### A.7.5.13.3.1 NR PCell FR2 active downlink TCI state switch to cell with additional PCI for a known TCI state

###### A.7.5.13.3.1.1 Test Purpose and Environment

The purpose of this test is to verify the MAC-CE based active downlink TCI state switch delay requirement defined in clause 8.15.3. Supported test configuration is shown in Table A.7.5.13.3.1.1-1.

Table A.7.5.13.3.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

###### A.7.5.13.3.1.2 Test Parameters

The test scenario comprises of one NR PCell (Cell 1) and one NR cell as the cell with additional PCI (Cell 2), as given in Table A.7.5.13.3.1.2-1. Cell-specific parameters of NR PCell and the cell with additional PCI are specified in Table A.7.5.13.3.1.2-2 below. The OTA related test parameters for FR2 are shown in Table A.7.5.13.3.1.2-3.

PDCCHs indicating new transmissions shall be sent continuously on PCell to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

- UE is provided with *dl-OrJoint-TCIStateList-r17* and UE’s higher layer signalling *unifiedTCI-StateType-r17* in IE *MIMOParam-r17* is set to *separate.*

- UE is configured with SSB-based L1-RSRP measurements on cell with additional PCI (Cell 2)

- UE is configured with 2 different TCI states for PCell, PDCCH TCI state 0 (QCL’d to TRS resource set 1, TCI state of which is QCLed to SSB0 of Cell1) and TCI state 1 (QCL’d to TRS resource set 2, TCI state of which is QCLed to SSB1 of Cell2), in Cell 1 before starting the test.

- UE is indicated in TCI state 0 as the active PDCCH TCI state

The test consists of two time periods, T1 and T2. Figure A.7.5.13.3.1.2-1 and Figure A.7.5.13.3.1.2-2 show the Time multiplexed (allocation in Frequency is symbolic) downlink transmissions from each Angle of Arrival. During T1 only SSB to which PDCCH-TCI-state0 is QCL’d is transmitted. At the beginning of T2, the SSB corresponding to TCI state 1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280ms of UE providing L1-RSRP report with results for both SSB0 of Cell 1 and SSB1 of Cell 2, UE receives a MAC-CE command indicating a switch to TCI state 1. *tci-PresentInDCI* is not configured in the PDSCH configuration, i.e. TCI state for the PDSCH is identical to the PDCCH TCI state.

The test equipment verifies that UE can be scheduled on PCell on TCI state 0 till n+ THARQ +3 ms. The test equipment also verifies the TCI state switch time in PCell by scheduling the UE on TCI state 1 after n+ THARQ +3 ms + (Tfirst-SSB + TSSB-proc).

Table A.7.5.13.3.1.2-1: General test parameters for TCI state switch

|  |  |  |  |
| --- | --- | --- | --- |
| 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. |
| Cell with additional PCI |  | Cell 2 |  |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| L1-RSRP reporting period | slot | 160 | Periodic L1-RSRP reporting configured |
| L1-RSRP measured RS |  | SSB0 of Cell1, SSB1 of Cell2 | L1-RSRP measurements of SSB0 and SSB1. |
| Number of RS for L1-RSRP reporting |  | 2 | Two source RSs in TCI state 0 and 1. |
| Cell2 timing offset to cell1 | us | <CP |  |
| T1 | s | 0.2 |  |
| T2 | s | 2 |  |

Table A.7.5.13.3.1.2-2: NR Cell specific test parameters for TCI state switch to a cell with additional PCI

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell 1 |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| Data RBs allocated |  | 66 |
| Initial DL BWP Configuration |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration |  | DLBWP.1.1 |
| Initial UL BWP Configuration |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration |  | ULBWP.1.1 |
| PDSCH Reference measurement channel |  | SR.3. 2 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP. 5 |
| SSB Configuration |  | SSB.1 FR2 for SSB0 of Cell 1 and SSB1 of Cell 2 |
| SMTC Configuration |  | SMTC.1 |
| DL TCI State 0 |  | DLorJoint TCI.State.0 |
| DL TCI State 1 |  | DLorJoint TCI.State.1 |
| TRS Configuration |  | TRS.2.1 TDD for DLorJoint TCI.State.0  TRS.2.2 TDD for DLorJoint TCI.State.1 |
| Pathloss RS Configuration |  | Resource #4 in TRS.2.1 TDD |
| reportQuantity for SSB |  | ssb-Index-RSRP-Index-r17 |
| reportConfigType for SSB |  | periodic |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low |
| 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) |  |  |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

Table A.7.5.13.3.1.2-3: OTA related test parameters for TCI state switch to a cell with additional PCI

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | Cell 2 | |
|  |  | SSB0 | | SSB1 | |
|  |  | T1 | T2 | T1 | T2 |
| Angle of arrival configuration |  | Setup 3 according to clause A.3.15.3 | | | |
|  |  | AoA1 | | AoA2 | |
| Assumption for UE beams Note 6 |  | Rough | | | |
| Ês | dBm/SCS | -80.6 | -80.6 | -Infinity | -80.6 |
| SS B\_RP Note 2 | dBm/ SCS | -80.6 | -80.6 | -Infinity | -80.6 |
| BB Note 7 | dB | 8.3 | 8.3 | -Infinity | 8.3 |
| IoNote2 | dBm/95.04 MHz Note4 | -56.0 | -56.0 | - Infinity | -56.0 |
| Note 1: Void  Note 2: SS B\_RP 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: As observed with 0dBi gain antenna at the center of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  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 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. | | | | | |



Figure A.7.5.13.3.1.2-1: Time multiplexed downlink transmissions during T1



Figure A.7.5.13.3.1.2-2: Time multiplexed downlink transmissions during T2

###### A.7.5.13.3.1.3 Test Requirements

During T2, UE shall send L1-RSRP report with results for both SSB0 of Cell 1 and SSB1 of Cell 2.

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to receive on DL TCI state 0 till n+ THARQ +3

- be able to start receiving on DL TCI state 1 after n+ THARQ + (5 ms + Tfirst-SSB) / *NR slot length*

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

## A.7.6 Measurement procedure

### A.7.6.1 Intra-frequency Measurements

#### A.7.6.1.1 SA event triggered reporting test without gap under non-DRX

##### A.7.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.1.1-1.

Table A.7.6.1.1.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 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. | |

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.1.1-2, A.7.6.1.1.1-3 and A.7.6.1.1.1-4 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 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.

Table A.7.6.1.1.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| Active cell |  | 1, 2 | PCell (Cell 1) |  |
| Neighbour cell |  | 1, 2 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1, 2 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| SMTC configuration |  | 1, 2 | SMTC.1 |  |
| A3-Offset | dB | 1, 2 | -11 |  |
| 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 Cell 1 and Cell 2 |  | 1, 2 | 3 μs | Synchronous cells |
| T1 | s | 1, 2 | 5 |  |
| T2 | s | 1, 2 | 5 |  |

Table A.7.6.1.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1 | 24 | | 24 | |
| 2 | 48 | | 48 | |
| Intial 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 | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| 2 | SR.3.3 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| 2 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| 2 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1, 2 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1, 2 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 120 | | 120 | |
| OCNG Patterns |  | 1, 2 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1~2 | N/A | | 16 | |
| SSB |  | 1 | SSB.1 FR2 | | SSB.7 FR2 | |
|  |  | 2 | SSB.2 FR2 | | SSB.8 FR2 | |
| Propagation Condition |  | 1, 2 | AWGN | | AWGN | |

Table A.7.6.1.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | | |
|  |  |  | T1 | T2 | T1 | | T2 |
| AoA setup |  | 1, 2 | Setup 3 defined in A.3.15.3 | | | | |
|  |  |  | AoA1 | | AoA2 | | |
| Beam assumptionNote 4 |  | 1,2 | Rough | | Rough | | |
| Es | dBm/SCS | 1 | -89 | -89 | | -Infinity | -89 |
|  |  | 2 | -86 | -86 | | -Infinity | -86 |
| BB Note 5 | dB | 1, 2 | -0.12 | -0.12 | | -Infinity | -0.12 |
| SSB\_RP | dBm/SCS | 1 | -89 | -89 | -Infinity | | -89 |
|  |  | 2 | -86 | -86 | -Infinity | | -86 |
|  | dBm/95.04MHz | 1 | -64.41 | -64.41 | -Infinity | | -64.41 |
| 2 | -61.41 | -61.41 | -Infinity | | -61.41 |
| Time multiplexing of the downlink transmissions from each AoA | | 1, 2 | Defined in Figure A.7.6.1.1.1-1 | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Void  Note 3: Es/Iot, SSB\_RP and Io 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. | | | | | | | |



Figure A.7.6.1.1.1-1: Time multiplexed downlink transmissions (Config 1 example)

##### A.7.6.1.1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,

- 1.44s for a UE supporting power class 2, 3 and 4

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.

#### A.7.6.1.2 SA event triggered reporting test without gap under DRX

##### A.7.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.2.1-1.

Table A.7.6.1.2.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 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. | |

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.2.1-2 ~ 6.

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 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.

Table A.7.6.1.2.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| Active cell |  | 1, 2 | PCell (Cell 1) | |  |
| Neighbour cell |  | 1, 2 | Cell 2 | | Cell to be identified. |
| RF Channel Number |  | 1, 2 | 1: Cell 1 and Cell 2 | | One TDD carrier frequency is used for the NR cells. |
| SMTC configuration |  | 1, 2 | SMTC.1 | |  |
| A3-Offset | dB | 1, 2 | -6 | |  |
| 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 | DRX related parameters are defined in Table A.7.6.1.2.1-5 |
| Time offset between Cell 1 and Cell 2 |  | 1, 2 | 3 μs | | Synchronous cells |
| T1 | s | 1, 2 | 5 | |  |
| T2 | s | 1, 2 | 10 | 52 |  |

Table A.7.6.1.2.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1, 2 | 66 | | 66 | |
| Intial 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 | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| 2 | SR.3.3 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| 2 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| 2 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1, 2 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1, 2 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 120 | | 120 | |
| OCNG Patterns |  | 1, 2 | OP.1 | | OP.1 | |
| SSB |  | 1 | SSB.3 FR2 | | SSB.3 FR2 | |
|  |  | 2 | SSB.4 FR2 | | SSB.4 FR2 | |
| Propagation Condition |  | 1, 2 | AWGN | | AWGN | |

Table A.7.6.1.2.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | | |
| Beam assumptionNote 4 |  | 1,2 | Rough | | Rough | |
| BB Note 5 | dB | 1, 2 | 3.77 | -1.52 | -Infinity | -1.52 |
| Note 2 | dBm/15 KHz | 1, 2 | -98 | | | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
|  |  | 2 | -86 | | | |
| SSB\_RP | dBm/SCS | 1 | -85 | -85 | -Infinity | -85 |
| 2 | -82 | -82 | -Infinity | -82 |
|  | dB | 1, 2 | 4 | 4 | -Infinity | 4 |
|  | dBm/95.04MHz | 1, 2 | -54.53 | -52.18 | See Cell 1 columns | |
| 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: Es/Iot, SSB\_RP and Io 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 A.7.6.1.2.1-5: Void

Table A.7.6.1.2.1-6: Void

##### A.7.6.1.2.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,

- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,

- 30.72s for a UE supporting power class 2, 3 and 4

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.

#### A.7.6.1.3 SA event triggered reporting test with per-UE gaps under non-DRX

##### A.7.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.3.1-1.

Table A.7.6.1.3.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 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. | |

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.3.1-2 ~ 4 below.

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.

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 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.

Table A.7.6.1.3.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| Active cell |  | 1, 2 | PCell (Cell 1) |  |
| Neighbour cell |  | 1, 2 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1, 2 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Gap type |  | 1, 2 | Per-UE gaps |  |
| Measurement gap repitition periodicity | ms | 1, 2 | 40 |  |
| Measurement gap length | ms | 1, 2 | 6 |  |
| Measurement gap offset | ms | 1, 2 | 39 |  |
| SMTC configuration |  | 1, 2 | SMTC.1 |  |
| CSI-RS parameters |  | 1, 2 | CSI-RS.3.2 TDD resource #0 | Resource #1 is not used |
| A3-Offset | dB | 1, 2 | -11 |  |
| 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 Cell 1 and Cell 2 |  | 1, 2 | 3 μs | Synchronous cells |
| T1 | s | 1, 2 | 5 |  |
| T2 | s | 1, 2 | 5 |  |

Table A.7.6.1.3.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1 | 24 | | 24 | |
| 2 | 48 | | 48 | |
| Intial 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 | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| 2 | SR.3.3 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| 2 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| 2 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1, 2 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1, 2 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 120 | | 120 | |
| OCNG Patterns |  | 1, 2 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1~2 | N/A | | 16 | |
| SSB |  | 1 | SSB.3 FR2 | | SSB.7 FR2 | |
|  |  | 2 | SSB.4 FR2 | | SSB.8 FR2 | |
| Propagation Condition |  | 1, 2 | AWGN | | AWGN | |

Table A.7.6.1.3.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | | |
| T1 | T2 | T1 | | T2 |
| AoA setup |  | 1, 2 | Setup 3 defined in A.3.15.3 | | | | |
|  |  |  | AoA1 | | AoA2 | | |
| Beam AssumptionNote 4 |  | 1,2 | Rough | | Rough | | |
| Es | dBm/SCS | 1 | -89 | -89 | | -Infinity | -89 |
|  |  | 2 | -86 | -86 | | -Infinity | -86 |
| BB Note 5 | dB | 1, 2 | -0.12 | -0.12 | | -Infinity | -0.12 |
| SSB\_RP | dBm/SCS | 1 | -89 | -89 | -Infinity | | -89 |
|  |  | 2 | -86 | -86 | -Infinity | | -86 |
|  | dBm/95.04MHz | 1 | -64.41 | -64.41 | -Infinity | | -64.41 |
| 2 | -61.41 | -61.41 | -Infinity | | -61.41 |
| Time multiplexing of the downlink transmissions from each AoA | | 1 | Defined in Figure A.7.6.1.3.1-1 | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Void  Note 3: Es/Iot, SSB\_RP and Io 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. | | | | | | | |



Figure A.7.6.1.3.1-1: Time multiplexed downlink transmissions (Config 1 example)

##### A.7.6.1.3.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 3.2s for a UE supporting power class 1,

- 1.92s for a UE supporting power class 2, 3 and 4

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.

#### A.7.6.1.4 SA event triggered reporting test with per-UE gaps under DRX

##### A.7.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.4.1-1.

Table A.7.6.1.4.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 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. | |

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.4.1-2, A.7.6.1.4.1-3 and A.7.6.1.4.1-4 below.

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.

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 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.

Table A.7.6.1.4.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| Active cell |  | 1, 2 | PCell (Cell 1) | |  |
| Neighbour cell |  | 1, 2 | Cell 2 | | Cell to be identified. |
| RF Channel Number |  | 1, 2 | 1: Cell 1 and Cell 2 | | One TDD carrier frequency is used for the NR cells. |
| Gap type |  | 1, 2 | Per-UE gaps | |  |
| Measurement gap repitition periodicity | ms | 1, 2 | 40 | |  |
| Measurement gap length | ms | 1, 2 | 6 | |  |
| Measurement gap offset | ms | 1, 2 | 39 | |  |
| SMTC configuration |  | 1, 2 | SMTC.1 | |  |
| CSI-RS parameters |  | 1, 2 | CSI-RS.3.2 TDD resource #0 | | Resource #1 is not used |
| A3-Offset | dB | 1, 2 | -6 | |  |
| 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 | DRX related parameters are defined in Table A.7.6.1.2.1-5 |
| Time offset between Cell 1 and Cell 2 |  | 1, 2 | 3 μs | | Synchronous cells |
| T1 | s | 1, 2 | 5 | |  |
| T2 | s | 1, 2 | 10 | 52 |  |

Table A.7.6.1.4.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1, 2 | 66 | | 66 | |
| Intial 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 | SCSI-RS | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| 2 | SR.3.3 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| 2 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| 2 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1, 2 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI state |  | 1, 2 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 120 | | 120 | |
| OCNG Patterns |  | 1, 2 | OP.1 | | OP.1 | |
| SSB |  | 1 | SSB.3 FR2 | | SSB.3 FR2 | |
|  |  | 2 | SSB.4 FR2 | | SSB.4 FR2 | |
| Propagation Condition |  | 1, 2 | AWGN | | AWGN | |

Table A.7.6.1.4.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | | |
| Beam AssumptionNote 4 |  | 1,2 | Rough | | | |
| BB Note 5 | dB | 1, 2 | 3.77 | -1.52 | -Infinity | -1.52 |
| Note 2 | dBm/15 KHz | 1, 2 | -98 | | | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
|  |  | 2 | -86 | | | |
| SSB\_RP | dBm/SCS | 1 | -85 | -85 | -Infinity | -85 |
|  |  | 2 | -82 | -82 | -Infinity | -82 |
|  | dB | 1, 2 | 4 | 4 | -Infinity | 4 |
|  | dBm/95.04MHz | 1,2 | -54.53 | -52.18 | See Cell 1 columns | |
| 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: Es/Iot, SSB\_RP and Io 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 A.7.6.1.4.1-5: Void

Table A.7.6.1.4.1-6:Void

##### A.7.6.1.4.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,

- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,

- 30.72s for a UE supporting power class 2, 3 and 4

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.

#### A.7.6.1.5 SA event triggered reporting test without gap under non-DRX for UE configured with *highSpeedMeasCA-Scell-r17*

##### A.7.6.1.5.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements for FR2 power class 6 UE configured with *highSpeedMeasFlagFR2-r17* in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.5.1-1.

Table A.7.6.1.5.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 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. | |

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.5.1-2, A.7.6.1.5.1-3 and A.7.6.1.5.1-4 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 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.

Table A.7.6.1.5.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| *highSpeedMeasFlagFR2-r17* |  | 1,2 | Set2 | *highSpeedMeasFlagFR2-r17* = set2 is configured |
| Active cell |  | 1, 2 | PCell (Cell 1) |  |
| Neighbour cell |  | 1, 2 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1, 2 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| SMTC configuration |  | 1, 2 | SMTC.1 |  |
| A3-Offset | dB | 1, 2 | -11 |  |
| 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 Cell 1 and Cell 2 |  | 1, 2 | 3 μs | Synchronous cells |
| T1 | s | 1, 2 | [1] |  |
| T2 | s | 1, 2 | [2] |  |

Table A.7.6.1.5.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1 | 24 | | 24 | |
| 2 | 48 | | 48 | |
| Intial 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 | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| 2 | SR.3.3 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| 2 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| 2 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1, 2 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1, 2 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 120 | | 120 | |
| OCNG Patterns |  | 1, 2 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1~2 | N/A | | 16 | |
| SSB |  | 1 | SSB.1 FR2 | | SSB.7 FR2 | |
|  |  | 2 | SSB.2 FR2 | | SSB.8 FR2 | |
| Propagation Condition |  | 1, 2 | AWGN | | AWGN 19444Hz Note 1 | |
| Note 1: The AWGN 19444 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 19444 Hz. | | | | | | |

Table A.7.6.1.5.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | | |
|  |  |  | T1 | T2 | T1 | | T2 |
| AoA setup |  | 1, 2 | Setup [x] defined in A.3.15.3 | | | | |
|  |  |  | AoA1 | | AoA2 | | |
| Beam assumptionNote 4 |  | 1,2 | Rough | | Rough | | |
| Es | dBm/SCS | 1 | -89 | -89 | | -Infinity | -89 |
|  |  | 2 | -86 | -86 | | -Infinity | -86 |
| BB Note 5 | dB | 1, 2 | -0.12 | -0.12 | | -Infinity | -0.12 |
| SSB\_RP | dBm/SCS | 1 | -89 | -89 | -Infinity | | -89 |
|  |  | 2 | -86 | -86 | -Infinity | | -86 |
|  | dBm/95.04MHz | 1 | -64.41 | -64.41 | -Infinity | | -64.41 |
| 2 | -61.41 | -61.41 | -Infinity | | -61.41 |
| Time multiplexing of the downlink transmissions from each AoA | | 1, 2 | Defined in Figure A.7.6.1.1.1-1 | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Void  Note 3: Es/Iot, SSB\_RP and Io 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. | | | | | | | |



Figure A.7.6.1.5.1-1: Time multiplexed downlink transmissions (Config 1 example)

##### A.7.6.1.5.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1140ms 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.

#### A.7.6.1.6 SA event triggered reporting test without gap under non-DRX for FR2-2

##### A.7.6.1.6.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.6.1-1.

Table A.7.6.1.6.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test, PCell (Cell 1) and a FR2-2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.6.1-2, A.7.6.1.6.1-3 and A.7.6.1.6.1-4 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 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.

Table A.7.6.1.6.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2-2 without gap without DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| Active cell |  | 1,2,3 | PCell (Cell 1) |  |
| Neighbour cell |  | 1,2,3 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1,2,3 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| SMTC configuration |  | 1,2,3 | SMTC.1 |  |
| A3-Offset | dB | 1,2,3 | -11 |  |
| CP length |  | 1,2,3 | Normal |  |
| Hysteresis | dB | 1,2,3 | 0 |  |
| Time To Trigger | s | 1,2,3 | 0 |  |
| Filter coefficient |  | 1,2,3 | 0 | L3 filtering is not used |
| DRX |  | 1,2,3 | OFF |  |
| Time offset between Cell 1 and Cell 2 |  | 1,2,3 | 3 μs | Synchronous cells |
| T1 | s | 1,2,3 | 5 |  |
| T2 | s | 1,2,3 | 5 |  |

Table A.7.6.1.6.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2-2 without gap without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1,2,3 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
| 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
| Data RBs allocated |  | 1 | 66 | | 66 | |
| 2 | 66 | | 66 | |
| 3 | 33 | | 33 | |
| Intial BWP configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1,2,3 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1,2,3 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1,2,3 | SSB | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| 2,3 | SR.3.3 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| 2,3 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| 2,3 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1,2,3 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1,2,3 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2,3 | 120 | | 120 | |
| OCNG Patterns |  | 1,2,3 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1,2,3 | N/A | | 16 | |
| SSB |  | 1 | SSB.1 FR2 | | SSB.7 FR2 | |
| 2 | SSB.9 FR2 | | SSB.15 FR2 | |
| 3 | SSB.10 FR2 | | SSB.16 FR2 | |
| Propagation Condition |  | 1, 2,3 | AWGN | | AWGN | |

Table A.7.6.1.6.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2-2 without gap without DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | | |
|  |  |  | T1 | T2 | T1 | | T2 |
| AoA setup |  | 1,2,3 | Setup 3 defined in A.3.15.3 | | | | |
|  |  |  | AoA1 | | AoA2 | | |
| Beam assumptionNote 4 |  | 1,2,3 | Rough | | Rough | | |
| Es | dBm/SCS | 1 | -89 | -89 | | -Infinity | -89 |
| 2 | -83 | -83 | | -Infinity | -83 |
| 3 | -80 | -80 | | -Infinity | -80 |
| BB Note 5 | dB | 1, 2,3 | -0.12 | -0.12 | | -Infinity | -0.12 |
| SSB\_RP | dBm/SCS | 1 | -89 | -89 | -Infinity | | -89 |
| 2 | -83 | -83 | -Infinity | | -83 |
|  | 3 | -80 | -80 | -Infinity | | -80 |
|  | dBm/95.04MHz | 1,2,3 | -61.41 | -61.41 | -Infinity | | -61.41 |
| Time multiplexing of the downlink transmissions from each AoA | | 1, 2,3 | Defined in Figure A.7.6.1.1.1-1 | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Void  Note 3: Es/Iot, SSB\_RP and Io 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. | | | | | | | |



Figure A.7.6.1.6.1-1: Time multiplexed downlink transmissions (Config 1 example)

##### A.7.6.1.6.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1，

- 2.4s (60\*20ms+60\*20ms)for a UE supporting power class 1,

- 1.44s (36\*20ms+36\*20ms) for a UE supporting power class 2 and 3

For Configuration 2，

- 3.6s (120\*20ms+60\*20ms) for a UE supporting power class 1,

- 2.16s (72\*20ms+36\*20ms) for a UE supporting power class 2 and 3

For Configuration 3，

- 4.8s (180\*20ms+60\*20ms) for a UE supporting power class 1,

- 2.88s (108\*20ms+36\*20ms) for a UE supporting power class 2 and 3

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.

#### A.7.6.1.7 SA event triggered reporting test without gap under DRX for FR2-2

##### A.7.6.1.7.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.7.1-1.

Table A.7.6.1.7.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test, PCell (Cell 1) and a FR2-2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.7.1-2 ~ 6.

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 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.

Table A.7.6.1.7.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD Pcell in FR2-2 without gap with DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| Active cell |  | 1, 2,3 | PCell (Cell 1) | |  |
| Neighbour cell |  | 1, 2,3 | Cell 2 | | Cell to be identified. |
| RF Channel Number |  | 1, 2,3 | 1: Cell 1 and Cell 2 | | One TDD carrier frequency is used for the NR cells. |
| SMTC configuration |  | 1, 2,3 | SMTC.1 | |  |
| A3-Offset | dB | 1, 2,3 | -6 | |  |
| CP length |  | 1, 2,3 | Normal | |  |
| Hysteresis | dB | 1, 2,3 | 0 | |  |
| Time To Trigger | s | 1, 2,3 | 0 | |  |
| Filter coefficient |  | 1, 2,3 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2,3 | DRX.1 | DRX.7 | DRX related parameters are defined in Table A.7.6.1.2.1-5 |
| Time offset between Cell 1 and Cell 2 |  | 1, 2,3 | 3 μs | | Synchronous cells |
| T1 | s | 1, 2,3 | 5 | |  |
| T2 | s | 1, 2,3 | 10 | 52 |  |

Table A.7.6.1.7.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2-2 without gap with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2,3 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
| 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
| Data RBs allocated |  | 1 | 66 | | 66 | |
| 2 | 66 | | 66 | |
| 3 | 33 | | 33 | |
| Intial BWP configuration |  | 1, 2,3 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2,3 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2,3 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2,3 | SSB | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| 2,3 | SR.3.3 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| 2,3 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| 2,3 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1, 2,3 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1, 2,3 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2,3 | 120 | | 120 | |
| OCNG Patterns |  | 1, 2,3 | OP.1 | | OP.1 | |
| SSB |  | 1 | SSB.1 FR2 | | SSB.7 FR2 | |
| 2 | SSB.9 FR2 | | SSB.15 FR2 | |
| 3 | SSB.10 FR2 | | SSB.16 FR2 | |
| Propagation Condition |  | 1, 2,3 | AWGN | | AWGN | |

Table A.7.6.1.7.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD Pcell in FR2-2 without gap with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| AoA setup |  | 1, 2,3 | Setup 1 defined in A.3.15.1 | | | |
| Beam assumptionNote 4 |  | 1,2,3 | Rough | | Rough | |
| BB Note 5 | dB | 1, 2,3 | 3.77 | -1.52 | -Infinity | -1.52 |
| Note 2 | dBm/15 KHz | 1, 2,3 | -98 | | | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| 2 | -83 | | | |
|  |  | 3 | -80 | | | |
| SSB\_RP | dBm/SCS | 1 | -85 | -85 | -Infinity | -85 |
| 2 | -79 | -79 | -Infinity | -79 |
| 3 | -76 | -76 | -Infinity | -76 |
|  | dB | 1, 2,3 | 4 | 4 | -Infinity | 4 |
|  | dBm/95.04MHz | 1, 2,3 | -54.53 | -52.18 | See Cell 1 columns | |
| 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: Es/Iot, SSB\_RP and Io 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. | | | | | | |

##### A.7.6.1.7.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,

- 7.2s (60\*40ms\*1.5 +60\*40ms\*1.5) for a UE supporting power class 1,

- 4.32s (36\*40ms\*1.5 + 36\*40ms\*1.5) for a UE supporting power class 2 and 3

For Configuration 2,

- 10.8s (120\*40ms\*1.5 +60\*40ms\*1.5) for a UE supporting power class 1,

- 6.48s (72\*40ms\*1.5 + 36\*40ms\*1.5) for a UE supporting power class 2 and 3

For Configuration 3,

- 14.4s (180\*40ms\*1.5 + 60\*40ms\*1.5) for a UE supporting power class 1,

- 8.64s (108\*40ms\*1.5 + 36\*40ms\*1.5) for a UE supporting power class 2 and 3

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,

- 76.8s (60\*640ms +60\*640ms) for a UE supporting power class 1,

- 46.08s (36\*640ms + 36\*640ms) for a UE supporting power class 2 and 3

For Configuration 2,

- 115.2s (120\*640ms +60\*640ms) for a UE supporting power class 1,

- 69.12s (72\*640ms + 36\*640ms) for a UE supporting power class 2 and 3

For Configuration 3,

- 153.6s (180\*640ms + 60\*640ms) for a UE supporting power class 1,

- 92.16s (108\*640ms + 36\*640ms) for a UE supporting power class 2 and 3

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.

#### A.7.6.1.8 SA event triggered reporting test with per-UE gaps under non-DRX for FR2-2

##### A.7.6.1.8.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.8.1-1.

Table A.7.6.1.8.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test, PCell (Cell 1) and a FR2-2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.8.1-2 ~ 4 below.

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.

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 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.

Table A.7.6.1.8.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD Pcell in FR2-2 with per-UE gaps without DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| Active cell |  | 1,2,3 | PCell (Cell 1) |  |
| Neighbour cell |  | 1,2,3 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1,2,3 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Gap type |  | 1,2,3 | Per-UE gaps |  |
| Measurement gap repitition periodicity | ms | 1,2,3 | 40 |  |
| Measurement gap length | ms | 1,2,3 | 6 |  |
| Measurement gap offset | ms | 1,2,3 | 39 |  |
| SMTC configuration |  | 1,2,3 | SMTC.1 |  |
| CSI-RS parameters |  | 1,2,3 | CSI-RS.3.2 TDD |  |
| A3-Offset | dB | 1,2,3 | -11 |  |
| CP length |  | 1,2,3 | Normal |  |
| Hysteresis | dB | 1,2,3 | 0 |  |
| Time To Trigger | s | 1,2,3 | 0 |  |
| Filter coefficient |  | 1,2,3 | 0 | L3 filtering is not used |
| DRX |  | 1,2,3 | OFF |  |
| Time offset between Cell 1 and Cell 2 |  | 1,2,3 | 3 μs | Synchronous cells |
| T1 | s | 1, 2,3 | 5 |  |
| T2 | s | 1, 2,3 | 5 |  |

Table A.7.6.1.8.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2-2 with per-UE gaps without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2,3 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
| 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
| Data RBs allocated |  | 1 | 66 | | 66 | |
| 2 | 66 | | 66 | |
| 3 | 33 | | 33 | |
| Intial BWP configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1,2,3 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1,2,3 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1,2,3 | CSI-RS | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| 2,3 | SR.3.3 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| 2,3 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| 2,3 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1,2,3 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1,2,3 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2,3 | 120 | | 120 | |
| OCNG Patterns |  | 1,2,3 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1,2,3 | N/A | | 16 | |
| SSB |  | 1 | SSB.1 FR2 | | SSB.7 FR2 | |
| 2 | SSB.9 FR2 | | SSB.15 FR2 | |
| 3 | SSB.10 FR2 | | SSB.16 FR2 | |
| Propagation Condition |  | 1, 2,3 | AWGN | | AWGN | |

Table A.7.6.1.8.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2-2 with per-UE gaps without DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | | |
| T1 | T2 | T1 | | T2 |
| AoA setup |  | 1, 2,3 | Setup 3 defined in A.3.15.3 | | | | |
|  |  |  | AoA1 | | AoA2 | | |
| Beam AssumptionNote 4 |  | 1,2,3 | Rough | | Rough | | |
| Es | dBm/SCS | 1 | -89 | -89 | | -Infinity | -89 |
| 2 | -83 | -83 | | -Infinity | -83 |
| 3 | -80 | -80 | | -Infinity | -80 |
| BB Note 5 | dB | 1,2,3 | -0.12 | -0.12 | | -Infinity | -0.12 |
| SSB\_RP | dBm/SCS | 1 | -89 | -89 | -Infinity | | -89 |
| 2 | -83 | -83 | -Infinity | | -83 |
| 3 | -80 | -80 | -Infinity | | -80 |
|  | dBm/95.04MHz | 1,2,3 | -61.41 | -61.41 | -Infinity | | -61.41 |
| Time multiplexing of the downlink transmissions from each AoA | | 1,2,3 | Defined in Figure A.7.6.1.3.1-1 | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Void  Note 3: Es/Iot, SSB\_RP and Io 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. | | | | | | | |



Figure A.7.6.1.8.1-1: Time multiplexed downlink transmissions (Config 1 example)

##### A.7.6.1.8.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1，

- 4.8s (60\*40ms+60\*40ms) for a UE supporting power class 1,

- 2.88s (36\*40ms+36\*40ms) for a UE supporting power class 2 and 3

For Configuration 2，

- 7.2s (120\*40ms+60\*40ms) for a UE supporting power class 1,

- 4.32s (72\*40ms+36\*40ms) for a UE supporting power class 2 and 3

For Configuration 3，

- 9.6s (180\*40ms+60\*40ms) for a UE supporting power class 1,

- 5.76s (108\*40ms+36\*40ms) for a UE supporting power class 2 and 3

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.

#### A.7.6.1.9 SA event triggered reporting test with per-UE gaps under DRX for FR2-2

##### A.7.6.1.9.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.9.1-1.

Table A.7.6.1.9.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test, PCell (Cell 1) and a FR2-2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.9.1-2, A.7.6.1.9.1-3 and A.7.6.1.9.1-4 below.

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.

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 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.

Table A.7.6.1.9.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2-2 with per-UE gaps with DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| Active cell |  | 1,2,3 | PCell (Cell 1) | |  |
| Neighbour cell |  | 1,2,3 | Cell 2 | | Cell to be identified. |
| RF Channel Number |  | 1,2,3 | 1: Cell 1 and Cell 2 | | One TDD carrier frequency is used for the NR cells. |
| Gap type |  | 1,2,3 | Per-UE gaps | |  |
| Measurement gap repitition periodicity | ms | 1,2,3 | 40 | |  |
| Measurement gap length | ms | 1,2,3 | 6 | |  |
| Measurement gap offset | ms | 1,2,3 | 39 | |  |
| SMTC configuration |  | 1,2,3 | SMTC.1 | |  |
| CSI-RS parameters |  | 1,2,3 | CSI-RS.3.2 TDD | |  |
| A3-Offset | dB | 1,2,3 | -6 | |  |
| CP length |  | 1,2,3 | Normal | |  |
| Hysteresis | dB | 1,2,3 | 0 | |  |
| Time To Trigger | s | 1,2,3 | 0 | |  |
| Filter coefficient |  | 1,2,3 | 0 | | L3 filtering is not used |
| DRX |  | 1,2,3 | DRX.1 | DRX.7 | DRX related parameters are defined in Table A.7.6X.1.2.17.6.1.7.1-5 |
| Time offset between Cell 1 and Cell 2 |  | 1,2,3 | 3 μs | | Synchronous cells |
| T1 | s | 1,2,3 | 5 | |  |
| T2 | s | 1,2,3 | 10 | 52 |  |

Table A.7.6.1.9.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2-2 with per-UE gaps with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1,2,3 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
| 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
| Data RBs allocated |  | 1 | 66 | | 66 | |
| 2 | 66 | | 66 | |
| 3 | 33 | | 33 | |
| Intial BWP configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1,2,3 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1,2,3 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1,2,3 | CSI-RS | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| 2,3 | SR.3.3 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| 2,3 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| 2,3 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1, 2,3 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI state |  | 1, 2,3 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2,3 | 120 | | 120 | |
| OCNG Patterns |  | 1, 2,3 | OP.1 | | OP.1 | |
| SSB |  | 1 | SSB.11 FR2 | | SSB.11 FR2 | |
|  |  | 2,3 | SSB.12 FR2 | | SSB.12 FR2 | |
| Propagation Condition |  | 1, 2,3 | AWGN | | AWGN | |

Table A.7.6.1.9.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2-2 with per-UE gaps with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| AoA setup |  | 1, 2,3 | Setup 1 defined in A.3.15.1 | | | |
| Beam AssumptionNote 4 |  | 1,2,3 | Rough | | | |
| BB Note 5 | dB | 1, 2,3 | 3.77 | -1.52 | -Infinity | -1.52 |
| Note 2 | dBm/15 KHz | 1, 2,3 | -98 | | | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| 2 | -83 | | | |
| 3 | -80 | | | |
| SSB\_RP | dBm/SCS | 1 | -85 | -85 | -Infinity | -85 |
| 2 | -79 | -79 | -Infinity | -79 |
| 3 | -76 | -76 | -Infinity | -76 |
|  | dB | 1, 2,3 | 4 | 4 | -Infinity | 4 |
|  | dBm/95.04MHz | 1,2,3 | -54.53 | -52.18 | See Cell 1 columns | |
| 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: Es/Iot, SSB\_RP and Io 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. | | | | | | |

##### A.7.6.1.9.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,

- 7.2s (60\*40ms\*1.5 +60\*40ms\*1.5) for a UE supporting power class 1,

- 4.32s (36\*40ms\*1.5 + 36\*40ms\*1.5) for a UE supporting power class 2 and 3

For Configuration 2,

- 10.8s (120\*40ms\*1.5 +60\*40ms\*1.5) for a UE supporting power class 1,

- 6.48s (72\*40ms\*1.5 + 36\*40ms\*1.5) for a UE supporting power class 2 and 3

For Configuration 3,

- 14.4s (180\*40ms\*1.5 + 60\*40ms\*1.5) for a UE supporting power class 1,

- 8.64s (108\*40ms\*1.5 + 36\*40ms\*1.5) for a UE supporting power class 2 and 3

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,

- 76.8s (60\*640ms +60\*640ms) for a UE supporting power class 1,

- 46.08s (36\*640ms + 36\*640ms) for a UE supporting power class 2 and 3

For Configuration 2,

- 115.2s (120\*640ms +60\*640ms) for a UE supporting power class 1,

- 69.12s (72\*640ms + 36\*640ms) for a UE supporting power class 2 and 3

For Configuration 3,

- 153.6s (180\*640ms + 60\*640ms) for a UE supporting power class 1,

- 92.16s (108\*640ms + 36\*640ms) for a UE supporting power class 2 and 3

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.

#### A.7.6.1.10 SA event triggered reporting test with SSB time index detection without gap under non-DRX for FR2-2

##### A.7.6.1.10.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.10.1-1.

Table A.7.6.1.10.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |

There are two cells in the test, Pcell (Cell 1) and a FR2-2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.10.1-2, A.7.6.1.10.1-3 and A.7.6.1.10.1-4 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 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.

Table A.7.6.1.10.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD Pcell in FR2-2 without gap without DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| Active cell |  | 1 | PCell (Cell 1) |  |
| Neighbour cell |  | 1 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| SMTC configuration |  | 1 | SMTC.1 |  |
| A3-Offset | dB | 1 | -11 |  |
| 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 |  |
| Time offset between Cell 1 and Cell 2 |  | 1 | 3 μs | Synchronous cells |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 5 |  |

Table A.7.6.1.10.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD Pcell in FR2-2 without gap without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1 | 24 | | 24 | |
| Intial 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 | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1 | 120 | | 120 | |
| OCNG Patterns |  | 1 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1 | N/A | | 16 | |
| SSB |  | 1 | SSB.10 FR2 | | SSB.16 FR2 | |
|  |  |
| Propagation Condition |  | 1 | AWGN | | AWGN | |

Table A.7.6.1.10.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2-2 without gap without DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | | |
|  |  |  | T1 | T2 | T1 | | T2 |
| AoA setup |  | 1 | Setup 3 defined in A.3.15.3 | | | | |
|  |  |  | AoA1 | | AoA2 | | |
| Beam assumptionNote 4 |  | 1 | Rough | | Rough | | |
| Es | dBm/SCS | 1 | -80 | -80 | | -Infinity | -80 |
|  |  |
| BB Note 5 | dB | 1 | -0.12 | -0.12 | | -Infinity | -0.12 |
| SSB\_RP | dBm/SCS | 1 | -80 | -80 | -Infinity | | -80 |
|  |  |
|  | dBm/95.04MHz | 1 | -64.41 | -64.41 | -Infinity | | -64.41 |
| Time multiplexing of the downlink transmissions from each AoA | | 1 | Defined in Figure A.7.6X.1.1.1-1 | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Void  Note 3: Es/Iot, SSB\_RP and Io 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. | | | | | | | |



Figure A.7.6.1.10.1-1: Time multiplexed downlink transmissions (Config 1 example)

##### A.7.6.1.10.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 6.24s (180\*20ms + 60\*20ms +72\*20ms) for a UE supporting power class 1,

- 3.84s (108\*20ms + 36\*20ms +48\*20ms) for a UE supporting power class 2 and 3

The UE is 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.

#### A.7.6.1.11 SA event triggered reporting test with SSB time index detection with per-UE gaps under non-DRX for FR2-2

##### A.7.6.1.11.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.11.1-1.

Table A.7.6.1.11.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |

There are two cells in the test, PCell (Cell 1) and a FR2-2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.11.1-2 ~ 4 below.

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.

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 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.

Table A.7.6.1.11.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2-2 with per-UE gaps without DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| Active cell |  | 1 | PCell (Cell 1) |  |
| Neighbour cell |  | 1 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Gap type |  | 1 | Per-UE gaps |  |
| Measurement gap repitition periodicity | ms | 1 | 40 |  |
| Measurement gap length | ms | 1 | 6 |  |
| Measurement gap offset | ms | 1 | 39 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| CSI-RS parameters |  | 1 | CSI-RS.3.2 TDD |  |
| A3-Offset | dB | 1 | -11 |  |
| 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 |  |
| Time offset between Cell 1 and Cell 2 |  | 1 | 3 μs | Synchronous cells |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 5 |  |

Table A.7.6.1.11.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2-2 with per-UE gaps without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1 | 24 | | 24 | |
| 2 | 48 | | 48 | |
| Intial BWP configuration |  | 1 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1 | CSI-RS | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1 | 120 | | 120 | |
| OCNG Patterns |  | 1 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1 | N/A | | 16 | |
| SSB |  | 1 | SSB.12 FR2 | | SSB.16 FR2 | |
|  |  |
| Propagation Condition |  | 1 | AWGN | | AWGN | |

Table A.7.6.1.11.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2-2 with per-UE gaps without DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | | |
| T1 | T2 | T1 | | T2 |
| AoA setup |  | 1 | Setup 3 defined in A.3.15.3 | | | | |
|  |  |  | AoA1 | | AoA2 | | |
| Beam AssumptionNote 4 |  | 1 | Rough | | Rough | | |
| Es | dBm/SCS | 1 | -80 | -80 | | -Infinity | -80 |
|  |  |
| BB Note 5 | dB | 1 | -0.12 | -0.12 | | -Infinity | -0.12 |
| SSB\_RP | dBm/SCS | 1 | -80 | -80 | -Infinity | | -80 |
|  |  |
|  | dBm/95.04MHz | 1 | -61.41 | -61.41 | -Infinity | | -61.41 |
| Time multiplexing of the downlink transmissions from each AoA | | 1 | Defined in Figure A.7.6X.1.3.1-1 | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Void  Note 3: Es/Iot, SSB\_RP and Io 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. | | | | | | | |



Figure A.7.6.1.11.1-1: Time multiplexed downlink transmissions (Config 1 example)

##### A.7.6.1.11.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 12.48s (180\*40ms +60\*40ms) for a UE supporting power class 1,

- 7.68s (108\*40ms + 36\*40ms) for a UE supporting power class 2 and 3

The UE is 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.

### A.7.6.2 Inter-frequency Measurements

#### A.7.6.2.1 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is not used (PCell in FR2)

##### A.7.6.2.1.1 Test Purpose and Environment

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 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.1.1-1, A.7.6.2.1.1-2, and A.7.6.2.1.1-3.

Measurement gap pattern configuration # 13 as defined in Table A.7.6.2.1.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

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 2.

Supported test configurations are shown in table A.7.6.2.1.1-1.

Table A.7.6.2.1.1-1 SA event triggered reporting tests without SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: Void. | |

Table A.7.6.2.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1, 2 | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1 | NR cell 2 | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| offsetMO | dB | Config 1 | 16 | Applied to NR Cell 2 measurement object |
| A3-Offset | dB | Config 1 | -11 |  |
| 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 | 5.2 for PC1; 3.5 for other PC |  |

Table A.7.6.2.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | | |
|  | |  |  | T1 | T2 | T1 | | T2 |
| AoA setup | |  | Config 1 | Setup 3 as specified in clause A.3.15 | | | | |
|  | |  |  | AoA1 | | AoA2 | | |
| Beam AssumptionNote 7 | |  | 1,2 | Rough | | Rough | | |
| NR RF Channel Number | |  | Config 1 | 1 | | 2 | | |
| Duplex mode | |  | Config 1 | TDD | | TDD | | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Data RBs allocated | |  | Config 1 | 66 | | 66 | | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.1 | | SMTC.1 | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | N/A | | |
| PDSCH/PDCCH TCI state | |  | Config 1 | TCI.State.2 | | N/A | | |
| 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 | 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) | |  |  |  | |  | | |
| Ês | | dBm/SCS | Config 1 | -87 | -87 | -Infinity | | -87 |
| SSBRP Note 3 | | dBm/SCS Note5 | Config 1 | -87 | -87 | -Infinity | | -87 |
| BB Note 8 | | dB | Config 1 | 1.89 | 1.89 | -Infinity | | 1.89 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -58.01 | -58.01 | -Infinity | | -58.01 |
| 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: VoidNote 3: SSBRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | |

##### A.7.6.2.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

The UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.2 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is used (Pcell in FR2)

##### A.7.6.2.2.1 Test Purpose and Environment

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 9.3.4.

In this test, there are two cells: NR cell 1 as Pcell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.2.1-1, A.7.6.2.2.1-2, and A.7.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6.2.2.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

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 2.

Supported test configurations are shown in table A.7.6.2.2.1-1.

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.

Table A.7.6.2.2.1-1: SA event triggered reporting tests without SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: Void. | |

Table A.7.6.2.2.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| NR RF Channel Number |  | Config 1 | 1, 2 | | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1 | 13 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 | |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| 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.7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1 | 3μs | | Synchronous cells. |
| T1 | s | Config 1 | 5 | |  |
| T2 | s | Config 1 | 8 for PC1;  5 for other PC | 82 for PC1; 52 for other PC |  |

Table A.7.6.2.2.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| NR RF Channel Number | |  | Config 1 | 1 | | 2 | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated | |  | Config 1 | 66 | | 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI state | |  | Config 1 | TCI.State.2 | | N/A | |
| 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 | 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 Note5 |  | -104.7 | | -104.7 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -95.7 | | -95.7 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -Infinity | -86.7 |
|  | | dB | Config 1 | 6 | 6 | -Infinity | 9 |
|  | | dB | Config 1 | 6 | 6 | -Infinity | 9 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -59.7 | -59.7 | -66.7 | -57.2 |
| 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: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.6.2.2.2 Test Requirements

In test 1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.3 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is not used (PCell in FR2)

##### A.7.6.2.3.1 Test Purpose and Environment

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 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.3.1-1, A.7.6.2.3.1-2, and A.7.6.2.3.1-3.

Measurement gap pattern configuration # 13 as defined in Table A.7.6.2.3.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

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 2.

Supported test configurations are shown in table A.7.6.2.3.1-1.

Table A.7.6.2.3.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: Void. | |

Table A.7.6.2.3.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1, 2 | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1 | NR cell 2 | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| offsetMO | dB | Config 1 | 16 | Applied to NR Cell 2 measurement object |
| A3-Offset | dB | Config 1 | -11 |  |
| 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 | 7 for PC1; 4.5 for other PC |  |

Table A.7.6.2.3.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | | |
|  | |  |  | T1 | T2 | T1 | | T2 |
| AoA setup | |  | Config 1 | Setup 3 as specified in clause A.3.15 | | | | |
|  | |  |  | AoA1 | | AoA2 | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | | |
| NR RF Channel Number | |  | Config 1 | 1 | | 2 | | |
| Duplex mode | |  | Config 1 | TDD | | TDD | | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Data RBs allocated | |  | Config 1 | 66 | | 66 | | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | | |
| OCNG Patterns defined in A.3.2.1.1 | |  | Config 1 | OP.1 | | OP.1 | | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.1 | | SMTC.1 | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | N/A | | |
| PDSCH/PDCCH TCI state | |  | Config 1 | TCI.State.2 | | N/A | | |
| 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 | 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) | |  |  |  | |  | | |
| Ês | | dBm/SCS | Config 1 | -87 | -87 | -Infinity | | -87 |
| SSBRP Note 3 | | dBm/SCS Note5 | Config 1 | -87 | -87 | -Infinity | | -87 |
| BB Note 8 | | dB | Config 1 | 1.89 | 1.89 | -Infinity | | 1.89 |
| Io Note3 | | dBm/95.04 MHz Note5 | Config 1 | -58.01 | -58.01 | -Infinity | | -58.01 |
| 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: Void  Note 3: SBRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | |

##### A.7.6.2.3.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

The UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.4 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is used (Pcell in FR2)

##### A.7.6.2.4.1 Test Purpose and Environment

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 9.3.4.

In this test, there are two cells: NR cell 1 as Pcell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.4.1-1, A.7.6.2.4.1-2, and A.7.6.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6.2.4.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

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 2.

Supported test configurations are shown in table A.7.6.2.4.1-1.

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.

Table A.7.6.2.4.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: Void. | |

Table A.7.6.2.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| NR RF Channel Number |  | Config 1 | 1, 2 | | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1 | 13 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 | |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| 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.7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1 | 3μs | | Synchronous cells. |
| T1 | s | Config 1 | 5 | |  |
| T2 | s | Config 1 | 11 for PC1; 6.5 for other PC | 108 for PC1; 67 for other PC |  |

Table A.7.6.2.4.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| NR RF Channel Number | |  | Config 1 | 1 | | 2 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated | |  | Config 1 | 66 | | 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI state | |  | Config 1 | TCI.State.2 | | N/A | |
| 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 | 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 Note5 |  | -104.7 | | -104.7 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -95.7 | | -95.7 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -Infinity | -86.7 |
|  | | dB | Config 1 | 6 | 6 | -Infinity | 9 |
|  | | dB | Config 1 | 6 | 6 | -Infinity | 9 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -59.7 | -59.7 | -66.7 | -57.2 |
| 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: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.6.2.4.2 Test Requirements

In test 1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.5 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is not used (PCell in FR1)

##### A.7.6.2.5.1 Test Purpose and Environment

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 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.5.1-1, A.7.6.2.5.1-2, and A.7.6.2.5.1-3.

In test 1 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 no gap pattern is configured as defined in Table A.7.6.2.5.1-2. If the UE supports per-FR gap, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 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.

Supported test configurations are shown in table A.7.6.2.5.1-1.

Table A.7.6.2.5.1-1 SA event triggered reporting tests without SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| Config | Description of serving cell | Description of target cell |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 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 | | |

Table A.7.6.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3 | 0 | Gap not configured | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 | N/A |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  |  | Config 2 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  |  | Config 3 | SSB.2 FR1 | | As specified in clause A.3.10.1 |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1 | TRS.1.1 FDD | |  |
|  | Config 2 | TRS.1.1 TDD | |  |
|  | Config 3 | TRS.1.2 TDD | |  |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| *offsetMO* | dB | Config 1,2,3 | 6 | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | |  |
| *a4-Threshold* | dBm | Config 1,2,3 | -105 | |  |
| 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 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | Config 2,3 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | |  |
| T2 | s | Config 1,2,3 | 5.2 for PC1; 3.5 for other PC | 3 for PC1; 2 for other PC |  |

Table A.7.6.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1,2,3 | N/A | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 | |  | Config 1,2,3 | N/A | | Rough | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | |  | Config 1 | FDD | | TDD | |
|  | |  | Config 2,3 | TDD | | TDD | |
| TDD configuration | |  | Config 1 | Not Applicable | | TDDConf.3.1 | |
|  | |  | Config 2 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | |  | Config 3 | TDDConf.2.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | |  | Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | |  | Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| BWP BW | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | |  | Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | |  | Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2,3 | OP.1 | | OP.1 | |
| PDSCH Reference | |  | Config 1 | SR.1.1 FDD | | - | |
| measurement channel | |  | Config 2 | SR.1.1 TDD | |  | |
|  | |  | Config 3 | SR.2.1 TDD | |  | |
| RMSI CORESET Reference | |  | Config 1 | CR.1.1 FDD | | - | |
| Channel | |  | Config 2 | CR.1.1 TDD | |  | |
|  | |  | Config 3 | CR.2.1 TDD | |  | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.1.1 FDD | | - | |
|  | Config 2 | CCR.1.1 TDD | |  | |
|  | Config 3 | CCR.2.1 TDD | |  | |
| SMTC configuration defined | |  | Config 1 | SMTC.2 | | SMTC.2 | |
| in A.3.11.1 and A.3.11.2 | |  | Config 2,3 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | 120 | |
|  | |  | Config 3 | 30 | | 120 | |
| 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 | 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) | |  |  |  | |  | |
| Ês | | dBm/SCS | Config 1,2,3 |  | | -Infinity | -87 |
| SSB\_RP Note 3 | | dBm/SCS | Config 1,2 |  | | -Infinity | -87 |
|  | | Note5 | Config 3 |  | | -Infinity | -87 |
| BB Note 8 | | dB | Config 1,2,3 | NA  Link only, see clause | | -Infinity | 14.69 |
|  | | dBm/95.04 MHz Note5 | Config 1,2,3 | A.3.7A | | -Infinity | -58.01 |
| Propagation Condition | |  | Config 1,2,3 | 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: Void  Note 3: SS B\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |

##### A.7.6.2.5.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 2, without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

2560 for UE supporting power class 1, or

1600 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.6 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is used (Pcell in FR1)

##### A.7.6.2.6.1 Test Purpose and Environment

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 9.3.4.

In this test, there are two cells: NR cell 1 as Pcell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.6.1-1, A.7.6.2.6.1-2, and A.7.6.2.6.1-3.

In test 1&2 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 no gap pattern is configured as defined in Table A.7.6.2.6.1-2. If a UE supports per-FR gap it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 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.

Supported test configurations are shown in table A.7.6.2.6.1-1.

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.

Table A.7.6.2.6.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| Config | Description of serving cell | Description of target cell |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 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 A.7.6.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
|  |  |  | Test 1 | Test 2 | Test 3 | Test 4 |  |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | | | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | | | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3 | 0 | | Gap not configured | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 | | N/A | |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 2 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 3 | SSB.2 FR1 | | | | As specified in clause A.3.10.1 |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1 | TRS.1.1 FDD | | | |  |
|  | Config 2 | TRS.1.1 TDD | | | |  |
|  | Config 3 | TRS.1.2 TDD | | | |  |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3 | SSB.3 FR2 | | | | As specified in clause A.3.10.2 |
| *offsetMO* | dB | Config 1,2,3 | 6 | | | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | | | |  |
| *a4-Threshold* | dBm | Config 1,2,3 | -105 | | | |  |
| 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.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | Config 2,3 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | | | |  |
| T2 | s | Config 1,2,3 | 8 for PC1;  5 for other PC | 82 for PC1; 52 for other PC | 8 for PC1;  5 for other PC | 82 for PC1; 52 for other PC |  |

Table A.7.6.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1,2,3 | NA | | Setup 1 as specified in clause A.3.15 | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | |  | Config 1 | FDD | | TDD | |
|  | |  | Config 2,3 | TDD | | TDD | |
| TDD configuration | |  | Config 1 | Not Applicable | | TDDConf.3.1 | |
|  | |  | Config 2 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | |  | Config 3 | TDDConf.2.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | |  | Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | |  | Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| BWP BW | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | |  | Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | |  | Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| 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 | SR.1.1 FDD | | - | |
|  | |  | Config 2 | SR.1.1 TDD | |  | |
|  | |  | Config 3 | SR.2.1 TDD | |  | |
| RMSI CORESET Reference Channel | |  | Config 1 | CR.1.1 FDD | | - | |
|  | |  | Config 2 | CR.1.1 TDD | |  | |
|  | |  | Config 3 | CR.2.1 TDD | |  | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.1.1 FDD | | - | |
|  | Config 2 | CCR.1.1 TDD | |  | |
|  | Config 3 | CCR.2.1 TDD | |  | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.2 | | SMTC.2 | |
|  | |  | Config 2,3 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | 120 | |
|  | |  | Config 3 | 30 | | 120 | |
| 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 Note5 |  | NA  Link only, see clause A.3.7A | | -104.7 | |
| Note2 | | dBm/SCS Note4 | Config 1,2 |  | | -95.7 | |
|  | |  | Config 3 |  | | -95.7 | |
| SSB\_RP Note 3 | | dBm/SCS Note5 | Config 1,2 |  | | -Infinity | -86.7 |
|  | |  | Config 3 |  | | -Infinity | -86.7 |
|  | | dB | Config 1,2,3 |  | | -Infinity | 9 |
|  | | dB | Config 1,2,3 |  | | -Infinity | 9 |
| IoNote3 | | dBm/9.36MHz | Config 1,2 |  | | - | - |
|  | | dBm/38.16MHz | Config 3 |  | | - | - |
|  | | dBm/95.04 MHz Note5 | Config 1,2,3 |  | | -66.7 | -57.2 |
| Propagation Condition | |  | Config 1,2,3 | 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SSB\_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone | | | | | | | |

##### A.7.6.2.6.2 Test Requirements

In test 1 with per-UE gap and in test 3 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.7 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is not used (PCell in FR1)

##### A.7.6.2.7.1 Test Purpose and Environment

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 9.3.4.

n this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.7.1-1, A.7.6.2.7.1-2, and A.7.6.2.7.1-3.

In test 1 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement no gap pattern is configured as defined in Table A.7.6.2.7.1-2. If the UE supports per-FR gap, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 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.

Supported test configurations are shown in table A.7.6.2.7.1-1.

Table A.7.6.2.7.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| Config | Description of serving cell | Description of target cell |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 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 A.7.6.2.7.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3 | 0 | Gap not configured | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 | N/A |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  |  | Config 2 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  |  | Config 3 | SSB.2 FR1 | | As specified in clause A.3.10.1 |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1 | TRS.1.1 FDD | |  |
|  | Config 2 | TRS.1.1 TDD | |  |
|  | Config 3 | TRS.1.2 TDD | |  |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| *offsetMO* | dB | Config 1,2,3 | 6 | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6 | -105 | |  |
| 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 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | Config 2,3 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | |  |
| T2 | s | Config 1,2,3 | 7 for PC1; 4.5 for other PC | 3.5 for PC1; 2.5 for other PC |  |

Table A.7.6.2.7.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1,2,3 | NA | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 | |  | Config 1,2,3 | N/A | | Rough | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | |  | Config 1 | FDD | | TDD | |
|  | |  | Config 2,3 | TDD | | TDD | |
| TDD configuration | |  | Config 1 | Not Applicable | | TDDConf.3.1 | |
|  | |  | Config 2 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | |  | Config 3 | TDDConf.2.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | | Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | | Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| BWP BW | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | | Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | | Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2,3 | OP.1 | | OP.1 | |
| PDSCH Reference | |  | Config 1 | SR.1.1 FDD | | - | |
| measurement channel | |  | Config 2 | SR.1.1 TDD | |  | |
|  | |  | Config 3 | SR.2.1 TDD | |  | |
| RMSI CORESET Reference | |  | Config 1 | CR.1.1 FDD | | - | |
| Channel | |  | Config 2 | CR.1.1 TDD | |  | |
|  | |  | Config 3 | CR.2.1 TDD | |  | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.1.1 FDD | | - | |
|  | Config 2 | CCR.1.1 TDD | |  | |
|  | Config 3 | CCR.2.1 TDD | |  | |
| SMTC configuration defined | |  | Config 1 | SMTC.2 | | SMTC.2 | |
| in A.3.11.1 and A.3.11.2 | |  | Config 2,3 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | 120 | |
| Config 3 | 30 | | 120 | |
| 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 | 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) | |  |  |  | |  | |
| Ês | | dBm/SCS | Config 1,2, 3 |  | | -Infinity | -87 |
| SSB\_RP Note 3 | | dBm/SCS | Config 1,2 |  | | -Infinity | -87 |
|  | | Note5 | Config 3 |  | | -Infinity | -87 |
| BB Note 8 | | dB | Config 1,2,3 | NA  Link only, see clause | | -Infinity | 14.69 |
|  | | dBm/95.04 MHz Note5 | Config 1,2,3 | A.3.7A | | Infinity | -58.01 |
| Propagation Condition | |  | Config 1,2,3 | 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: Void  Note 3: SSB\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |

##### A.7.6.2.7.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 2 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

3360 for UE supporting power class 1, or

2080 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.8 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is used (PCell in FR1)

##### A.7.6.2.8.1 Test Purpose and Environment

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 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.8.1-1, A.7.6.2.8.1-2, and A.7.6.2.8.1-3.

In test 1&2 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement no gap pattern is configured as defined in Table A.7.6.2.8.1-2.If a UE supports per-FR gap , it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 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.

Supported test configurations are shown in table A.7.6.2.8.1-1.

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.

Table A.7.6.2.8.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| Config | Description of serving cell | Description of target cell |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 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 A.7.6.2.8.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
|  |  |  | Test 1 | Test 2 | Test 3 | Test 4 |  |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | | | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | | | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3 | 0 | | Gap not configured | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 | | N/A | |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  |  | Config 2 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  |  | Config 3 | SSB.2 FR1 | | | | As specified in clause A.3.10.1 |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1 | TRS.1.1 FDD | | | |  |
|  | Config 2 | TRS.1.1 TDD | | | |  |
|  | Config 3 | TRS.1.2 TDD | | | |  |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3 | SSB.3 FR2 | | | | As specified in clause A.3.10.2 |
| *offsetMO* | dB | Config 1,2,3 | 6 | | | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | | | |  |
| *a4-Threshold* | dBm | Config 1,2,3 | -105 | | | |  |
| 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.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | Config 2,3 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | | | |  |
| T2 | s | Config 1,2,3 | 11 for PC1; 6.5 for other PCTBD | 108 for PC1; 67 for other PCTBD | 11 for PC1; 6.5 for other PCTBD | 108 for PC1; 67 for other PCTBD |  |

Table A.7.6.2.8.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1,2,3 | NA | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 | |  | Config 1,2,3 | N/A | | Rough | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | |  | Config 1 | FDD | | TDD | |
|  | |  | Config 2,3 | TDD | | TDD | |
| TDD configuration | |  | Config 1 | Not Applicable | | TDDConf.3.1 | |
|  | |  | Config 2 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | |  | Config 3 | TDDConf.2.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | |  | Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | |  | Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| BWP BW | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | |  | Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | |  | Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2,3 | OP.1 | | OP.1 | |
| PDSCH Reference | |  | Config 1 | SR.1.1 FDD | | - | |
| measurement channel | |  | Config 2 | SR.1.1 TDD | |  | |
|  | |  | Config 3 | SR.2.1 TDD | |  | |
| RMSI CORESET Reference | |  | Config 1 | CR.1.1 FDD | | - | |
| Channel | |  | Config 2 | CR.1.1 TDD | |  | |
|  | |  | Config 3 | CR.2.1 TDD | |  | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.1.1 FDD | | - | |
|  | Config 2 | CCR.1.1 TDD | |  | |
|  | Config 3 | CCR.2.1 TDD | |  | |
| SMTC configuration defined | |  | Config 1 | SMTC.2 | | SMTC.2 | |
| in A.3.11.1 and A.3.11.2 | |  | Config 2,3 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | 120 | |
|  | |  | Config 3 | 30 | | 120 | |
| 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 | 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 Note5 |  |  | | -104.7 | |
| Note2 | | dBm/SCS Note4 | Config 1,2 |  | | -95.7 | |
|  | |  | Config 3 |  | | -95.7 | |
| SSB\_RP Note 3 | | dBm/SCS Note5 | Config 1,2 |  | | -Infinity | -86.7 |
|  | |  | Config 3 |  | | -Infinity | -86.7 |
|  | | dB | Config 1,2,3 | NA  Link only, see clause | | -Infinity | 9 |
|  | | dB | Config 1,2,3 | A.3.7A | | -Infinity | 9 |
| IoNote3 | | dBm/9.36MHz | Config 1,2 |  | | - | - |
|  | | dBm/38.16MHz | Config 3 |  | | - | - |
|  | | dBm/95.04 MHz Note5 | Config 1,2,3 |  | | -66.7 | -57.2 |
| Propagation Condition | |  | Config 1,2,3 |  | | 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SSB\_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.6.2.8.2 Test Requirements

In test 1 with per-UE gap and in test 3 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.9 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is not used (PCell in FR2) (rel16 additional mandatory gap pattern 17)

##### A.7.6.2.9.1 Test Purpose and Environment

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 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.9.1-1, A.7.6.2.9.1-2, and A.7.6.2.9.1-3.

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 2.

Supported test configurations are shown in table A.7.6.2.9.1-1.

Table A.7.6.2.9.1-1 SA event triggered reporting tests without SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: Void. | |

Table A.7.6.2.9.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection (GP17)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1, 2 | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1 | NR cell 2 | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1 | 17 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| A3-Offset | dB | Config 1 | -30 |  |
| 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 | 6 (PC1)  4 (other PC) |  |

Table A.7.6.2.9.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection (GP17)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 1 | |
| T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 3 as specified in clause A.3.15 | | | |
| AoA1 | | AoA2 | |
| Beam assumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| NR RF Channel Number | |  | Config 1 | 1 | | 2 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
| Initial UL BWP |  | ULBWP.0.1 | | N/A | |
| Dedicated DL BWP |  | DLBWP.1.1 | | N/A | |
| Dedicated UL BWP |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | N/A | |
| TCI configuration | |  | Config 1 | CSI-RS.Config.0 | | N/A | |
| 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 Note5 |  | N/A | | N/A | |
| Note2 | | dBm/SCS Note4 | Config 1 | N/A | | N/A | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -87 | -87 | -Infinity | -87 |
|  | | dB | Config 1 | N/A | N/A | -Infinity | N/A |
|  | | dB | Config 1 | N/A | N/A | -Infinity | N/A |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -58.01 | -58.01 | -Infinity | -58.01 |
| Propagation Condition | |  | Config 1 | 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.6.2.9.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 5120ms (PC1) or 3200ms (other than PC1) from the beginning of time period T2.

The UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.10 SA event triggered reporting test without gap under non-DRX

##### A.7.6.2.10.1 Test Purpose and Environment

The purpose of this test is to verify that if UE supports *interFrequencyMeas-NoGap-r16* and the flag *interFrequencyConfig-NoGap-r16* is configured by the network, the UE makes correct reporting of an event. This test will partly verify the inter-frequency without gap cell search requirements in clause 9.3.9. Supported test configurations are shown in table A.7.6.2.10.1-1.

Table A.7.6.2.10.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

There are two cells in the test, NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The SSB of Cell 2 is completely within UE’s active BWP BW. The RBs containing SSB from cell 1 and cell 2 should be different in frequency location within the cell bandwidth. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.2.10.1-2, A.7.6.2.10.1-3 and A.7.6.2.10.1-4 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 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.

Table A.7.6.2.10.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| Active cell |  | 1 | PCell (Cell 1) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | 1 | Cell 2 | NR cell 2 is on NR RF channel number 2. |
| RF Channel Number |  | 1 | 1, 2 | Two FR2 NR carrier frequencies is used. |
| SMTC configuration |  | 1 | SMTC.1 |  |
| A3-Offset | dB | 1 | -6 |  |
| 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 |  |
| Time offset between Cell 1 and Cell 2 |  | 1 | 3 μs | Synchronous cells |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 5 |  |

Table A.7.6.2.10.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Intial 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 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | CR.3.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1 | TCI.State.2 | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| SSB |  | 1 | SSB.3 FR2 | | SSB.3 FR2 | |
| Propagation Condition |  | 1 | AWGN | | | |

Table A.7.6.2.10.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| AoA setup |  | 1 | Setup 1 defined in A.3.15.1 | | | |
|  |  |  |
| Beam assumptionNote 4 |  | 1 | Rough | | Rough | |
|  | dB | 1 | 4 | 4 | -Infinity | 8 |
| Note 2 | dBm/15 KHz | 1 | -102 | | | |
| Note 2 | dBm/SCS | 1 | -93 | | | |
|  |  |
| SS-RSRP | dBm/SCS | 1 | -89 | -89 | -Infinity | -85 |
|  |  |
|  | dB | 1 | 4 | 4 | -Infinity | 8 |
|  | dBm/95.04MHz | 1 | -58.56 | | -55.38 | |
| 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.  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 | | | | | | |

##### A.7.6.2.10.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,

- 1.44s for a UE supporting power class 2, 3 and 4

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.

#### A.7.6.2.11 SA event triggered reporting test without gap under DRX

##### A.7.6.2.11.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD inter-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.2.11.1-1.

Table A.7.6.2.11.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 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. | |

There are two cells in the test: PCell (Cell 1) on NR RF channel 1 and a FR2 neighbour cell (Cell 2) on NR RF channel 2. The SSB of Cell 2 is completely within UE’s active BWP BW. The RBs containing SSB from cell 1 and cell 2 should be different in frequency location within the cell bandwidth. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.2.11.1-2 ~ 6.

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 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.

Table A.7.6.2.11.1-2: General test parameters for inter-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| NR RF Channel Number |  | 1, 2 | 1, 2 | 2 TDD carrier frequency are used for the NR cells. |
| Active cell |  | 1, 2 | PCell (Cell 1) | Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | 1, 2 | Cell 2 | Cell to be identified. Cell 2 is on NR RF channel number 2. |
| SMTC configuration |  | 1, 2 | SMTC.1 |  |
| A3-Offset | dB | 1, 2 | -6 |  |
| 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.7 |  |
| Time offset between Cell 1 and Cell 2 |  | 1, 2 | 3 μs | Synchronous cells |
| T1 | s | 1, 2 | 5 |  |
| T2 | s | 1, 2 | 52 |  |

Table A.7.6.2.11.1-3: NR Cell specific test parameters for inter-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| NR RF Channel Number |  | 1, 2 | 1 | | 2 | |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Intial BWP configuration |  | 1, 2 | DLBWP.0.1  ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.1 | | N/A | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.1 | | N/A | |
| RLM-RS |  | 1, 2 | SSB | | N/A | |
| PDSCH RMC configuration |  | 1, 2 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1, 2 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1, 2 | CCR.3.1 TDD | | N/A | |
| TRS configuration |  | 1, 2 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1, 2 | TCI.State.2 | | N/A | |
| OCNG Patterns |  | 1, 2 | OP.1 | | OP.1 | |
| SSB |  | 1 | SSB.3 FR2 | | SSB.3 FR2 | |
| 2 | SSB.4 FR2 | | SSB.4 FR2 | |
| Propagation Condition |  | 1, 2 | AWGN | | | |

Table A.7.6.2.11.1-4: NR OTA Cell specific test parameters for inter-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | | |
| Beam assumptionNote 4 |  | 1,2 | Rough | | Rough | |
|  | dB | 1, 2 | 4 | -1.46 | -Infinity | -1.46 |
| Note 2 | dBm/15 KHz | 1, 2 | -98 | | | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
|  |  | 2 | -86 | | | |
| SS-RSRP | dBm/SCS | 1 | -85 | -85 | -Infinity | -85 |
| 2 | -82 | -82 | -Infinity | -82 |
|  | dB | 1, 2 | 4 | 4 | -Infinity | 4 |
|  | dBm/95.04MHz | 1 | -54.53 | -52.18 | -54.53 | -52.18 |
| 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.  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. | | | | | | |

##### A.7.6.2.11.2 Test Requirements

In test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,

- 30.72s for a UE supporting power class 2, 3 and 4est

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.

#### A.7.6.2.12 SA event triggered reporting tests for FR2-2 without SSB time index detection when DRX is not used (PCell in FR2-2)

##### A.7.6.2.12.1 Test Purpose and Environment

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 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2-2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.1.12-1, A.7.6.2.12.1-2, and A.7.6.2.12.1-3.

Measurement gap pattern configuration # 13 as defined in Table A.7.6.2.12.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

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 2.

Supported test configurations are shown in table A.7.6.2.12.1-1.

Table A.7.6.2.12.1-1 SA event triggered reporting tests without SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.7.6.2.12.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2-2 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1,2,3 | 1 | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
|  | Config 2 | SSB.11 FR2 |
|  | Config 3 | SSB.12 FR2 |
| offsetMO | dB | Config 1,2,3 | 16 | Applied to NR Cell 2 measurement object |
| A3-Offset | dB | Config 1,2,3 | -11 |  |
| 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 | 3μs | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 |  |
| T2 | s | Config 1,2,3 | 5.2 for PC1; 3.5 for other PC |  |

Table A.7.6.2.12.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2-2 without SSB time index detection

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | | |
|  | |  |  | T1 | T2 | T1 | | T2 |
| AoA setup | |  | Config 1,2,3 | Setup 3 as specified in clause A.3.15 | | | | |
|  | |  |  | AoA1 | | AoA2 | | |
| Beam AssumptionNote 7 | |  | 1,2,3 | Rough | | Rough | | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | | |
| Duplex mode | |  | Config 1,2,3 | TDD | | TDD | | |
| TDD configuration | |  | Config 1,2,3 | TDDConf.3.1 | | TDDConf.3.1 | | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Config 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | | |
| Config 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | | |
| Data RBs allocated | |  | Config 1 | 66 | | 66 | | |
| Config 2 | 66 | | 66 | | |
| Config 3 | 33 | | 33 | | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Config 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | | |
| Config 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3 | DLBWP.0.1 | | N/A | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | | |
| 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.3.1 TDD | | - | | |
| CORESET Reference Channel | |  | Config 1,2,3 | CR.3.1 TDD | | - | | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1,2,3 | SMTC.1 | | SMTC.1 | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,3 | 120 | | 120 | | |
| TRS configuration | |  | Config 1,2,3 | TRS.2.1 TDD | | N/A | | |
| PDSCH/PDCCH TCI state | |  | Config 1,2,3 | TCI.State.2 | | N/A | | |
| 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 | 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) | |  |  |  | |  | | |
| Ês | | dBm/SCS | Config 1 | -87 | -87 | -Infinity | | -87 |
| Config 2 | -81 | -81 | -Infinity | | -81 |
| Config 3 | -78 | -78 | -Infinity | | -78 |
| SSBRP Note 3 | | dBm/SCS Note5 | Config 1 | -87 | -87 | -Infinity | | -87 |
| Config 2 | -81 | -81 | -Infinity | | -81 |
| Config 3 | -78 | -78 | -Infinity | | -78 |
| BB Note 8 | | dB | Config 1,2,3 | 1.89 | 1.89 | -Infinity | | 1.89 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1,2,3 | -58.01 | -58.01 | -Infinity | | -58.01 |
| 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: VoidNote 3: SSBRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | |

##### A.7.6.2.12.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,

7.68s (96\*40ms + 96\*40ms) for UE supporting power class 1, or

4.8s (60\*40ms +60\*40ms) for UE supporting other power class.

For Configuration 2,

11.52s (192\*40ms + 96\*40ms) for UE supporting power class 1, or

7.2s (120\*40ms +60\*40ms) for UE supporting other power class.

For Configuration 3,

15.36s (288\*40ms + 96\*40ms) for UE supporting power class 1, or

9.6s (180\*40ms +60\*40ms) for UE supporting other power class.

The UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.13 SA event triggered reporting tests for FR2-2 without SSB time index detection when DRX is used (PCell in FR2-2)

##### A.7.6.2.13.1 Test Purpose and Environment

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 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2-2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.63.2.13.1-1, A.7.6.2.13.1-2, and A.7.6.2.13.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6.2.13.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

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 2.

Supported test configurations are shown in table A.7.6.2132.1-1.

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.

Table A.7.6.2.13.1-1: SA event triggered reporting tests without SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.7.6.2.13.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2-2 without SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3 | 13 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 | |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
|  | Config 2 | SSB.11 FR2 | |
|  | Config 3 | SSB.12 FR2 | |
| 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.7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | |  |
| T2 | s | Config 1,2,3 | 8 for PC1;  5 for other PC | 82 for PC1; 52 for other PC |  |

Table A.7.6.2.13.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1,2,3 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1,2,3 | Rough | | Rough | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | |
| TDD configuration | |  | Config 1,2,3 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1,2,3 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Config 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
| Config 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
| Data RBs allocated | |  | Config 1 | 66 | | 66 | |
| Config 2 | 66 | | 66 | |
| Config 3 | 33 | | 33 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Config 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
| Config 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| 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.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1,2,3 | CR.3.1 TDD | | - | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1,2,3 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,3 | 120 | | 120 | |
| TRS configuration | |  | Config 1,2,3 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI state | |  | Config 1,2,3 | TCI.State.2 | | N/A | |
| 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 | 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 Note5 | Config 1,2,3 | -104.7 | | -104.7 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -95.7 | | -95.7 | |
| Config 2 | -89.7 | | -89.7 | |
| Config 3 | -86.7 | | -86.7 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -Infinity | -86.7 |
| Config 2 | -83.7 | -83.7 | -Infinity | -80.7 |
| Config 3 | -80.7 | -80.7 | -Infinity | -77.7 |
|  | | dB | Config 1,2,3 | 6 | 6 | -Infinity | 9 |
|  | | dB | Config 1,2,3 | 6 | 6 | -Infinity | 9 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1,2,3 | -59.7 | -59.7 | -66.7 | -57.2 |
| 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: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.6.2.13.2 Test Requirements

In test 1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

For Configuration 1,

11.52s (96\*40ms\*1.5 + 96\*40ms\*1.5) for UE supporting power class 1, or

7.2s (60\*40ms\*1.5 + 60\*40ms\*1.5) for UE supporting other power class.

For Configuration 2,

17.28s (192\*40ms\*1.5 + 96\*40ms\*1.5) for UE supporting power class 1, or

10.80s (120\*40ms\*1.5 + 60\*40ms\*1.5) for UE supporting other power class.

For Configuration 3,

23.04s (288\*40ms\*1.5 + 96\*40ms\*1.5) for UE supporting power class 1, or

14.40s (180\*40ms\*1.5 + 60\*40ms\*1.5) for UE supporting other power class.

In test 2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

For Configuratiojn 1,

122.88s (96\*640ms + 96\*640ms) for UE supporting power class 1, or

76.80s (60\*640ms + 60\*640ms) for UE supporting other power class.

For Configuratiojn 2,

184.32s (192\*640ms + 96\*640ms) for UE supporting power class 1, or

115.20s (120\*640ms + 60\*640ms) for UE supporting other power class.

For Configuratiojn 3,

245.76s (288\*640ms + 96\*640ms) for UE supporting power class 1, or

153.60s (180\*640ms + 60\*640ms) for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.14 SA event triggered reporting tests for FR2-2 with SSB time index detection when DRX is not used (PCell in FR2-2)

##### A.7.6.2.14.1 Test Purpose and Environment

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 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2-2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.14.1-1, A.7.6.2.14.1-2, and A.7.6.2.14.1-3.

Measurement gap pattern configuration # 13 as defined in Table A.7.6.2.14.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

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 2.

Supported test configurations are shown in table A.7.6.2.14.1-1.

Table A.7.6.2.14.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.7.6.2.14.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2-2 with SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| Config 2 | SSB.11 FR2 |
| Config 3 | SSB.12 FR2 |
| offsetMO | dB | Config 1,2,3 | 16 | Applied to NR Cell 2 measurement object |
| A3-Offset | dB | Config 1,2,3 | -11 |  |
| 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 | 3μs | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 |  |
| T2 | s | Config 1,2,3 | 7 for PC1; 4.5 for other PC |  |

Table A.7.6.2.14.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2-2 with SSB time index detection

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | | |
|  | |  |  | T1 | T2 | T1 | | T2 |
| AoA setup | |  | Config 1,2,3 | Setup 3 as specified in clause A.3.15 | | | | |
|  | |  |  | AoA1 | | AoA2 | | |
| Beam AssumptionNote 7 | |  | Config 1,2,3 | Rough | | Rough | | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | | |
| Duplex mode | |  | Config 1,2,3 | TDD | | TDD | | |
| TDD configuration | |  | Config 1,2,3 | TDDConf.3.1 | | TDDConf.3.1 | | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Config 2 | 400: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Config 3 | 400: NRB,c = 33 | | 100: NRB,c = 33 | | |
|  | |  | Config 1 | 66 | | 66 | | |
| Config 2 | 66 | | 66 | | |
| Config 3 | 33 | | 33 | | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Config 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | | |
| Config 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3 | DLBWP.0.1 | | N/A | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | | |
| OCNG Patterns defined in A.3.2.1.1 | |  | Config 1,2,3 | OP.1 | | OP.1 | | |
| PDSCH Reference measurement channel | |  | Config 1,2,3 | SR.3.1 TDD | | - | | |
| CORESET Reference Channel | |  | Config 1,2,3 | CR.3.1 TDD | | - | | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1,2,3 | SMTC.1 | | SMTC.1 | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,3 | 120 | | 120 | | |
| TRS configuration | |  | Config 1,2,3 | TRS.2.1 TDD | | N/A | | |
| PDSCH/PDCCH TCI state | |  | Config 1,2,3 | TCI.State.2 | | N/A | | |
| 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 | 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) | |  |  |  | |  | | |
| Ês | | dBm/SCS | Config 1 | -87 | -87 | -Infinity | | -87 |
| Config 2 | -81 | -81 | -Infinity | | -81 |
| Config 3 | -78 | -78 | -Infinity | | -78 |
| SSBRP Note 3 | | dBm/SCS Note5 | Config 1 | -87 | -87 | -Infinity | | -87 |
| Config 2 | -81 | -81 | -Infinity | | -81 |
| Config 3 | -78 | -78 | -Infinity | | -78 |
| BB Note 8 | | dB | Config 1,2,3 | 1.89 | 1.89 | -Infinity | | 1.89 |
| Io Note3 | | dBm/95.04 MHz Note5 | Config 1,2,3 | -58.01 | -58.01 | -Infinity | | -58.01 |
| 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: Void  Note 3: SBRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | |

##### A.7.6.2.14.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,

10.56s (96\*40ms + 96\*40ms+72\*40ms) for UE supporting power class 1, or

6.72s (60\*40ms+60\*40ms+48\*40ms) for UE supporting other power class.

For Configuration 2,

14.4s (192\*40ms + 96\*40ms+72\*40ms) for UE supporting power class 1, or

9.12s (120\*40ms+60\*40ms+48\*40ms) for UE supporting other power class.

For Configuration 3,

18.24s (288\*40ms + 96\*40ms+72\*40ms) for UE supporting power class 1, or

11.52s (180\*40ms+60\*40ms+48\*40ms) for UE supporting other power class.

The UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.15 SA event triggered reporting tests for FR2-2 with SSB time index detection when DRX is used (PCell in FR2-2)

##### A.7.6.2.15.1 Test Purpose and Environment

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 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2-2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.15.1-1, A.7.6.2.15.1-2, and A.7.6.2.15.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6.2.15.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

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 2.

Supported test configurations are shown in table A.7.6.2.15.1-1.

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.

Table A.7.6.2.15.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.7.6.2.15.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2-2 with SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3 | 13 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 | |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| Config 2 | SSB.11 FR2 | |
| Config 3 | SSB.12 FR2 | |
| 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.7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | |  |
| T2 | s | Config 1,2,3 | 11 for PC1; 6.5 for other PC | 108 for PC1; 67 for other PC |  |

Table A.7.6.2.15.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1,2,3 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1,2,3 | Rough | | Rough | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | |  | Config 1,2,3 | TDD | | TDD | |
| TDD configuration | |  | Config 1,2,3 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Config 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
| Config 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
|  | |  | Config 1 | 66 | | 66 | |
|  | |  | Config 2 | 66 | | 66 | |
|  | |  | Config 3 | 33 | | 33 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
|  | |  | Config 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
|  | |  | Config 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 | |  | Config 1,2,3 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1,2,3 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1,2,3 | CR.3.1 TDD | | - | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1,2,3 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,3 | 120 | | 120 | |
| TRS configuration | |  | Config 1,2,3 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI state | |  | Config 1,2,3 | TCI.State.2 | | N/A | |
| 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 | 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 Note5 |  | -104.7 | | -104.7 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -95.7 | | -95.7 | |
| Config 2 | -89.7 | | -89.7 | |
| Config 3 | -86.7 | | -86.7 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -Infinity | -86.7 |
| Config 2 | -83.7 | -83.7 | -Infinity | -80.7 |
| Config 3 | -80.7 | -80.7 | -Infinity | -77.7 |
|  | | dB | Config 1,2,3 | 6 | 6 | -Infinity | 9 |
|  | | dB | Config 1,2,3 | 6 | 6 | -Infinity | 9 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1,2,3 | -59.7 | -59.7 | -66.7 | -57.2 |
| 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: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.6.2.15.2 Test Requirements

In test 1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

For Configuration 1,

15.84s (96\*40ms\*1.5+96\*40ms\*1.5+72\*40ms\*1.5) for UE supporting power class 1, or

10.08s (60\*40ms\*1.5+60\*40ms\*1.5+48\*40ms\*1.5) for UE supporting other power class.

For Configuration 2,

21.6s (192\*40ms\*1.5+96\*40ms\*1.5+72\*40ms\*1.5) for UE supporting power class 1, or

13.68s (120\*40ms\*1.5+60\*40ms\*1.5+48\*40ms\*1.5) for UE supporting other power class.

For Configuration 3,

27.36s (288\*40ms\*1.5+96\*40ms\*1.5+48\*40ms\*1.5) for UE supporting power class 1, or

17.28s (180\*40ms\*1.5+60\*40ms\*1.5+48\*40ms\*1.5) for UE supporting other power class.

In test 2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

For Configuration 1,

168.96s (96\*640ms+96\*640ms+72\*640ms) for UE supporting power class 1, or

107.52s (60\*640ms+60\*640ms+48\*640ms) for UE supporting other power class.

For Configuration 2,

230.4s (192\*640ms+96\*640ms+72\*640ms) for UE supporting power class 1, or

145.92s (120\*640ms+60\*640ms+48\*640ms) for UE supporting other power class.

For Configuration 3,

291.84s (288\*640ms+96\*640ms+72\*640ms) for UE supporting power class 1, or

184.32s (180\*640ms+60\*640ms+48\*640ms) for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.16 SA event triggered reporting tests for FR2-2 without SSB time index detection when DRX is not used (PCell in FR1)

##### A.7.6.2.16.1 Test Purpose and Environment

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 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2-2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.16.1-1, A.7.6.2.16.1-2, and A.7.6.2.16.1-3.

In test 1 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.16.1-2 is provided for a UE that does not support per-FR gap and in test 2 no gap pattern is configured as defined in Table A.7.6.2.16.1-2. If the UE supports per-FR gap, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 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.

Supported test configurations are shown in table A.7.6.2.16.1-1.

Table A.7.6.2.16.1-1 SA event triggered reporting tests without SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| Config | Description of serving cell | Description of target cell |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 480 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 960 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 9 | 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 | | |

Table A.7.6.2.16.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2-2 without SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| NR RF Channel Number |  | Config 1,2,3,4,5,6,7,8,9 | 1, 2 | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 1 (Pcell) | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6,7,8,9 | 0 | Gap not configured | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6,7,8,9 | 39 | N/A |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1,4,7 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  |  | Config 2,5,8 | SSB.1 FR1 | |
|  |  | Config 3,6,9 | SSB.2 FR1 | |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1,4,7 | TRS.1.1 FDD | |  |
|  | Config 2,5,8 | TRS.1.1 TDD | |  |
|  | Config 3,6,9 | TRS.1.2 TDD | |  |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| Config 4,5,6 | SSB.11 FR2 | |
| Config 7,8,9 | SSB.12 FR2 | |
| *offsetMO* | dB | Config 1,2,3,4,5,6,7,8,9 | 6 | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6,7,8,9 | 0 | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6,7,8,9 | -105 | |  |
| CP length |  | Config 1,2,3,4,5,6,7,8,9 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6,7,8,9 | 0 | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6,7,8,9 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6,7,8,9 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,4,7 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | Config 2,3,5,6,8,9 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6,7,8,9 | 5 | |  |
| T2 | s | Config 1,2,3,4,5,6,7,8,9 | 5.2 for PC1; 3.5 for other PC | 3 for PC1; 2 for other PC |  |

Table A.7.6.2.16.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2-2 without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1,2,3,4,5,6,7,8,9 | N/A | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 | |  | Config 1,2,3,4,5,6,7,8,9 | N/A | | Rough | |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6,7,8,9 | 1 | | 2 | |
| Duplex mode | |  | Config 1,4,7 | FDD | | TDD | |
|  | |  | Config 2,3,5,6,8,9 | TDD | | TDD | |
| TDD configuration | |  | Config 1,4,7 | Not Applicable | | TDDConf.3.1 | |
|  | |  | Config 2,5,8 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | |  | Config 3,6,9 | TDDConf.2.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| Config 4 | 52 | | 66 | |
| Config 5 | 52 | | 66 | |
| Config 6 | 106 | | 66 | |
| Config 7 | 52 | | 33 | |
| Config 8 | 52 | | 33 | |
| Config 9 | 106 | | 33 | |
| BWP BW | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3,4,5,6,7,8,9 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2,3,4,5,6,7,8,9 | OP.1 | | OP.1 | |
| PDSCH Reference | |  | Config 1,4,7 | SR.1.1 FDD | | - | |
| measurement channel | |  | Config 2,5,8 | SR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | SR.2.1 TDD | |  | |
| RMSI CORESET Reference | |  | Config 1,4,7 | CR.1.1 FDD | | - | |
| Channel | |  | Config 2,5,8 | CR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | CR.2.1 TDD | |  | |
| Dedicated CORESET RMC configuration | |  | Config 1,4,7 | CCR.1.1 FDD | | - | |
|  | Config 2,5,8 | CCR.1.1 TDD | |  | |
|  | Config 3,6,9 | CCR.2.1 TDD | |  | |
| SMTC configuration defined | |  | Config 1,4,7 | SMTC.2 | | SMTC.2 | |
| in A.3.11.1 and A.3.11.2 | |  | Config 2,3,5,6,8,9 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,4,5,7,8 | 15 | | 120 | |
|  | |  | Config 3,6,9 | 30 | | 120 | |
| 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 1,2,3,4,5,6,7,8,9 | 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) | |  |  |  | |  | |
| Ês | | dBm/SCS | Config 1,2,3 |  | | -Infinity | -87 |
| Config 4,5,6 |  | | -Infinity | -81 |
| Config 7,8,9 |  | | -Infinity | -78 |
| SSB\_RP Note 3 | | dBm/SCS  Note5 | Config 1,2,3 |  | | -Infinity | -87 |
| Config 4,5,6 |  | | -Infinity | -81 |
| Config 7,8,9 |  | | -Infinity | -78 |
| BB Note 8 | | dB | Config 1,2,3,4,5,6,7,8,9 | NA  Link only, see clause | | -Infinity | 14.69 |
|  | | dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6,7,8,9 | A.3.7A | | -Infinity | -58.01 |
| Propagation Condition | |  | Config 1,2,3,4,5,6,7,8,9 | 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: Void  Note 3: SS B\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |

##### A.7.6.2.16.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,2,3

7.68s (96\*40ms+96\*40ms) for UE supporting power class 1, or

4.8s (60\*40ms + 60\*40ms) for UE supporting other power class.

For Configuration 4,5,6

11.52s (192\*40ms+96\*40ms) for UE supporting power class 1, or

7.2s (120\*40ms + 60\*40ms) for UE supporting other power class.

For Configuration 7,8,9

15.36s (288\*40ms+96\*40ms) for UE supporting power class 1, or

9.6s (180\*40ms + 60\*40ms) for UE supporting other power class.

In test 2, without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,2,3

3.84s (96\*20ms+96\*20ms) for UE supporting power class 1, or

2.4s (60\*20ms + 60\*20ms) for UE supporting other power class.

For Configuration 4,5,6

5.76s (192\*20ms+96\*20ms) for UE supporting power class 1, or

3.6s (120\*20ms + 60\*20ms) for UE supporting other power class.

For Configuration 7,8,9

7.68s (288\*20ms+96\*20ms) for UE supporting power class 1, or

4.8s (180\*20ms + 60\*20ms) for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.17 SA event triggered reporting tests for FR2-2 without SSB time index detection when DRX is used (PCell in FR1)

##### A.7.6.2.17.1 Test Purpose and Environment

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 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2-2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.17.1-1, A.7.6.2.17.1-2, and A.7.6.2.17.1-3.

In test 1&2 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.17.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 no gap pattern is configured as defined in Table A.7.6.2.17.1-2. If a UE supports per-FR gap it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 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.

Supported test configurations are shown in table A.7.6.2.17.1-1.

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.

Table A.7.6.2.17.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| Config | Description of serving cell | Description of target cell |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 480 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 960 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 9 | 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 | | |

Table A.7.6.2.17.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2-2 without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
|  |  |  | Test 1 | Test 2 | Test 3 | Test 4 |  |
| NR RF Channel Number |  | Config 1,2,3,4,5,6,7,8,9 | 1, 2 | | | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 1 (Pcell) | | | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6,7,8,9 | 0 | | Gap not configured | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6,7,8,9 | 39 | | N/A | |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1,4,7 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 2,5,8 | SSB.1 FR1 | | | |
|  | Config 3,6,9 | SSB.2 FR1 | | | |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1,4,7 | TRS.1.1 FDD | | | |  |
|  | Config 2,5,8 | TRS.1.1 TDD | | | |  |
|  | Config 3,6,9 | TRS.1.2 TDD | | | |  |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3 | SSB.3 FR2 | | | | As specified in clause A.3.10.2 |
|  | Config 4,5,6 | SSB.11 FR2 | | | |
|  | Config 7,8,9 | SSB.12 FR2 | | | |
| *offsetMO* | dB | Config 1,2,3,4,5,6,7,8,9 | 6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6,7,8,9 | 0 | | | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6,7,8,9 | -105 | | | |  |
| CP length |  | Config 1,2,3,4,5,6,7,7,8,9 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6,7,8,9 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6,7,8,9 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6,7,8,9 | DRX.1 | DRX.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1,4,7 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | Config 2,3,5,6,8,9 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6,7,8,9 | 5 | | | |  |
| T2 | s | Config 1,2,3,4,5,6,7,8,9 | 8 for PC1;  5 for other PC | 82 for PC1; 52 for other PC | 8 for PC1;  5 for other PC | 82 for PC1; 52 for other PC |  |

Table A.7.6.2.17.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2-2 without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1,2,3,4,5,6,7,8,9 | NA | | Setup 1 as specified in clause A.3.15 | |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6,7,8,9 | 1 | | 2 | |
| Duplex mode | |  | Config 1,4,7 | FDD | | TDD | |
|  | |  | Config 2,3,5,6,8,9 | TDD | | TDD | |
| TDD configuration | |  | Config 1,4,7 | Not Applicable | | TDDConf.3.1 | |
|  | |  | Config 2,5,8 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | |  | Config 3,6,9 | TDDConf.2.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| Config 4 | 52 | | 66 | |
| Config 5 | 52 | | 66 | |
| Config 6 | 106 | | 66 | |
| Config 7 | 52 | | 33 | |
| Config 8 | 52 | | 33 | |
| Config 9 | 106 | | 33 | |
| BWP BW | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
|  | | Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3,4,5,6,7,8,9 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2,3,4,5,6,7,8,9 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1,4,7 | SR.1.1 FDD | | - | |
|  | |  | Config 2,5,8 | SR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | SR.2.1 TDD | |  | |
| RMSI CORESET Reference Channel | |  | Config 1,4,7 | CR.1.1 FDD | | - | |
|  | |  | Config 2,5,8 | CR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | CR.2.1 TDD | |  | |
| Dedicated CORESET RMC configuration | |  | Config 1,4,7 | CCR.1.1 FDD | | - | |
|  | Config 2,5,8 | CCR.1.1 TDD | |  | |
|  | Config 3,6,9 | CCR.2.1 TDD | |  | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1,4,7 | SMTC.2 | | SMTC.2 | |
|  | |  | Config 2,3,5,6,8,9 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,4,5,7,8 | 15 | | 120 | |
|  | |  | Config 3,6,9 | 30 | | 120 | |
| EPRE ratio of PSS to SSS | |  | Config 1,2,3,4,5,6,7,8,9 | 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 Note5 |  | NA  Link only, see clause A.3.7A | | -104.7 | |
| Note2 | | dBm/SCS Note4 | Config 1,2,3 |  | | -95.7 | |
| Config 4,5,6 |  | | -89.7 | |
| Config 7,8,9 |  | | -86.7 | |
| SSB\_RP Note 3 | | dBm/SCS Note5 | Config 1,2,3 |  | | -Infinity | -86.7 |
| Config 4,5,6 |  | | -Infinity | -80.7 |
| Config 7,8,9 |  | | -Infinity | -77.7 |
|  | | dB | Config 1,2,3,4,5,6,7,8,9 |  | | -Infinity | 9 |
|  | | dB | Config 1,2,3,4,5,6,7,8,9 |  | | -Infinity | 9 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6,7,8,9 |  | | -66.7 | -57.2 |
|  | |  | |
|  | |  | |
| Propagation Condition | |  | Config 1,2,3,4,5,6,7,8,9 | 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SSB\_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone | | | | | | | |

##### A.7.6.2.17.2 Test Requirements

In test 1 with per-UE gap and in test 3 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

For Configuration 1,2,3

11.52s (96\*40ms\*1.5 + 96\*40ms\*1.5) for UE supporting power class 1, or

7.2s (60\*40ms\*1.5 + 60\*40ms\*1.5) for UE supporting other power class.

For Configuration 4,5,6

17.28s (192\*40ms\*1.5 + 96\*40ms\*1.5) for UE supporting power class 1, or

10.80s (120\*40ms\*1.5 + 60\*40ms\*1.5) for UE supporting other power class.

For Configuration 7,8,9

23.04s (288\*40ms\*1.5 + 96\*40ms\*1.5) for UE supporting power class 1, or

14.40s (180\*40ms\*1.5 + 60\*40ms\*1.5) for UE supporting other power class.

In test 2 with per-UE gap and in test 4 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

For Configuration 1,2,3

122.80s (96\*640ms + 96\*640ms) for UE supporting power class 1, or

76.80s (60\*640ms + 60\*640ms) for UE supporting other power class.

For Configuration 4,5,6

184.32s (192\*640ms + 96\*640ms) for UE supporting power class 1, or

115.20s (120\*640ms + 60\*640ms) for UE supporting other power class.

For Configuration 7,8,9

245.76s (288\*640ms + 96\*640ms) for UE supporting power class 1, or

153.60s (180\*640ms + 60\*640ms) for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.18 SA event triggered reporting tests for FR2-2 with SSB time index detection when DRX is not used (PCell in FR1)

##### A.7.6.2.18.1 Test Purpose and Environment

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 9.3.4.

n this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2-2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.18.1-1, A.7.6.2.18.1-2, and A.7.6.2.18.1-3.

In test 1 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.18.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement no gap pattern is configured as defined in Table A.7.6.2.18.1-2. If the UE supports per-FR gap, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 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.

Supported test configurations are shown in table A.7.6.2.18.1-1.

Table A.7.6.2.18.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| Config | Description of serving cell | Description of target cell |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 480 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 960 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 9 | 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 | | |

Table A.7.6.2.18.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2-2 with SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| NR RF Channel Number |  | Config 1,2,3,4,5,6,7,8,9 | 1, 2 | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 1 (Pcell) | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6,7,8,9 | 0 | Gap not configured | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6,7,8,9 | 39 | N/A |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1,4,7 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  |  | Config 2,5,8 | SSB.1 FR1 | |
|  |  | Config 3,6,9 | SSB.2 FR1 | |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1,4,7 | TRS.1.1 FDD | |  |
|  | Config 2,5,8 | TRS.1.1 TDD | |  |
|  | Config 3,6,9 | TRS.1.2 TDD | |  |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| Config 4,5,6 | SSB.11 FR2 | |
| Config 7,8,9 | SSB.12 FR2 | |
| *offsetMO* | dB | Config 1,2,3,4,5,6,7,8,9 | 6 | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6,7,8,9 | 0 | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6,7,8,9 | -105 | |  |
| CP length |  | Config 1,2,3,4,5,6,7,8,9 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6,7,8,9 | 0 | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6,7,8,9 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6,7,8,9 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,4,7 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | Config 2,3,5,6,8,9 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6,7,8,9 | 5 | |  |
| T2 | s | Config 1,2,3,4,5,6,7,8,9 | 5.2 for PC1; 3.5 for other PC | 3 for PC1; 2 for other PC |  |

Table A.7.6.2.18.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2-2 with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1,2,3,4,5,6,7,8,9 | N/A | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 | |  | Config 1,2,3,4,5,6,7,8,9 | N/A | | Rough | |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6,7,8,9 | 1 | | 2 | |
| Duplex mode | |  | Config 1,4,7 | FDD | | TDD | |
|  | |  | Config 2,3,5,6,8,9 | TDD | | TDD | |
| TDD configuration | |  | Config 1,4,7 | Not Applicable | | TDDConf.3.1 | |
|  | |  | Config 2,5,8 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | |  | Config 3,6,9 | TDDConf.2.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| Config 4 | 52 | | 66 | |
| Config 5 | 52 | | 66 | |
| Config 6 | 106 | | 66 | |
| Config 7 | 52 | | 33 | |
| Config 8 | 52 | | 33 | |
| Config 9 | 106 | | 33 | |
| BWP BW | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3,4,5,6,7,8,9 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2,3,4,5,6,7,8,9 | OP.1 | | OP.1 | |
| PDSCH Reference | |  | Config 1,4,7 | SR.1.1 FDD | | - | |
| measurement channel | |  | Config 2,5,8 | SR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | SR.2.1 TDD | |  | |
| RMSI CORESET Reference | |  | Config 1,4,7 | CR.1.1 FDD | | - | |
| Channel | |  | Config 2,5,8 | CR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | CR.2.1 TDD | |  | |
| Dedicated CORESET RMC configuration | |  | Config 1,4,7 | CCR.1.1 FDD | | - | |
|  | Config 2,5,8 | CCR.1.1 TDD | |  | |
|  | Config 3,6,9 | CCR.2.1 TDD | |  | |
| SMTC configuration defined | |  | Config 1,4,7 | SMTC.2 | | SMTC.2 | |
| in A.3.11.1 and A.3.11.2 | |  | Config 2,3,5,6,8,9 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,4,5,7,8 | 15 | | 120 | |
|  | |  | Config 3,6,9 | 30 | | 120 | |
| 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 1,2,3,4,5,6,7,8,9 | 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) | |  |  |  | |  | |
| Ês | | dBm/SCS | Config 1,2,3 |  | | -Infinity | -87 |
| Config 4,5,6 |  | | -Infinity | -81 |
| Config 7,8,9 |  | | -Infinity | -78 |
| SSB\_RP Note 3 | | dBm/SCS  Note5 | Config 1,2,3 |  | | -Infinity | -87 |
| Config 4,5,6 |  | | -Infinity | -81 |
| Config 7,8,9 |  | | -Infinity | -78 |
| BB Note 8 | | dB | Config 1,2,3,4,5,6,7,8,9 | NA  Link only, see clause | | -Infinity | 14.69 |
|  | | dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6,7,8,9 | A.3.7A | | -Infinity | -58.01 |
| Propagation Condition | |  | Config 1,2,3,4,5,6,7,8,9 | 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: Void  Note 3: SS B\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |

##### A.7.6.2.18.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,2,3

10.56s (96\*40ms+96\*40ms+72\*40ms) for UE supporting power class 1, or

6.72s (60\*40ms + 60\*40ms+48\*40ms) for UE supporting other power class.

For Configuration 4,5,6

14.4s (192\*40ms+96\*40ms+72\*40ms) for UE supporting power class 1, or

9.12s (120\*40ms + 60\*40ms+48\*40ms) for UE supporting other power class.

For Configuration 7,8,9

18.24s (288\*40ms+96\*40ms+72\*40ms) for UE supporting power class 1, or

11.52s (180\*40ms + 60\*40ms+48\*40ms) for UE supporting other power class.

In test 2 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,2,3

5.28s (96\*20ms+96\*20ms+72\*20ms)for UE supporting power class 1, or

3.36s (60\*20ms + 60\*20ms+48\*20ms) for UE supporting other power class.

For Configuration 4,5,6

7.2s (192\*20ms+96\*20ms+72\*20ms) for UE supporting power class 1, or

4.56s (120\*20ms + 60\*20ms+48\*20ms) for UE supporting other power class.

For Configuration 7,8,9

9.12s (288\*20ms+96\*20ms+72\*20ms) for UE supporting power class 1, or

5.76s (180\*20ms + 60\*20ms+48\*20ms) for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.2.19 SA event triggered reporting tests for FR2-2 with SSB time index detection when DRX is used (PCell in FR1)

##### A.7.6.2.19.1 Test Purpose and Environment

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 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2-2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.19.1-1, A.7.6.2.19.1-2, and A.7.6.2.19.1-3.

In test 1&2 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.19.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement no gap pattern is configured as defined in Table A.7.6.2.19.1-2. If a UE supports per-FR gap , it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 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.

Supported test configurations are shown in table A.7.6.2.19.1-1.

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.

Table A.7.6.2.19.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| Config | Description of serving cell | Description of target cell |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 480 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 960 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 9 | 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 | | |

Table A.7.6.2.19.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2-2 with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
|  |  |  | Test 1 | Test 2 | Test 3 | Test 4 |  |
| NR RF Channel Number |  | Config 1,2,3,4,5,6,7,8,9 | 1, 2 | | | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 1 (Pcell) | | | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6,7,8,9 | 0 | | Gap not configured | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6,7,8,9 | 39 | | N/A | |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1,4,7 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 2,5,8 | SSB.1 FR1 | | | |
|  | Config 3,6,9 | SSB.2 FR1 | | | |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1,4,7 | TRS.1.1 FDD | | | |  |
|  | Config 2,5,8 | TRS.1.1 TDD | | | |  |
|  | Config 3,6,9 | TRS.1.2 TDD | | | |  |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3 | SSB.3 FR2 | | | | As specified in clause A.3.10.2 |
|  | Config 4,5,6 | SSB.11 FR2 | | | |
|  | Config 7,8,9 | SSB.12 FR2 | | | |
| *offsetMO* | dB | Config 1,2,3,4,5,6,7,8,9 | 6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6,7,8,9 | 0 | | | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6,7,8,9 | -105 | | | |  |
| CP length |  | Config 1,2,3,4,5,6,7,7,8,9 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6,7,8,9 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6,7,8,9 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6,7,8,9 | DRX.1 | DRX.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1,4,7 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | Config 2,3,5,6,8,9 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6,7,8,9 | 5 | | | |  |
| T2 | s | Config 1,2,3,4,5,6,7,8,9 | 8 for PC1;  5 for other PC | 82 for PC1; 52 for other PC | 8 for PC1;  5 for other PC | 82 for PC1; 52 for other PC |  |

Table A.7.6.2.19.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2-2 with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1,2,3,4,5,6,7,8,9 | NA | | Setup 1 as specified in clause A.3.15 | |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6,7,8,9 | 1 | | 2 | |
| Duplex mode | |  | Config 1,4,7 | FDD | | TDD | |
|  | |  | Config 2,3,5,6,8,9 | TDD | | TDD | |
| TDD configuration | |  | Config 1,4,7 | Not Applicable | | TDDConf.3.1 | |
|  | |  | Config 2,5,8 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | |  | Config 3,6,9 | TDDConf.2.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| Config 4 | 52 | | 66 | |
| Config 5 | 52 | | 66 | |
| Config 6 | 106 | | 66 | |
| Config 7 | 52 | | 33 | |
| Config 8 | 52 | | 33 | |
| Config 9 | 106 | | 33 | |
| BWP BW | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
|  | | Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3,4,5,6,7,8,9 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2,3,4,5,6,7,8,9 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1,4,7 | SR.1.1 FDD | | - | |
|  | |  | Config 2,5,8 | SR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | SR.2.1 TDD | |  | |
| RMSI CORESET Reference Channel | |  | Config 1,4,7 | CR.1.1 FDD | | - | |
|  | |  | Config 2,5,8 | CR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | CR.2.1 TDD | |  | |
| Dedicated CORESET RMC configuration | |  | Config 1,4,7 | CCR.1.1 FDD | | - | |
|  | Config 2,5,8 | CCR.1.1 TDD | |  | |
|  | Config 3,6,9 | CCR.2.1 TDD | |  | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1,4,7 | SMTC.2 | | SMTC.2 | |
|  | |  | Config 2,3,5,6,8,9 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,4,5,7,8 | 15 | | 120 | |
|  | |  | Config 3,6,9 | 30 | | 120 | |
| EPRE ratio of PSS to SSS | |  | Config 1,2,3,4,5,6,7,8,9 | 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 Note5 |  | NA  Link only, see clause A.3.7A | | -104.7 | |
| Note2 | | dBm/SCS Note4 | Config 1,2,3 |  | | -95.7 | |
| Config 4,5,6 |  | | -89.7 | |
| Config 7,8,9 |  | | -86.7 | |
| SSB\_RP Note 3 | | dBm/SCS Note5 | Config 1,2,3 |  | | -Infinity | -86.7 |
| Config 4,5,6 |  | | -Infinity | -80.7 |
| Config 7,8,9 |  | | -Infinity | -77.7 |
|  | | dB | Config 1,2,3,4,5,6,7,8,9 |  | | -Infinity | 9 |
|  | | dB | Config 1,2,3,4,5,6,7,8,9 |  | | -Infinity | 9 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6,7,8,9 |  | | -66.7 | -57.2 |
|  | |  | |
|  | |  | |
| Propagation Condition | |  | Config 1,2,3,4,5,6,7,8,9 | 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SSB\_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone | | | | | | | |

##### A.7.6.2.19.2 Test Requirements

In test 1 with per-UE gap and in test 3 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

For Configuration 1,2,3

15.84s (96\*40ms\*1.5+96\*40ms\*1.5+72\*40ms\*1.5) for UE supporting power class 1, or

10.08s (60\*40ms\*1.5+60\*40ms\*1.5+48\*40ms\*1.5) for UE supporting other power class.

For Configuration 4,5,6

21.6s (192\*40ms\*1.5+96\*40ms\*1.5+72\*40ms\*1.5) for UE supporting power class 1, or

13.68s (120\*40ms\*1.5+60\*40ms\*1.5+48\*40ms\*1.5) for UE supporting other power class.

For Configuration 7,8,9

27.36s (288\*40ms\*1.5+96\*40ms\*1.5+72\*40ms\*1.5) for UE supporting power class 1, or

17.28s (180\*40ms\*1.5+60\*40ms\*1.5+48\*40ms\*1.5) for UE supporting other power class.

In test 2 with per-UE gap and in test 4 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

For Configuration 1,2,3

168.69s (96\*640ms+96\*640ms+72\*640ms) for UE supporting power class 1, or

107.52s (60\*640ms+60\*640ms+48\*640ms) for UE supporting other power class.

For Configuration 4,5,6

230.4s (192\*640ms+96\*640ms+72\*640ms) for UE supporting power class 1, or

145.92s (120\*640ms+60\*640ms+48\*640ms) for UE supporting other power class.

For Configuration 7,8,9

291.84s (288\*640ms+96\*640ms+72\*640ms) for UE supporting power class 1, or

184.32s (180\*640ms+60\*640ms+48\*640ms) for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

### A.7.6.3 L1-RSRP measurement for beam reporting

#### A.7.6.3.1 SSB based L1-RSRP measurement when DRX is not used

#### A.7.6.3.1 SSB based L1-RSRP measurement when DRX is not used

##### A.7.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.7.6.3.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.7.6.3.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 240 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 | |

##### A.7.6.3.1.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.1.2-1 and Table A.7.6.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. 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.

Table A.7.6.3.1.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1~2 |  | freq1 |
| Duplex mode | 1~2 |  | TDD |
| TDD Configuration | 1~2 |  | TDDConf.3.1 |
| BWchannel | 1~2 | MHz | 100: NRB,c = 66 |
| Data RBs allocated | 1~4 |  | 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.2 TDD |
| 2 | SR.3.3 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD |
| 2 | CR.3.2 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD |
| 2 | CCR.3.7 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
|  | 2 | SSB.2 FR2 |
| OCNG Patterns | 1~2 |  | OP.1 |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.3  ULBWP.1.3 |
| SMTC configuration | 1~2 |  | SMTC.1 |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 |
| 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 | 320 |
| T1 | 1~2 | s | 5 |
| T2 | 1~2 | s | 2 |
| EPRE ratio of PSS to SSS | 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 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. | | | |

Table A.7.6.3.1.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | | | |
| Beam AssumptionNote 4 | 1-2 |  | Rough | | | |
| Note2 | 1~2 | dBm/15kHz | -105 | | | |
| Note2 | 1 | dBm/SSB SCS | -96 | | | |
|  | 2 |  | -93 | | | |
|  | 1~2 | dB | 0 | 0 | -Infinity | 9 |
| SSB\_RP Note3 | 1 | dBm/SSB SCS | -96 | -96 | -Infinity | -87 |
|  | 2 |  | -93 | -93 | -Infinity | -84 |
| Io Note3 | 1 | dBm/95.04MHz | -63.97 | -63.97 | -66.98 | -57.47 |
|  | 2 |  | -63.97 | -63.97 | -66.98 | -57.47 |
|  | 1~2 | dB | 0 | 0 | -Infinity | 9 |
| 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: SSB\_RP and Io 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 | | | | | | |

##### A.7.6.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 1680 for UE supporting power class 1

- 1200 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

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

#### A.7.6.3.2 SSB based L1-RSRP measurement when DRX is used

##### A.7.6.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.7.6.3.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.7.6.3.2.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 240 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 | |

##### A.7.6.3.2.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.2.2-1 and Table A.7.6.3.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. 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.

Table A.7.6.3.2.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1~2 |  | freq1 |
| Duplex mode | 1~2 |  | TDD |
| TDD Configuration | 1~2 |  | TDDConf.3.1 |
| BWchannel | 1~2 | MHz | 100: NRB,c = 66 |
| Data RBs allocated | 1~2 |  | 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.2 TDD |
| 2 | SR.3.3 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD |
| 2 | CR.3.2 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD |
| 2 | CCR.3.7 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
|  | 2 |  | SSB.2 FR2 |
| OCNG Patterns | 1~2 |  | OP.1 |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.3  ULBWP.1.3 |
| SMTC configuration | 1~2 |  | SMTC.1 |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 |
| 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 | 320 |
| T1 | 1~2 | s | 5 |
| T2 | 1~2 | s | 3 |
| EPRE ratio of PSS to SSS | 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 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. | | | |

Table A.7.6.3.2.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | | | |
| Beam AssumptionNote 4 | 1-2 |  | Rough | | | |
| Note2 | 1~2 | dBm/15kHz | -105 | | | |
| Note2 | 1 | dBm/SSB SCS | -96 | | | |
|  | 2 |  | -93 | | | |
|  | 1~2 | dB | 0 | 0 | -Infinity | 9 |
| SSB\_RP Note3 | 1 | dBm/SSB SCS | -96 | -96 | -Infinity | -87 |
|  | 2 |  | -93 | -93 | -Infinity | -84 |
| Io Note3 | 1 | dBm/95.04MHz | -63.97 | -63.97 | -66.98 | -57.47 |
|  | 2 |  | -63.97 | -63.97 | -66.98 | -57.47 |
|  | 1~2 | dB | 0 | 0 | -Infinity | 9 |
| 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: SSB\_RP and Io 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 | | | | | | |

##### A.7.6.3.2.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 2880 for UE supporting power class 1

- 1920 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

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

#### A.7.6.3.3 CSI-RS based L1-RSRP measurement when DRX is not used

##### A.7.6.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.7.6.3.3.1-1.

Table A.7.6.3.3.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

##### A.7.6.3.3.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.3.2-1 and Table A.7.6.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 480ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.3.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.7.6.3.3.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1 |  | freq1 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.3.1 |
| BWchannel | 1 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
| CSI-RS configuration | 1 |  | CSI-RS.3.3 TDD |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.1  ULBWP.1.1 |
| SMTC configuration | 1 |  | SMTC.1 |
| TRS Configuration | 1 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1 |  | TCI.State.2 |
| DRX configuration | 1 |  | Off |
| reportConfigType | 1 |  | aperiodic |
| reportQuantity | 1 |  | cri-RSRP |
| Number of reported RS | 1 |  | 2 |
| qcl-Info | 1 |  | SSB#0 for resource#0 |
| SSB#1 for resource#1 |
| reportSlotOffsetList | 1 |  | 8 |
| Propagation condition | 1 |  | AWGN |
| T1 | 1 | s | 5 |
| EPRE ratio of PSS to SSS | 1 | 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 |  |  |  |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |

Table A.7.6.3.3.2-1: CSI-RS specific test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | CSI-RS#0 | CSI-RS#1 |
| Angle of arrival configuration | 1 |  | Setup 1 according to A.3.15.1 | |
| Beam AssumptionNote 4 | 1 |  | Rough | Rough |
| Note1 | 1 | dBm/15kHz | -105 | |
| Note1 | 1 | dBm/SSB SCS | -95.97 | |
|  | 1 | dB | 0 | 9 |
| CSI-RS RSRP Note2 | 1 | dBm/SSB SCS | -95.97 | -86.97 |
| Io Note2 | 1 | dBm/95.04MHz | -63.97 | -57.47 |
|  | 1 | dB | 0 | 9 |
| 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: CSI-RS RSRP and Io 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 | | | | |

##### A.7.6.3.3.3 Test Requirements

After 480ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1. The reported L1-RSRP value shall include the Rx antenna gain in the range of [-10 ~ +20] dB.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.6.3.3.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.7.6.3.3.3-1: L1-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| CSI-RS0 | CSI-RS \_RP0 -δ + Gmin ≤ Reported RSRP(dBm) ≤CSI-RS \_RP0 +δ + Gmax |
| CSI-RS1 | CSI-RS \_RP1 -δ + Gmin ≤ Reported RSRP(dBm) ≤CSI-RS \_RP1 +δ + Gmax |
| Note 1: CSI-RS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class | |

#### A.7.6.3.4 CSI-RS based L1-RSRP measurement when DRX is used

##### A.7.6.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.7.6.3.4.1-1.

Table A.7.6.3.4.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

##### A.7.6.3.4.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.4.2-1 and Table A.7.6.3.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 1440ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.3.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.7.6.3.4.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1 |  | freq1 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.3.1 |
| BWchannel | 1 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
| CSI-RS configuration | 1 |  | CSI-RS.3.3 TDD |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.1  ULBWP.1.1 |
| SMTC configuration | 1 |  | SMTC.1 |
| TRS Configuration | 1 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1 |  | TCI.State.2 |
| DRX configuration | 1 |  | DRX.3 |
| reportConfigType | 1 |  | aperiodic |
| reportQuantity | 1 |  | cri-RSRP |
| Number of reported RS | 1 |  | 2 |
| qcl-Info | 1 |  | SSB#0 for resource#0 |
| SSB#1 for resource#1 |
| reportSlotOffsetList | 1 |  | 8 |
| Propagation condition | 1 |  | AWGN |
| T1 | 1 | s | 5 |
| EPRE ratio of PSS to SSS | 1 | 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 |  |  |  |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |

Table A.7.6.3.4.2-1: CSI-RS specific test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | CSI-RS#0 | CSI-RS#1 |
| Angle of arrival configuration | 1 |  | Setup 1 according to A.3.15.1 | |
| Beam AssumptionNote 4 | 1 |  | Rough | Rough |
| Note1 | 1 | dBm/15kHz | -105 | |
| Note1 | 1 | dBm/SSB SCS | -95.97 | |
|  | 1 | dB | 0 | 9 |
| CSI-RS RSRP Note2 | 1 | dBm/SSB SCS | -95.97 | -86.97 |
| Io Note2 | 1 | dBm/95.04MHz | -63.97 | -57.47 |
|  | 1 | dB | 0 | 9 |
| 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: CSI-RS RSRP and Io 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 | | | | |

##### A.7.6.3.3.3 Test Requirements

After 1440ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1. The reported L1-RSRP value shall include the Rx antenna gain in the range of [-10 ~ +20] dB.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.6.3.4.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.7.6.3.4.3-1: L1-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| CSI-RS0 | CSI-RS \_RP0 -δ + Gmin ≤ Reported RSRP(dBm) ≤CSI-RS \_RP0 +δ + Gmax |
| CSI-RS1 | CSI-RS \_RP1 -δ + Gmin ≤ Reported RSRP(dBm) ≤CSI-RS \_RP1 +δ + Gmax |
| Note 1: CSI-RS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class | |

#### A.7.6.3.5 SSB based L1-RSRP measurement when DRX is used for power class 6 UE configured with *highSpeedMeasFlagFR2-r17*

##### A.7.6.3.5.1 Test Purpose and Environment

The purpose of this test is to verify that the power class 6 UE makes correct reporting of L1-RSRP measurement when *highSpeedMeasFlagFR2-r17* is configured. This test will partly verify the L1-RSRP measurement requirements for power class 6 UE configured with *highSpeedMeasFlagFR2-r17* in clause 9.5.4.1, with the testing configurations for NR cells in Table A.7.6.3.5.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.7.6.3.5.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test for power class 6 UE configured with *highSpeedMeasFlag-r17*

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 240 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 | |

##### A.7.6.3.5.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.5.2-1 and Table A.7.6.3.5.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. 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.

Table A.7.6.3.5.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| highSpeedMeasFlagFR2-r17 | 1~2 |  | Set 1 |
| SSB GSCN | 1~2 |  | freq1 |
| Duplex mode | 1~2 |  | TDD |
| TDD Configuration | 1~2 |  | TDDConf.3.1 |
| BWchannel | 1~2 | MHz | 100: NRB,c = 66 |
| Data RBs allocated | 1~2 |  | 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.2 TDD |
| 2 | SR.3.3 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD |
| 2 | CR.3.2 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD |
| 2 | CCR.3.7 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
|  | 2 |  | SSB.2 FR2 |
| OCNG Patterns | 1~2 |  | OP.1 |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.3  ULBWP.1.3 |
| SMTC configuration | 1~2 |  | SMTC.1 |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 |
| 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 | 320 |
| T1 | 1~2 | s | 5 |
| T2 | 1~2 | s | 3 |
| EPRE ratio of PSS to SSS | 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 DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation condition | 1~2 |  | AWGN 19444Hz |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |

Table A.7.6.3.5.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | | | |
| Beam AssumptionNote 4 | 1-2 |  | Rough | | | |
| Note2 | 1~2 | dBm/15kHz | -105 | | | |
| Note2 | 1 | dBm/SSB SCS | -96 | | | |
|  | 2 |  | -93 | | | |
|  | 1~2 | dB | 0 | 0 | -Infinity | 9 |
| SSB\_RP Note3 | 1 | dBm/SSB SCS | -96 | -96 | -Infinity | -87 |
|  | 2 |  | -93 | -93 | -Infinity | -84 |
| Io Note3 | 1 | dBm/95.04MHz | -63.97 | -63.97 | -66.98 | -57.47 |
|  | 2 |  | -63.97 | -63.97 | -66.98 | -57.47 |
|  | 1~2 | dB | 0 | 0 | -Infinity | 9 |
| 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: SSB\_RP and Io 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 | | | | | | |

##### A.7.6.3.5.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than [1520] ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

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

#### A.7.6.3.6 Inter-cell SSB based L1-RSRP measurements on FR2 SCell when DRX is not used

##### A.7.6.3.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.13.4.1, with the testing configurations for NR serving cell in Table A.7.6.3.6.1-1.

The AoA setup of FR2 cell for this test is Setup 3 as defined in clause A.3.15.

Table A.7.6.3.6.1-1: Applicable NR configurations for inter-cell SSB based L1-RSRP test in FR2

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR PCell 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR PCell 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  NR SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | NR PCell 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 4 | NR PCell 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR SCell 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 5 | NR PCell 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  NR SCell 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 6 | NR PCell 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR SCell 240 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 | |

##### A.7.6.3.6.2 Test parameters

There are two cells in the test, Cell 1 is the serving cell in CA, including a FR1 PCC and FR2 SCC. Cell 2 is a FR2 cell with different PCI from Cell 1. The test parameters for Cell 1 are given in Table A.7.6.3.6.2-1. The test parameters for FR2 Cell (Cell 2) are given in Table A.7.6.3.6.2-2 and Table A.7.6.3.6.2-3.

SSB#0 and SSB#1 is transmitted on Cell 1 FR2 SCC and Cell 2.In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on SSB#0, and report measurement results periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. At the beginning of T2, SSB#1 starts transmission and the UE is configured for L1-RSRP measurement on SSB#1. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured in CSI-ReportConfigand *additionalPCIList* configured in *CSI-SSB-ResourceSet*.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD on Cell 1 in FR1 and perform L1-RSRP measurements on the SSB#0in FR2.

Table A.7.6.3.6.2-1: Cell specific test parameters for FR1 PCell

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Value** |
| 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 |
| Dedicated 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.3 FR1 |
|  | 2,5 |  | SSB.3 FR1 |
|  | 3,6 |  | SSB.4 FR1 |
| OCNG Patterns | 1~6 |  | OP.1 |
| Initial BWP Configuration | 1~6 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~6 |  | DLBWP.1.1  ULBWP.1.1 |
| SMTC configuration | 1~6 |  | SMTC.1 |
| CSI-RS for tracking | 1,4 |  | TRS.1.1 FDD |
|  | 2,5 |  | TRS.1.1 TDD |
|  | 3,6 |  | TRS.1.2 TDD |
| DRX configuration | 1~6 |  | Off |
| SSB index assigned as RLM RS | 1~6 |  | 0,1 |
| SSB Index assigned as BFD RS (q0) | 1~6 |  | 0 |
| SSB Index assigned as CBD RS (q1) | 1~6 |  | 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 | 1~6 | dBm/15 kHz | -104 |
|  | 1~6 | dB | 17 |
|  | 1~6 | dB | 17 |
| SS-RSRP Note3 | 1~6 | dBm/15 kHz | -87 |
| IoNote3 | 1,2,4,5 | dBm/  9.36MHz | -58.96 |
| 3,6 | dBm/  38.16MHz | -52.86 |
| Propagation condition | 1~6 |  | 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 modeled as AWGN of appropriate power for Noc to be fulfilled within BWoccupied.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess. | | | |

Table A.7.6.3.6.2-2: Cell specific test parameters for FR2 SCell

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Value** |
| SSB GSCN | 1~6 |  | Freq2 |
| Duplex mode | 1~6 |  | TDD |
| TDD Configuration | 1~2 |  | TDDConf.3.1 |
| BWchannel | 1~6 | MHz | 100: NRB,c = 66 |
| Data RBs allocated | 1~6 |  | 66 |
| PDSCH Reference measurement channel | 1,2,3 |  | SR.3.2 TDD |
| 4,5,6 | SR.3.3 TDD |
| RMSI CORESET Reference Channel | 1,2,3 |  | CR.3.1 TDD |
| 4,5,6 | CR.3.2 TDD |
| Dedicated CORESET Reference Channel | 1,2,3 |  | CCR.3.1 TDD |
| 4,5,6 | CCR.3.7 TDD |
| SSB configuration | 1,2,3 |  | SSB.1 FR2 |
|  | 4,5,6 | SSB.2 FR2 |
| OCNG Patterns | 1~6 |  | OP.1 |
| Initial BWP Configuration | 1~6 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~6 |  | DLBWP.1.3  ULBWP.1.3 |
| SMTC configuration | 1~6 |  | SMTC.1 |
| TRS Configuration | 1~6 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~6 |  | TCI.State.2 |
| DRX configuration | 1~6 |  | Off |
| reportConfigType | 1~6 |  | periodic |
| reportQuantity | 1~6 |  | ssb-Index-RSRP |
| Number of reported RS | 1~6 |  | 2 |
| SSB index associated to serving PCI | 1~6 |  | 0 |
| SSB index associated to a PCI different from serving cell | 1~6 |  | 1 |
| Timing offset between two SSBs associated to different PCI | 1~6 |  | <CP |
| L1-RSRP reporting period | 1~6 | slot | 320 |
| T1 | 1~6 | s | 5 |
| T2 | 1~6 | s | 2 |
| 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 |  |  |  |
| Propagation condition | 1~6 |  | 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. | | | |

Table A.7.6.3.6.2-2: SSB specific test parameters for FR2 SCell

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **SSB#0** | | **SSB#1** | |
|  |  |  | **T1** | **T2** | **T1** | **T2** |
| Angle of arrival configuration | 1~6 |  | Setup 3 according to A.3.15.3 | | | |
| AoA1 | | AoA2 | |
| Beam AssumptionNote 4 | 1~6 |  | Rough | | Rough | |
| Note2 | 1~6 | dBm/15kHz | -105 | | -105 | |
| Note2 | 1~3 | dBm/SSB SCS | -96 | | -96 | |
| 4~6 | -93 | | -93 | |
|  | 1~2 | dB | 0 | 0 | -Infinity | 9 |
| SSB\_RP Note3 | 1 | dBm/SSB SCS | -96 | -96 | -Infinity | -87 |
|  | 2 |  | -93 | -93 | -Infinity | -84 |
| Io Note3 | 1 | dBm/95.04MHz | -63.97 | -63.97 | -66.98 | -57.47 |
|  | 2 |  | -63.97 | -63.97 | -66.98 | -57.47 |
|  | 1~2 | dB | 0 | 0 | -Infinity | 9 |
| 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: SSB\_RP and Io 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 | | | | | | |

##### A.7.6.3.6.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 2160 for UE supporting power class 1

- 1680 for UE supporting power class 2, 3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

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

### A.7.6.4 CLI measurements

#### A.7.6.4.1 SRS-RSRP measurement with non-DRX

##### A.7.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of SRS-RSRP measurement. This test will verify the SRS-RSRP measurement requirements in clause 9.7.2.5 with the testing configurations for NR cells in Table A.7.6.4.1.1-1.

Table A.7.6.4.1.1-1: Applicable NR configurations for FR2 SRS-RSRP test

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SRS SCS, 100 MHz bandwidth, TDD duplex mode |

##### A.7.6.4.1.2 Test Parameters

One cell is deployed in the test, which is FR2 PCell (Cell 1). The test parameters for PCell is given in Table A.7.6.4.1.2-1 ~ A.7.6.4.1.2-3 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 I1 is used. The test consists of two successive time periods, with time duration of T1 and T2, respectively.

During the test, the test system transmits SRS resource for measurement in the DL slot according to the SRS configuration in Table A.7.6.4.1.2-4 and the test parameters for the (virtual) neighbour cell UE in Table A. 7.6.4.1.2-3. During the test, the test system does not transmit PDCCH/PDSCH/OCNG on SRS symbol to be transmitted and on 2 data symbols before SRS to be transmitted.

Table A.7.6.4.1.2-1: General test parameters for SRS-RSRP event triggered reporting for PCell in FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1 | Cell 1 |  |
| RF Channel Number |  | 1 | 1: Cell 1 |  |
| SSB configuration |  | 1 | SSB.1 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| SRS configuration |  | 1 | SRSConf.1 | Table A.7.6.4.1.2-4 |
| CP length |  | 1 | Normal |  |
| i1-Threshold | dBm | 1 | -103 |  |
| Hysteresis | dB | 1 | 0 |  |
| Time To Trigger | s | 1 | 0 |  |
| Filter coefficient |  | 1 | 0 | L3 filtering is not used |
| DRX | ms | 1 | OFF | Non-DRX |
| Time offset between DL from serving cell and SRS from test system | μs | 1 | 10.67 |  |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 1 |  |

Table A.7.6.4.1.2-2: NR Cell specific test parameters for SA SRS-RSRP event triggered reporting for PCell in FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | |
|  |  |  | T1 | T2 |
| TDD configuration |  | 1 | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | |
| OCNG Patterns |  | 1 | OP.1 | |
| TRS configuration |  |  | TRS.2.1. TDD | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | |
| Propagation Condition |  | 1 | AWGN | |

Table A.7.6.4.1.2-3: NR OTA Cell specific test parameters for SA SRS-RSRP event triggered reporting for PCell and neighbour cell UE in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Neighbour cell UE | |
|  |  |  | T1 | T2 | T1 | T2 |
| AoA setup |  | 1 | Setup 1 defined in A.3.15.1 | | | |
| Beam assumption Note 4 |  | 1 | Fine | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | -98 | |
| Note 2 | dBm/SCS | 1 | -89 | | -89 | |
|  | dB | 1 | - | - | -infinity | 4 |
|  | dB | 1 | 4 | 4 | -infinity | 4 |
| SRS-RSRP Note 3 | dBm/SCS kHz | 1 | - | - | -infinity | -94 |
| Io | dBm/95.04 MHz | 1 | -61.41 | -54.53 | -70.01 | -68.82 |
| 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: SRS-RSRP 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 : Cell 2 doesn’t transmit during the SRS and the 2 previous symbols. Es/NoC is not applied to those symbols. | | | | | | |

Table A.7.6.4.1.2-4: SRS configuration for measurement reporting

|  |  |  |  |
| --- | --- | --- | --- |
|  | Field | SRSConf.1 | Comments |
| SRS-ResourceSet | srs-ResourceSetId | 0 |  |
|  | srs-ResourceIdList | 0 |  |
|  | resourceType | Periodic |  |
|  | Usage | Codebook |  |
| SRS-Resource | SRS-ResourceId | 0 |  |
|  | nrofSRS-Ports | Port1 |  |
|  | transmissionComb | n2 |  |
|  | combOffset-n2 | 0 |  |
|  | cyclicShift-n2 | 0 |  |
|  | resourceMapping  startPosition | 0 |  |
|  | resourceMapping  nrofSymbols | n1 |  |
|  | resourceMapping  repetitionFactor | n1 |  |
|  | freqDomainPosition | 0 |  |
|  | freqDomainShift | 0 |  |
|  | freqHopping  c-SRS | 12 |  |
|  | freqHopping  b-SRS | 0 |  |
|  | freqHopping  b-hop | 0 |  |
|  | groupOrSequenceHopping | Neither |  |
|  | resourceType | Periodic |  |
|  | periodicityAndOffset | sl40, 25 |  |
|  | sequenceId | 0 | Any 10 bit number |

##### A.7.6.4.1.3 Test Requirements

The UE shall send one Event I1 triggered measurement report, with a measurement reporting delay less than 60 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%.

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

#### A.7.6.4.2 CLI-RSSI measurement with non-DRX

##### A.7.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of CLI-RSSI measurement. This test will verify the CLI-RSSI measurement requirements in clause 9.7.3.5 with the testing configurations for NR cells in Table A.7.6.4.2.1-1.

Table A.7.6.4.2.1-1: Applicable NR configurations for FR2 CLI-RSSI test

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SCS, 100 MHz bandwidth, TDD duplex mode |

##### A.7.6.4.2.2 Test Parameters

One cell is deployed in the test, which is FR2 PCell (Cell 1). The test parameters for PCell is given in Table A.7.6.4.2.2-1 ~ A.7.6.4.2.2-3 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 I1 is used. The test consists of two successive time periods, with time duration of T1 and T2, respectively.

During the test, the test system does not transmit PDCCH/PDSCH/OCNG on symbols for CLI-RSSI measurement resource and on 2 data symbols before. The CLI-RSSI measurement resource configuration is in Table A.7.6.4.2.2-4.

Table A.7.6.4.2.2-1: General test parameters for CLI-RSSI event triggered reporting for PCell in FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1 | NR Cell 1 |  |
| RF Channel Number |  | 1 | 1: Cell 1 |  |
| SSB configuration |  | 1 | SSB.1 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| CLI-RSSI configuration |  | 1 | CLI-RSSIConf.1 | Table A.7.6.4.2.2-4 |
| CP length |  | 1 | Normal |  |
| i1-Threshold | dBm | 1 | -94.5 |  |
| Hysteresis | dB | 1 | 0 |  |
| Time To Trigger | s | 1 | 0 |  |
| Filter coefficient |  | 1 | 0 | L3 filtering is not used |
| DRX |  | 1 | OFF | Non-DRX |
| Time offset between DL from serving cell and OCNG from test system | μs | 1 | 10.67 |  |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 1 |  |

Table A.7.6.4.2.2-2: NR Cell specific test parameters for CLI-RSSI event triggered reporting for PCell in FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | |
|  |  |  | T1 | T2 |
| TDD configuration |  | 1 | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | |
| PUSCH parameters |  | 1 | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | |
| OCNG Patterns Note 1 |  | 1 | OP.1 | |
| TRS configuration |  |  | TRS.2.1. TDD | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | |
| Propagation Condition |  | 1 | AWGN | |
| Note 1: OCNG is not transmitted in the CLI-RSSI measurement resources. | | | | |

Table A.7.6.4.2.2-3: NR OTA Cell specific test parameters for CLI-RSSI event triggered reporting for PCell in FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | |
|  |  |  | T1 | T2 |
| AoA setup |  | 1 | Setup 1 defined in A.3.15.1 | |
| Beam assumption Note 3 |  | 1 | Fine | Fine |
| on CLI-RSSI measurement resource Note 2 | dBm/15 kHz | 1 | -119 | -108 |
| on CLI-RSSI measurement resource Note 2 | dBm/SCS | 1 | -110 | -99 |
| Io on CLI-RSSI measurement resource | dBm/95.04 MHz | 1 | -81.01 | -70.01 |
| Io on CLI-RSSI measurement resource | dBm/1.08 MHz | 1 | -100.46 | -89.46 |
| 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: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | |

Table A.7.6.4.2.2-4: CLI-RSSI measurement resource configuration for measurement reporting

|  |  |  |
| --- | --- | --- |
|  | Field | CLI-RSSIConf.1 |
| RSSI-Resource | rssi-ResourceId | 0 |
|  | rssi-SCS | 120 |
|  | startPRB | 0 |
|  | nrofPRBs | 66 |
|  | startPosition | 3 |
|  | nrofSymbols | 11 |
|  | rssi-PeriodicityAndOffset | sl40, 25 |

##### A.7.6.4.2.3 Test Requirements

The UE shall send one Event I1 triggered measurement report, with a measurement reporting delay less than 5ms from the beginning of time period T2. The nominal RSSI used to evaluate the requirement shall be based on Io.

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

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

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

A.7.6.5 NR Measurements with autonomous gaps

#### A.7.6.5.1 SA interfrequency CGI reporting in autonomous gaps test (PCell in FR2)

##### A.7.6.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an CGI. This test will partly verify the SA inter-frequency NR cell search requirements in clause 8.2.1.2.16 and 9.11

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.5.1.1-1, A.7.6.5.1.1-2, and A.7.6.5.1.1-3.

Measurement gap patterns are configured. During T1 the UE shall report event A3 for cell 2. Within 3 seconds of the event report, the test equipment shall add a measurement reporting configuration using *ReportConfigNR* which containsa ReportCGI IE with cellForWhichToReportCGI set to the physical Cell ID of cell 2 and including the optional IE useAutonomousGaps-r16

In the measurement control information, it is indicated to the UE to decode the CGI of the neighbour cell using autonomous gaps. The test consists of two time phases, T1 and T2. Time period T2 begins 10ms after the test equipment has transmitted the RRC reconfiguration message containing the ReportCGI IE.

Supported test configurations are shown in table A.7.6.5.1.1-1.

Table A.7.6.5.1.1-1 SA interfrequency CGI reporting test in autonomous gaps

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.6.5.1.1-2: General test parameters for SA interfrequency CGI reporting in autonomous gaps

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1, 2 | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1 | NR cell 2 | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| SI-RNTI scheduling rate | ms |  | 40 ms | S-RNTI scheduled on four occasions per 160ms transmission period |
| A3-Offset | dB | Config 1 | -30 |  |
| 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 | <10 | UE expected to report event A3 for cell 2 within 5,2s (PC1)or 3.5s (other PC) of the start of T1. Test equipment shall configure CGI reporting within 3s after receiving the event A3 report. T2 begins 10ms after test equipment has transmitted the RRC reconfiguration to configure CGI reporting. |
| T2 | s | Config 1 | 1 |  |

Table A.7.6.5.1.1-3: Cell specific test parameters SA interfrequency CGI reporting in autonomous gaps

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 3 as specified in clause A.3.15 | | | |
|  | |  |  | AoA1 | | AoA2 | |
| Beam AssumptionNote 7 | |  | 1,2 | Rough | | | |
| NR RF Channel Number | |  | Config 1 | 1 | | 2 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | Not sent | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | N/A | |
| TCI configuration | |  | Config 1 | CSI-RS.Config.0 | | N/A | |
| 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 | 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 Note5 |  | -99.03 | | -99.03 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -90 | | -90 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -87 | | -93 | |
|  | | dB | Config 1 | 3 | | -3 | |
|  | | dB | Config 1 | 3 | | -3 | |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -56.25 | | -59.25 | |
| Propagation Condition | |  | Config 1 | 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.6.5.1.2 Test Requirements

The UE shall report the CGI of cell 2 within 25\*Tsmtc + 6\*Tsi-rnti+20ms +2ms= 762ms from the start of T2, allow 765ms. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 775 ms the number of interrupted slots shall not exceed the allowed number as defined in clause 8.2.2.2.14.

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

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

### A.7.6.6 L1-SINR measurement for beam reporting

A.7.6.6.1 L1-SINR measurement with CSI-RS based CMR and no dedicated IMR configured when DRX is not used

A.7.6.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-SINR measurement. This test will partly verify the L1-SINR measurement requirements in clause 9.8.4.1, with the testing configurations for NR cells in Table A.7.6.6.1.1-1.

**Table A.7.6.6.1.1-1: Applicable NR configurations for FR2 CSI-RS based L1-SINR test**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

A.7.6.6.1.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.6.1.2-1 and Table A.7.6.6.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-SINR measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-SINR on aperiodic CSI-RS resources. After 160ms from the beginning of the test, the DCI trigger comes in slot 8 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.6.1.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

**Table A.7.6.6.1.2-1: General test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Value** |
| SSB GSCN | 1 |  | freq1 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.3.1 |
| BWchannel | 1 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
| CSI-RS configuration | 1 |  | CSI-RS.3.3 TDD |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.3  ULBWP.1.3 |
| SMTC configuration | 1 |  | SMTC.1 |
| TRS Configuration | 1 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1 |  | TCI.State.2 |
| DRX configuration | 1 |  | Off |
| reportConfigType | 1 |  | aperiodic |
| reportQuantity | 1 |  | cri-SINR |
| reportQuantity-r16 | 1 |  | cri-SINR-r16 |
| Number of reported RS | 1 |  | 2 |
| qcl-Info | 1 |  | SSB#0 for resource#0 |
| SSB#1 for resource#1 |
| reportSlotOffsetList | 1 |  | 26 |
| Propagation condition | 1 |  | AWGN |
| T1 | 1 | s | 5 |
| EPRE ratio of PSS to SSS | 1 | 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 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |

Table A.7.6.6.1.2-2: CSI-RS specific test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | CSI-RS#0 | CSI-RS#1 |
| Angle of arrival configuration | 1 |  | Setup 1 according to A.3.15.1 | |
| Beam assumptionNote 3 | 1 |  | Rough | |
| Note1 | 1 | dBm/15kHz | -105 | |
| Note1 | 1 | dBm/SSB SCS | -95.97 | |
|  | 1 | dB | 0 | 9 |
| CSI-RS RSRP Note3 | 1 | dBm/SSB SCS | -95.97 | -86.97 |
| Io Note2 | 1 | dBm/95.04MHz | -63.97 | -57.47 |
|  | 1 | dB | 0 | 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: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

A.7.6.6.1.3 Test Requirements

After 160ms from the beginning of the test, the UE shall send L1-SINR report at slot 26 from the reception of DCI triggering the L1-SINR measurement. The L1-SINR report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.28.1.

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

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

#### A.7.6.6.2 L1-SINR measurement with SSB based CMR and dedicated IMR when DRX is used

##### A.7.6.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-SINR measurement. This test will partly verify the L1-SINR measurement requirements in clause 9.8.4.2, with the testing configurations for NR cells in Table A.7.6.6.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.7.6.6.2.1-1: Applicable NR configurations for FR2 L1-SINR measurement test with SSB based CMR and CSI-IM based IMR

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 240 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 | |

##### A.7.6.6.2.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.6.2.2-1 and Table A.7.6.6.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-SINR measurement on the SSBs and the associated CSI-IM resources, and report periodically. 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 and BFD measurements based on the SSBs, and UE is configured to perform L1-SINR measurement based on the SSBs as CMR and the CSI-IM resources as IMR.

Table A.7.6.6.2.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1~2 |  | freq1 |
| Duplex mode | 1~2 |  | TDD |
| TDD Configuration | 1~2 |  | TDDConf.3.1 |
| BWchannel | 1~2 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1~2 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1~2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1~2 |  | CCR.3.1 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
| 2 | SSB.2 FR2 |
| CSI-IM configuration | 1~2 |  | CSI-IM.3.1 TDD |
| OCNG Patterns | 1~2 |  | OP.1 |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.3  ULBWP.1.3 |
| SMTC configuration | 1~2 |  | SMTC.1 |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 |
| DRX configuration | 1~2 |  | DRX.3 |
| reportConfigType | 1~2 |  | periodic |
| reportQuantity-r16 | 1~2 |  | ssb-Index-SINR-r16 |
| Number of reported RS | 1~2 |  | 2 |
| L1-SINR reporting period | 1~2 | slot | 640 |
| T1 | 1~2 | s | 5 |
| T2 | 1~2 | s | 2 |
| Propagation condition | 1~2 |  | AWGN |
| EPRE ratio of PSS to SSS | 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 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. | | | |

Table A.7.6.6.2.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
| T1 | T2 | T1 | T2 |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | | | |
| Beam assumptionNote 4 | 1~2 |  | Rough | | | |
| Note2 | 1~2 | dBm/15kHz | -105 | | | |
| Note2 | 1 | dBm/SSB SCS | -96 | | | |
| 2 | -93 | | | |
|  | 1~2 | dB | 0 | 0 | -Infinity | 9 |
| SSB RSRP Note3 | 1 | dBm/SSB SCS | -96 | -96 | -Infinity | -87 |
| 2 | -93 | -93 | -Infinity | -84 |
| Io Note3 | 1 | dBm/95.04MHz | -64 | -64 | -67 | -57.5 |
| 2 | -64 | -64 | -67 | -57.5 |
|  | 1~2 | dB | 0 | 0 | -Infinity | 9 |
| 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: SSB RSRP and Io 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 | | | | | | |

##### A.7.6.6.2.3 Test Requirements

The UE shall send L1-SINR report every 640 slots. No later than X ms plus 640 slots from the beginning of time period T2, UE shall send L1-SINR report including the results for both SSB#0+CSI-IM#0 and SSB#1+CSI-IM#1 while meeting the accuracy requirements defined in clause 10.1.28.2, where X is

- 2880 for UE supporting power class 1

- 1920 for UE supporting power class 2,3 or 4.

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

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

#### A.7.6.6.3 L1-SINR measurement with CSI-RS based CMR and dedicated IMR configured when DRX is used

##### A.7.6.6.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-SINR measurement. This test will partly verify the L1-SINR measurement requirements with CSI-RS based CMR and dedicated IMR cofigured in clause 9.8.4.3, with the testing configurations for NR cells in Table A.7.6.6.3.1-1.

Table A.7.6.6.3.1-1: Applicable NR configurations for FR2 L1-SINR test with CMR and dedicated IMR

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

##### A.7.6.6.3.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.6.3.2-1 and Table A.7.6.6.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-SINR measurement on the configured CSI-RS as CMR and an associated CSI-RS as IMR, and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-SINR on aperiodic CSI-RS resources and the associated IMR. UE is also configured to measure L1-SINR based on SSB. After 1440ms from the beginning of the test, the DCI trigger comes in slot 8 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.6.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs, and UE is configured to perform L1-SINR measurement based on the CSI-RS as CMR and the CSI-RS as IMR.

Table A.7.6.6.3.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1 |  | freq1 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.3.1 |
| BWchannel | 1 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
| CSI-RS as CMR configuration | 1 |  | CSI-RS.3.3 TDD |
| CSI-RS as IMR configuration | 1 |  | CSI-RS.3.2A TDD |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.3  ULBWP.1.3 |
| SMTC configuration | 1 |  | SMTC.1 |
| TRS Configuration | 1 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1 |  | TCI.State.2 |
| DRX configuration | 1 |  | DRX.3 |
| reportConfigType | 1 |  | aperiodic |
| reportQuantity-r16 | 1 |  | cri-SINR-r16 |
| Number of reported RS | 1 |  | 2 |
| qcl-Info | 1 |  | SSB#0 for resource#0 |
| SSB#1 for resource#1 |
| reportSlotOffsetList | 1 |  | 26 |
| T1 | 1 | s | 5 |
| EPRE ratio of PSS to SSS | 1 | 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 |
| Propagation condition | 1 |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |

Table A.7.6.6.3.2-2: CSI-RS specific test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | CSI-RS#0 | CSI-RS#1 |
| Angle of arrival configuration | 1~2 |  | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 3 | 1~2 |  | Rough | |
| Note1 | 1~2 | dBm/15kHz | -105 | |
| Note1 | 1~2 | dBm/SSB SCS | -95.97 | |
|  | 1~2 | dB | 0 | 9 |
| CSI-RS RSRP Note2 | 1~2 | dBm/SSB SCS | -95.97 | -86.97 |
| Io Note2 | 1~2 | dBm/95.04MHz | -63.97 | -57.47 |
|  | 1~2 | dB | 0 | 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: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

##### A.7.6.6.3.3 Test Requirements

After 1440ms from the beginning of the test, the UE shall send L1-SINR report at slot 26 from the reception of DCI triggering the L1-SINR measurement. The L1-SINR report shall include the results for both CSI-RS#0 as CMR + CSI-RS#0 as IMR and CSI-RS#1 as CMR + CSI-RS#1 as IMR while meeting the accuracy requirement in clause 10.1.28.3. The reported L1-SINR value shall consider the Rx antenna gain in the range of [-10 ~ +20] dB when calculated.

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

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

### A.7.6.7 CSI-RS based intra-frequency Measurements

#### A.7.6.7.1 SA event triggered reporting test without gap under DRX for CSI-RS based intra-frequency measurement

##### A.7.6.7.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency measurement requirements in clause 9.10.2 and 9.10.3. Supported test configurations are shown in table A.7.6.7.1.1-1.

Table A.7.6.7.1.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB and CSI-RS SCS, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.7.1.1-2 ~ 6.

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

Table A.7.6.7.1.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| Test 1 |
| Active cell |  | 1 | PCell (Cell 1) |  |
| Neighbour cell |  | 1 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| CSI-RS resource configuration |  | 1 | CSI-RS.RRM.FR2.1 TDD |  |
| A3-Offset | dB | 1 | -6 |  |
| 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 related parameters are defined in Table A.3.3 |
| Time offset between Cell 1 and Cell 2 | μs | 1 | 0.58 |  |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 10 |  |

Table A.7.6.7.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Intial 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 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | CR.3.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1 | TCI.State.2 | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| SMTC |  | 1 | SMTC.1 | | | |
| SSB |  | 1 | SSB.3 FR2 | | SSB.3 FR2 | |
| CSI-RS |  | 1 | CSI-RS.RRM.FR2.1 TDD | | | |
| Propagation Condition |  | 1 | AWGN | | | |

Table A.7.6.7.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| AoA setup |  | 1 | Setup 1 defined in A.3.15.1 | | | |
| Beam assumptionNote 4 |  | 1 | Fine | | Fine | |
|  | dB | 1 | 4 | -1.46 | -Infinity | -1.46 |
| Note 2 | dBm/15 KHz | 1 | -98 | | | |
| Note 2 | dBm/SCS | 1 | -86 | | | |
| CSI-RSRP | dBm/SCS | 1 | -82 | -82 | -Infinity | -82 |
| SS-RSRP | dBm/SCS | 1 | -82 | -82 | -Infinity | -82 |
|  | dB | 1 | 4 | 4 | -Infinity | 4 |
|  | dBm/95.04MHz | 1 | -54.53 | -52.18 | -54.53 | -52.18 |
| 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: CSI-RSRP 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, and does not limit UE implementation or test system implementation. | | | | | | |

##### A.7.6.7.1.2 Test Requirements

In this test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

- 9.6s for a UE supporting power class 1,

- 5.76s for a UE supporting power class 2, 3 and 4

The UE is 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.

### A.7.6.8 CSI-RS based inter-frequency Measurements

#### A.7.6.8.1 SA event triggered reporting tests for FR2 CSI-RS based measurement when non-DRX is used (PCell in FR2)

##### A.7.6.8.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event for CSI-RS based L3 measurement. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.10.3.5.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.8.1.1-1, A.7.6.8.1.1-2, and A.7.6.8.1.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6.8.1.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

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 2.

Supported test configurations are shown in table A.7.6.8.1.1-1.

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

Table A.7.6.8.1.1-1: SA event triggered reporting tests for CSI-RS based L3 measurement for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.6.8.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 CSI-RS based L3 measurement

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1, 2 | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1 | NR cell 2 | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 |  |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| SMTC configuration |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| 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 | μs | Config 1 | 0.58 | Synchronous cells. |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 7 for PC1;  4.5 for other PC |  |

Table A.7.6.8.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 CSI-RS based L3 measurement

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| NR RF Channel Number | |  | Config 1 | 1 | | 2 | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | N/A | |
| TCI configuration | |  | Config 1 | CSI-RS.Config.0 | | N/A | |
| CSI-RS configuration for RRM | |  |  | - | | CSI-RS.RRM.FR2.1 TDD | |
| 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 Note5 |  | -104.7 | | -104.7 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -95.7 | | -95.7 | |
| CSI-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -Infinity | -86.7 |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -Infinity | -86.7 |
|  | | dB | Config 1 | 6 | 6 | -Infinity | 9 |
|  | | dB | Config 1 | 6 | 6 | -Infinity | 9 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -59.7 | -59.7 | -66.7 | -57.2 |
| Propagation Condition | |  | Config 1 | 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: CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | | | |

##### A.7.6.8.1.2 Test Requirements

In the test the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

### A.7.6.9 RSTD measurements

#### A.7.6.9.1 NR RSTD measurement reporting delay test case for single positioning frequency layer in FR2 SA

##### A.7.6.9.1.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 9.9.2 in an environment with AWGN propagation conditions in FR2 in standalone scenario when single positioning frequency layer is configured.

Supported test configurations are shown in table A.7.7.1.1-1. The test parameters are as given in Table 7.6.7.1.1-2, Table A.7.6.9.1.1-3 and , Table A.7.6.9.1.1-4.

Table A.7.6.9.1.1-1: Supported test configurations for NR RSTD

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel distributed in single positioning frequency layers.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2 and Cell 3. All three cells transmit PRS during T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The *NR-DL-TDOA-ProvideAssistanceData* and *nr-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID # 24 or #13 before T2.

Table A.7.6.9.1.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| SSB configuration | Config 1 |  | SSB.2 FR2 |  |
| SMTC configuration | Config 1 |  | SMTC.1 |  |
| PDSCH RMC configuration | Config 1 |  | SR.1.1 FDD |  |
| RMSI CORESET RMC configuration | Config 1 |  | CR.3.1 TDD | As specified in clause A.3.1.2.1 |
| Dedicated CORESET RMC configuration | Config 1 |  | CCR.1.1 FDD |  |
| PRS Configuration | Config 1 |  | PRS.1.1. FR2 | As specified in clause A.3. 31 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | |  | OFF |  |
| Measurement gap | |  | GP#24 or GP#13 | GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 16 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [24] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Beam assumption | |  | Rough | Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

Table A.7.6.9.1.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | N/A | N/A |
| 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) | |
| Note 3 | Config 1 | dBm/SCS | -89 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  95.04MHz | -57.00 | -57.00 | -57.00 |
| SSB\_RP Note4 | Config 1 | dBm/SCS | -89 | -Infinity | -Infinity |
| SSB | Config 1 | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB\_RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.7.6.9.1.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| T2 | T2 | T2 |
| RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| 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) | |
| EPRE ratio of PRS to SSS | |
| PRACH configuration | |  | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 |
| Note 3 | Config 1 | dBm/SCS | -89 | -89 | -89 |
| PRS | Config 1 | dB | -5.44 | -11.67 | -11.67 |
| Io Note4 | Config 1 | dBm/  95.04MHz | -58.48 | -58.48 | -58.48 |
| PRS | | dB | -6 | -13 | -13 |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. The Io is calculated based only on the symbols in which PRS is transmitted. | | | | | |

**Table A.7.6.9.1.-5: Void**

##### A.7.6.9.1.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 9.9.2.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 9.9.1.5 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1.23.3, i.e., between RSTD\_0000000 and RSTD\_1970049.

#### A.7.6.9.2 NR RSTD measurement reporting delay test case for dual positioning frequency layers in FR2 SA

##### A.7.6.9.2.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 9.9.2 in an environment with AWGN propagation conditions in FR2 in standalone scenario when dual positioning frequency layer is configured.

Supported test configurations are shown in table A.7.6.9.2.1-1. The test parameters are as given in Table 7.6.7.2.1-2, Table A.7.6.9.2.1-3 and , Table A.7.6.9.2.1-4.

Table A.7.6.9.2.1-1: Supported test configurations for NR RSTD

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the 2 RF channels distributed in dual positioning frequency layers.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2 and Cell 3. All three cells transmit PRS during T2.Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The *NR-DL-TDOA-ProvideAssistanceData* and *nr-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID # 24 or #13 before T2.

Table A.7.6.9.2.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| SSB configuration | Config 1 |  | SSB.2 FR2 |  |
| SMTC configuration | Config 1 |  | SMTC.1 |  |
| PDSCH RMC configuration | Config 1 |  | SR.1.1 FDD |  |
| RMSI CORESET RMC configuration | Config 1 |  | CR.3.1 TDD | As specified in clause A.3.1.2.1 |
| Dedicated CORESET RMC configuration | Config 1 |  | CCR.1.1 FDD |  |
| PRS Configuration | Config 1 |  | PRS.1.1. FR2 | As specified in clause A.3.31 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | |  | OFF |  |
| Measurement gap | |  | GP#24 or GP#13 | GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 16 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [24] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Beam assumption | |  | Rough | Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

Table A.7.6.9.2.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 2 |
| Positiong frequency layer | |  | 1 | 1 | 2 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | N/A | N/A |
| 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) | |
| Note 3 | Config 1 | dBm/SCS | -89 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/95.04MHz | -57.00 | -57.00 | -60.01 |
| SSB\_RP Note4 | Config 1 | dBm/SCS | -89 | -Infinity | -Infinity |
| SSB |  | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB\_RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.7.6.9.2.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | **Cell 2** | **Cell 3** |
| **T2** | **T2** | **T2** |
| RF Channel Number | |  | 1 | 1 | 2 |
| Positiong frequency layer | |  | 1 | 1 | 2 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| EPRE ratio of PBCH DMRS to SSS | | dB | 0 | 0 | 0 |
| 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) | |
| EPRE ratio of PRS to SSS | |
| PRACH configuration | |  | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 |
| Note 3 | Config 1 | dBm/SCS | -89 | -89 | -89 |
| PRS | Config 1 | dB | -5.44 | -11.67 | -11.67 |
| Io Note4 | Config 1 | dBm/  95.04MHz | -58.70 | -58.70 | -59.73 |
| PRS | | dB | -6 | -13 | -13 |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. The Io is calculated based only on the symbols in which PRS is transmitted. | | | | | |

**Table A.7.6.9.2.1-5: Void**

##### A.7.6.9.2.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 9.9.2.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 9.9.1.5 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1.23.3, i.e., between RSTD\_0000000 and RSTD\_1970049.

#### A.7.6.9.3 NR RSTD measurement reporting delay test case for single positioning frequency layer with reduced number of samples in FR2 SA

##### A.7.6.9.3.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 9.9.2 in an environment with AWGN propagation conditions in FR2 in standalone scenario when single positioning frequency layer is configured. In this test PRS is transmitted within the active BWP of the UE.

Supported test configurations are shown in table A.7.6.9.3.1-1. The test parameters are as given in Table 7.6.9.3.1-2, Table A.7.6.9.3.1-3 and , Table A.7.6.9.3.1-4.

Table A.7.6.9.3.1-1: Supported test configurations for NR RSTD

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel distributed in single positioning frequency layers.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2 and Cell 3. All three cells transmit PRS during T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The *NR-DL-TDOA-ProvideAssistanceData* and *nr-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request. UE can support *supportedDL-PRS-ProcessingSamples-RRC-CONNECTED*, and the LMF indicates the UE to perform positioning measurements with reduced number of samples via *reducedDL-PRS-ProcessingSamples*.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID # 24 or #13 before T2.

Table A.7.6.9.3.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| SSB configuration | Config 1 |  | SSB.2 FR2 |  |
| SMTC configuration | Config 1 |  | SMTC.1 |  |
| PDSCH RMC configuration | Config 1 |  | SR.1.1 FDD |  |
| RMSI CORESET RMC configuration | Config 1 |  | CR.3.1 TDD | As specified in clause A.3.1.2.1 |
| Dedicated CORESET RMC configuration | Config 1 |  | CR.1.1 FDD |  |
| PRS Configuration | Config 1 |  | PRS.1.2. FR2 | As specified in clause A.3. 31 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | |  | OFF |  |
| Measurement gap | |  | GP#24 or GP#13 | GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 16 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [24] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | [1.28] | The length of the time interval that follows immediately after time interval T1 |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Beam assumption | |  | Rough | Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

Table A.7.6.9.3.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.5 FDD | N/A | N/A |
| Note 3 | Config 1 | dBm/SCS | -89 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  95.04MHz | -58.86 | -60.01 | -60.01 |
| SSB RP Note4 | Config 1 | dBm/SCS | -89 | -Infinity | -Infinity |
|  |  | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.7.6.9.3.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| T2 | T2 | T2 |
| RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| PRACH configuration | |  | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 |
| Note 3 | Config 1 | dBm/SCS | -89 | -89 | -89 |
| PRS | Config 1 | dB | -2 | -5.44 | -5.44 |
| Io | Config 1 | dBm/  9.36MHz | -57.63 | -59.65 | -59.65 |
| PRS | | dB | -3 | -6 | -6 |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | |

##### A.7.6.9.3.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 9.9.2.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration X1 specified in section 9.9.1.5 starting from the beginning of time interval T2, where X1 is 2560ms.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1.23.3, i.e., between RSTD\_0000000 and RSTD\_1970049.

#### A.7.6.9.4 NR RSTD measurement reporting delay test case for single positioning frequency layer in FR2 SA without measurement gap

##### A.7.6.9.4.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the gapless RSTD measurement requirements specified in Clause 9.9.2.7 in an environment with AWGN propagation conditions in FR2 in standalone scenario when single positioning frequency layer is configured. Reporting delay test for gapless PRS measurement is conducted assuming that the PRS has higher priority, i.e., state 1, than all other DL signals/channels and is transmitted within active DL BWP of UE. Two sub-tests are defined, sub-test 1 is for Nsample = 4 and sub-test 2 is for Nsample = 1. For sub-test 2 LMF indicates UE to perform PRS measurement with Nsample = 1.

Supported test configurations are shown in table A.7.6.9.4.1-1. The test parameters are as given in Table A.7.6.9.4.1-2, Table A.7.6.9.4.1-3, and Table A.7.6.9.4.1-4.

Table A.7.6.9.4.1-1: Supported test configurations for NR RSTD

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel distributed in single positioning frequency layers.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2 and Cell 3. All three cells transmit PRS during T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The *NR-DL-TDOA-ProvideAssistanceData* and *nr-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first PRS processing window instance containing the PRS resources.

The UE is configured with PPW before T2.

Table A.7.6.9.4.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |  |
| SSB configuration | Config 1 |  | SSB.2 FR2 |  |
| SMTC configuration | Config 1 |  | SMTC.1 |  |
| PDSCH RMC configuration | Config 1 |  | SR.1.1 FDD |  |
| RMSI CORESET RMC configuration | Config 1 |  | CR.3.1 TDD | As specified in clause A.3.1.2.1 |
| Dedicated CORESET RMC configuration | Config 1 |  | CR.1.1 FDD |  |
| PRS Configuration | Config 1 |  | PRS.1.4. FR2 | As specified in clause A.3. 31 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | |  | OFF |  |
| PPW configuration | |  | Table A.3.X-1: Reference PPW configuration | As defined in A.3.X |
| Time offset between serving and neighbour cells | | μs | set to the UE reported capability for receive time difference threshold if the UE reported value is < 3µs  3µs otherwise | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | 0 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | Same as time offset | The corresponding parameter in the DL-TDOA assistance ta specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 16 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [24] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | ms | 10 | The length of the time interval that follows after time interval T1 and processing time of assistance data. In this test UE is configured to measure single PFL within the configured PPW. |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Beam assumption | |  | Rough | Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

Table A.7.6.9.4.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.5 FDD | N/A | N/A |
| Note 3 | Config 1 | dBm/SCS | -89 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  95.04MHz | -58.86 | -60.01 | -60.01 |
| SSB RP Note4 | Config 1 | dBm/SCS | -89 | -Infinity | -Infinity |
|  |  | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.7.6.9.4.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
| Sub-test 1 | Sub-test 2 | Sub-test 1 | Sub-test 2 | Sub-test 1 | Sub-test 2 |
| RF Channel Number | |  | 1 | | 1 | | 1 | |
| Positiong frequency layer | |  | 1 | | 1 | | 1 | |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | | OP.1 | | OP.1 | |
| PRACH configuration | |  | FR2 PRACH configuration 1 | | FR2 PRACH configuration 1 | | FR2 PRACH configuration 1 | |
| Note 3 | Config 1 | dBm/SCS | -89 | | -89 | | -89 | |
| PRS | Config 1 | dB | -6 | -3 | -13 | 5 | -13 | 5 |
| Io | Config 1 | dBm/  9.36MHz | -59.65 | | -59.92 | | -59.92 | |
| PRS | | dB | -6 | -3 | -13 | 5 | -13 | 5 |
| PRS-RSRP Note 4 | | dBm/SCS | -95 | -92 | -102 | -84 | -102 | -84 |
| Propagation Condition | |  | AWGN | | | | | |
| Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | | | | |

##### A.7.6.9.4.2 Test Requirements

The RSTD measurement time fulfils the gapless RSTD measurement reporting delay requirements specified in Clause 9.9.2.7.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 9.9.2.7 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1.23.3, i.e., between RSTD\_0000000 and RSTD\_1970049.

#### A.7.6.9.5 NR RSTD measurement reporting delay test case for single positioning frequency layer in FR2 SA in RRC\_CONNECTED state with Rx TEG

##### A.7.6.9.5.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the Rx TEG based measurement period requirements specified in Clause 9.9.2.5 in an environment with AWGN propagation conditions in FR2 in standalone scenario when single positioning frequency layer is configured.

Supported test configurations are shown in table A.7.6.9.5.1-1. The test parameters are as given in Table A7.6.9.5.1-2, Table A.7.6.9.5.1-3 and, Table A.7.6.9.5.1-4.

Table A.7.6.9.5.1-1: Supported test configurations for NR RSTD

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel distributed in single positioning frequency layers.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2 and Cell 3. All three cells transmit PRS during T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The *NR-DL-TDOA-ProvideAssistanceData* and *nr-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID # 24 or #13 before T2.

The test applies to the UE supporting Rx TEG indicated via *NR-UE-TEG-Capability* and is requested to provide the Rx TEG in the test via *nr-UE-RxTEG-Request-r17* in *NR-TDOA-RequestLocationInformation*. In the location request *measureSameDL-PRS-ResourceWithDifferentRxTEGs-r17* is set to n0. The UE shall perform and optionally report the Rx TEG based RSTD measurements.

The UE is capable of performing Rx TEG based RSTD measurements. UE may or may not be able to receive same DL PRS resource from the same TRP simultaneously from multiple Rx TEGs*.*

Table A.7.6.9.5.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |  |
| SSB configuration | Config 1 |  | SSB.2 FR2 |  |
| SMTC configuration | Config 1 |  | SMTC.1 |  |
| PDSCH RMC configuration | Config 1 |  | SR.1.1 FDD |  |
| RMSI CORESET RMC configuration | Config 1 |  | CR.3.1 TDD | As specified in clause A.3.1.2.1 |
| Dedicated CORESET RMC configuration | Config 1 |  | CR.1.1 FDD |  |
| PRS Configuration | Config 1 |  | PRS.1.4. FR2 | As specified in clause A.3. 31 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | |  | OFF |  |
| Measurement gap | |  | GP#24 or GP#13 | GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 16 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [24] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | [1.28\*]Note 1 | The length of the time interval that follows immediately after time interval T1 |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Beam assumption | |  | Rough | Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |
| Note 1: = if UE is capable of receiving the same DL PRS resource from the same TRP simultaneously from multiple Rx TEGs, where is the maximum number of Rx TEGs with which UE can support to measure the same PRS resource, and is the number of Rx TEGs UE can measure simultaneously which is reported via *measureSameDL-PRS-ResourceWithDifferentRxTEGsSimul*. | | | | |

Table A.7.6.9.5.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.5 FDD | N/A | N/A |
| Note 3 | Config 1 | dBm/SCS | -89 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  95.04MHz | -58.86 | -60.01 | -60.01 |
| SSB RP Note4 | Config 1 | dBm/SCS | -89 | -Infinity | -Infinity |
|  |  | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.7.6.9.5.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| T2 | T2 | T2 |
| RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| PRACH configuration | |  | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 |
| Note 3 | Config 1 | dBm/SCS | -89 | -89 | -89 |
| PRS | Config 1 | dB | -5.44 | -11.67 | -11.67 |
| Io | Config 1 | dBm/  9.36MHz | -59.65 | -59.92 | -59.92 |
| PRS | | dB | -6 | -13 | -13 |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | |

##### A.7.6.9.5.2 Test Requirements

The RSTD measurement time fulfils the Rx TEG based RSTD measurement period requirements specified in Clause 9.9.2.5. The UE shall perform and report the Rx TEG based RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 9.9.2.5 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1.23.3, i.e., between RSTD\_0000000 and RSTD1970049.

### A.7.6.10 PRS-RSRP measurements

#### A.7.6.10.1 PRS-RSRP reporting delay test case for single positioning frequency layer

##### A.7.6.10.1.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRP measurement requirements specified in Clause 9.9.3.5 for single positioning frequency layer under AWGN propagation conditions in standalone scenario. Supported test configurations are shown in table A.7.6.10.1.1-1

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell.

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. Both cells transmit PRS during T2.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The test parameters are as given in table A.7.6.10.1.1-2, and table A.7.6.10.1.1-3.

Table A.7.6.10.1.1-1: supported test configurations for PRS RSRP measurement for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.6.10.1.1-2: General test parameters for PRS RSRP measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| Gap Pattern Id |  | Config 1 | GP#13 or GP#24Note1 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 |  |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| 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. |
| Expected RSTD | μs | Config 1 | 3 |  |
| Expected RSTD uncertainty | μs | Config 1 | 5 |  |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 7 |  |
| Note 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | |

Table A.7.6.10.1.1-3: Cell-specific test parameters for PRS RSRP measurement reporting delay

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.3.1 TDD | | - | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | - | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| PRS configuration | |  | Config 1 | PRS.1.1 FR2 | | PRS.1.1 FR2 | |
| PRS muting configuration | |  | Config 1 | ‘10’ | | ‘01’ | |
| 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 | 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 Note5 |  | -102 | | -102 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -93 | | -93 | |
| SSB\_RP Note 3 | | dBm/SCS Note5 | Config 1 | -96 | -96 | -Infinity | -103 |
| PRP Note 3 | | dBm/SCS Note5 | Config 1 | -Infinity | -96 | -Infinity | -103 |
| PRS | | dB | Config 1 | -Infinity | -3.41 | -Infinity | -11.76 |
| PRS | | dB | Config 1 | -Infinity | -3 | -Infinity | -10 |
| SSB | | dB | Config 1 | -3 | -3 | -Infinity | -10 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -62.25 | -61.97 | -62.25 | -61.97 |
| Propagation Condition | |  | Config 1 | 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/PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.6.10.1.2 Test Requirements

The PRS RSRP measurement time fulfils the requirements specified in Clause 9.9.3.5.The UE shall perform and report the PRS RSRP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 9.9.3.5 starting from the beginning of time interval T2.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRP measurement for each correct event shall be within the PRS RSRP reporting range specified in Clause 10.1.24.3, i.e., between PRS RSRP\_0 and PRS RSRP\_126.

#### A.7.6.10.2 PRS-RSRP reporting delay test case for dual positioning frequency layer

##### A.7.6.10.2.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRP measurement requirements specified in Clause 9.9.3.5 for dual positioning frequency layers under AWGN propagation conditions in standalone scenario. Supported test configurations are shown in table A.7.6.10.2.1-1

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the different frequency from the PCell.

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. Both cells transmit PRS during T2.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The test parameters are as given in table A.7.6.10.2.1-2, and table A.7.6.10.2.1-3.

Table A.7.6.10.2.1-1: supported test configurations for PRS RSRP measurement for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.6.10.2.1-2: General test parameters for PRS RSRP measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| Gap Pattern Id |  | Config 1 | GP#13 or GP#24Note1 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 |  |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| 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. |
| Expected RSTD | μs | Config 1 | 3 |  |
| Expected RSTD uncertainty | μs | Config 1 | 5 |  |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 7 |  |
| Note 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | |

Table A.7.6.10.2.1-3: Cell-specific test parameters for PRS RSRP measurement reporting delay

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| NR RF Channel Number | |  | Config 1 | 1 | | 2 | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.3.1 TDD | | - | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | - | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| PRS configuration | |  | Config 1 | PRS.1.1 FR2 | | PRS.1.2 FR2 | |
| PRS muting configuration | |  | Config 1 | ‘10’ | | ‘01’ | |
| 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 | 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 Note5 |  | -104.7 | | -104.7 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -95.7 | | -95.7 | |
| SSB\_RP Note 3 | | dBm/SCS Note5 | Config 1 | -92.7 | -92.7 | -Infinity | -85.7 |
| PRP Note 3 | | dBm/SCS Note5 | Config 1 | -Infinity | -92.7 | -Infinity | -85.7 |
| PRS | | dB | Config 1 | -Infinity | -3 | -Infinity | -10 |
| PRS | | dB | Config 1 | -Infinity | -3 | -Infinity | -10 |
| SSB | | dB | Config 1 | -3 | -3 | -Infinity | -10 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -64.95 | -64.95 | -66.71 | -66.30 |
| Propagation Condition | |  | Config 1 | 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/PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.6.10.2.2 Test Requirements

The PRS RSRP measurement time fulfils the requirements specified in Clause 9.9.3.5.The UE shall perform and report the PRS RSRP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 9.9.3.5 starting from the beginning of time interval T2.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRP measurement for each correct event shall be within the PRS RSRP reporting range specified in Clause 10.1.24.3, i.e., between PRS RSRP\_0 and PRS RSRP\_126.

#### A.7.6.10.3 PRS-RSRP reporting delay test case for reduced number of samples

##### A.7.6.10.3.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRP measurement requirements for reduced number of samples specified in Clause 9.9.3.5 for single positioning frequency layer under AWGN propagation conditions in standalone scenario. Supported test configurations are shown in table A.7.6.10.X1.1-1. In this test PRS is transmitted within the active BWP of the UE.

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell.

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. Both cells transmit PRS during T2.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n. UE can support *supportedDL-PRS-ProcessingSamples-RRC-CONNECTED*, and the LMF indicates the UE to perform positioning measurements with reduced number of samples via *reducedDL-PRS-ProcessingSamples*.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The test parameters are as given in table A.7.6.10.3.1-2, and table A.7.6.10.3.1-3.

Table A.7.6.10.3.1-1: supported test configurations for PRS RSRP measurement for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.6.10.3.1-2: General test parameters for PRS RSRP measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| Gap Pattern Id |  | Config 1 | GP#13 or GP#24Note1 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 |  |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| 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. |
| Expected RSTD | μs | Config 1 | 3 |  |
| Expected RSTD uncertainty | μs | Config 1 | 5 |  |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 7 |  |
| Note 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | |

Table A.7.6.10.3.1-3: Cell-specific test parameters for PRS RSRP measurement reporting delay

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.3.1 TDD | | - | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | - | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| PRS configuration | |  | Config 1 | PRS.1.1 FR2 | | PRS.1.1 FR2 | |
| PRS BW | |  | Config 1 | 48 PRBs | | 48 PRBs | |
| PRS muting configuration | |  | Config 1 | ‘10’ | | ‘01’ | |
| 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 | Config 1 | 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) | |  |  |  | |  | |
| EPRE ratio of PRS to SSS | |  |  |  | |  | |
| Note2 | | dBm/15kHz Note5 |  | -102 | | -102 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -93 | | -93 | |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -Infinity | -93 | -Infinity | -96 |
| PRS | | dB | Config 1 | -Infinity | -1.76 | -Infinity | -6.01 |
| PRS | | dB | Config 1 | -Infinity | 0 | -Infinity | -3 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -60.03 | | -60.03 | |
| Propagation Condition | |  | Config 1 | 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: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.6.10.3.2 Test Requirements

The PRS RSRP measurement time fulfils the requirements specified in Clause 9.9.3.5. The UE shall perform and report the PRS RSRP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 9.9.3.5 starting from the beginning of time interval T2.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRP measurement for each correct event shall be within the PRS RSRP reporting range specified in Clause 10.1.24.3, i.e., between PRS RSRP\_0 and PRS RSRP\_126.

#### A.7.6.10.4 PRS-RSRP reporting delay test case for single positioning frequency layer outside MG

##### A.7.6.10.4.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRP measurement outside MG requirements specified in Clause 9.9.3.6 for single positioning frequency layer under AWGN propagation conditions in standalone scenario. There are two sub-tests in the test, sub-test 1 is to verify the delay requirements with Nsample=1, and sub-test 2 is to verify the delay requirements with Nsample=4.

Supported test configurations are shown in table A.7.6.10.4.1-1

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell.

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. Both cells transmit PRS during T2.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n. In sub-test 1, *requestedDL-PRS-ProcessingSamples* shall be included in the location information request and set to ‘m1’, and *lowerRxBeamSweepingThan8-FR2* shall be included.

During T1, a PPW shall be configured for the PCell and be activated via DL MAC CE. The last PDSCH containing the MAC CE shall be transmitted before slot #n.

The beginning of the time interval T2 shall be aligned with the beginning of the first PPW instance containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The general test parameters are as given in table A.7.6.10.4.1-2, and cell specific test parameters during T2 are listed in table A.7.6.10.4.1-3.

Table A.7.6.10.4.1-1: supported test configurations for PRS RSRP measurement for FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.6.10.4.1-2: General test parameters for PRS RSRP measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| PPW configuration |  | Config 1 | TBD |  |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| CP length |  | Config 1 | Normal |  |
| DRX |  | Config 1 | OFF | DRX is not used |
| Time offset between serving and neighbour cells | μs | Config 1 | 0.58, 2.0 or 3 Note 1 |  |
| Expected RSTD | μs | Config 1 | 0 |  |
| Expected RSTD uncertainty | μs | Config 1 | Same as time offset between serving and neighbour cells |  |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 7 |  |
| NOTE 1: If UE indicates support of CP length for the receive time difference threshold, the time offset is set to 0.58us; If UE indicates support of 1/4 symbol length for the receive time difference threshold, the time offset is set to 2.0us, otherwise 3us. | | | | |

Table A.7.6.10.4.1-3: Cell-specific test parameters during T2 for PRS RSRP measurement reporting delay

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  | |  | Sub-test 1 | Sub-test 2 | | Sub-test 1 | Sub-test 2 | |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | | Rough | | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| Duplex mode | |  | Config 1 | TDD | | | TDD | | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | | N/A | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | | N/A | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | | N/A | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | | N/A | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | | OP.1 | | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | | - | | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | | - | | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.3.1 TDD | | | - | | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | | - | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | | 120 | | |
| PRS configuration | |  | Config 1 | PRS.1.1 FR2 | | | PRS.1.1 FR2 | | |
| PRS muting configuration | |  | Config 1 | ‘10’ | | | ‘01’ | | |
| 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 | 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 Note5 |  | -102 | | | -102 | | |
| Note2 | | dBm/SCS Note4 | Config 1 | -93 | | | -93 | | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -96 | -96 | | -99 | -103 | |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -96 | -96 | | -99 | -103 | |
| PRS | | dB | Config 1 | -3 | -3 | | -6 | -10 | |
| PRS | | dB | Config 1 | -3 | -3 | | -6 | -10 | |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -62.25 | | -62.25 | -63.04 | | -63.60 |
| Propagation Condition | |  | Config 1 | 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/PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | |

##### A.7.6.10.4.2 Test Requirements

The PRS RSRP measurement time fulfils the requirements specified in Clause 9.9.3.6, with Nsample=1 for sub-test 1 and Nsample=4 for sub-test 2. The UE shall perform and report the PRS RSRP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 9.9.3.6 starting from the beginning of time interval T2.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRP measurement for each correct event shall be within the PRS RSRP reporting range specified in Clause 10.1.24.3, i.e., between PRS RSRP\_0 and PRS RSRP\_126.

### A.7.6.11 UE Rx-Tx time difference measurements

#### A.7.6.11.1 UE Rx-Tx time difference measurements for single positioning frequency layer in FR2 SA

##### A.7.6.11.1.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement meets the requirements specified in clause 9.9.4.5 in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations in listed in Table A.7.6.11.1.1-1.

Table A.7.6.11.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). Both cells are on the same RF channel in FR2.

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID #13 or ID #24 before T2.

The UE is configured to transmit positioning SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.7.6.11.1.1-2 and Table A.7.6.11.1.1-3 respectively.

T Table A.7.6.11.1.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1 | Cell 1 | Cell 1 is the PCell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| Neighbour cell |  | 1 | Cell 2 | Cell 2 is a neighbour cell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| RF Channel Number |  | 1 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1 | 100: NRB,c = 66 |  |
| SSB configuration |  | 1 | SSB.2 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| Measurement gap |  | 1 | GP#24 or GP#13 Note 1 |  |
| CP length |  | 1 | Normal |  |
| DRX |  | 1 | OFF |  |
| Time offset between serving and neighbour cells | μs | 1 | 3 | Synchronous cells |
| Expected RSTD | μs | 1 | 3 |  |
| Expected RSTD uncertainty | μs | 1 | 5 |  |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 20 |  |
| NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | |

T Table A.7.6.11.1.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  | T1 | T2 | T1 | T2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 |  | 1 | Rough | | Rough | |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 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 DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | | N/A | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | | N/A | |
| PRS configuration |  | 1 | PRS.1.1 FR2 | | PRS.1.1 FR2 | |
| PRS muting info |  | 1 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1 | POS-SRS.3 | | N/A | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
| PRS | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -10 |
| PRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -91 | -Infinity | -99 |
| Io | dBm/95.04 MHz | 1 | N/A | -57.63 | N/A | -57.63 |
| 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: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | |

Table Table A.7.6.11.1.1-4: Void

##### A.7.6.11.1.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9.4.5.

The UE shall perform and report the UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified UE Rx-Tx time difference measurement time starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.3.1.

#### A.7.6.11.2 UE Rx-Tx time difference measurement period for dual positioning frequency layers in FR2 SA

##### A.7.6.11.2.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement meets the requirements specified in clause 9.9.4.5 in AWGN propagation condition in FR2 in standalone scenario when dual positioning frequency layers are cnfigured.

The supported test configurations in listed in Table A.7.6.11.2.1-1.

Table A.7.6.11.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on different RF channels in FR2.

transmission during T1 and transmit PRS during T2.

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID #13 or ID #24 before T2.

The UE is configured to transmit positioning SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.7.6.11.2.1-2 and Table A.7.6.11.2.1-3 respectively.

Table A.7.6.11.2.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1 | Cell 1 | Cell 1 is the PCell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| Neighbour cell |  | 1 | Cell 2 | Cell 2 is a neighbour cell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| RF Channel Number |  | 1 | 1 | For Cell 1 |
| RF Channel Number |  | 1 | 2 | For Cell 2 |
| BWchannel | MHz | 1 | 100: NRB,c = 66 |  |
| SSB configuration |  | 1 | SSB.2 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| Measurement gap |  | 1 | GP#24 or GP#13 Note 1 |  |
| CP length |  | 1 | Normal |  |
| DRX |  | 1 | OFF |  |
| Time offset between serving and neighbour cells | μs | 1 | 3 | Synchronous cells |
| Expected RSTD | μs | 1 | 3 |  |
| Expected RSTD uncertainty | μs | 1 | 5 |  |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 20 |  |
| Note 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | |

Table A.7.6.11.2.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  | T1 | T2 | T1 | T2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 |  | 1 | Rough | | Rough | |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 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 DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | | N/A | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | | N/A | |
| PRS configuration |  | 1 | PRS.1.1 FR2 | | PRS.1.1 FR2 | |
| PRS muting info |  | 1 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1 | POS-SRS.3 | | N/A | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
| PRS | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -10 |
| PRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -91 | -Infinity | -99 |
| Io | dBm/95.04 MHz | 1 | N/A | -57.89 | N/A | -59.60 |
| 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: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | |

Table Table A.7.6.11.1.1-4: Void

##### A.7.6.11.2.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9.4.5.

The UE shall perform and report the UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified UE Rx-Tx time difference measurement time starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.3.1.

#### A.7.6.11.3 UE Rx-Tx time difference measurements for single positioning frequency layer in FR2 SA with reduced sample number

##### A.7.6.11.3.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement meets the requirements specified in clause 9.9.4.5 with Nsample = 1 in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured. In this test PRS is transmitted within the active BWP of the UE. UE can support *supportedDL-PRS-ProcessingSamples-RRC-CONNECTED*, and the LMF indicates the UE to perform positioning measurements with reduced number of samples via *reducedDL-PRS-ProcessingSamples*.

The supported test configurations in listed in Table A.7.6.11.3.1-1.

Table A.7.6.11.3.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on the same RF channel in FR2.

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. *requestedDL-PRS-ProcessingSamples* and shall be included in the location information request and set to ‘m1’, and *lowerRxBeamSweepingThan8-FR2* shall be included. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID #13 or ID #24 before T2.

The UE is configured to transmit SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.7.6.11.3.1-2 and Table A.7.6.11.3.1-3 respectively.

Table A.7.6.11.3.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1 | Cell 1 | Cell 1 is the PCell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| Neighbour cell |  | 1 | Cell 2 | Cell 2 is a neighbour cell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| RF Channel Number |  | 1 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1 | 100: NRB,c = 66 |  |
| SSB configuration |  | 1 | SSB.2 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| Measurement gap |  | 1 | GP#24 or GP#13 Note 1 |  |
| CP length |  | 1 | Normal |  |
| DRX |  | 1 | OFF |  |
| Time offset between serving and neighbour cells | μs | 1 | 3 | Synchronous cells |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 20 |  |
| NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | |

Table A.7.6.11.3.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  | T1 | T2 | T1 | T2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 |  | 1 | Rough | | Rough | |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | | N/A | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | | N/A | |
| PRS configuration |  | 1 | PRS.1.1 FR2 | | PRS.1.1 FR2 | |
| PRS muting info |  | 1 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1 | POS-SRS.3 | | N/A | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -6 |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -6 |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -91 | -Infinity | -95 |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -91 | -91 | -95 | -95 |
| Io | dBm/95.04 MHz | 1 | N/A | -57.88 | N/A | -59.04 |
| 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, PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | |

##### A.7.6.11.3.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9.4.5 with Nsample=1.

The UE shall perform and report the UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified UE Rx-Tx time difference measurement time starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.3.1.

#### A.7.6.11.4 UE Rx-Tx time difference measurements without gaps in FR2 SA

##### A.7.6.11.4.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement meets the requirements specified in clause 9.9.4.6 in AWGN propagation condition in FR2 in standalone scenario. There are two sub-tests in the test, sub-test 1 is to verify the delay requirements with Nsample=1, and sub-test 2 is to verify the delay requirements with Nsample=4.

The supported test configurations in listed in Table A.7.6.11.4.1-1.

Table A.7.6.11.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on the same RF channel in FR2.

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of PRS processing window containing the PRS resources.

The UE is configured with PRS processing window before T2.

The UE is configured to transmit SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.7.6.11.4.1-2 and Table A.7.6.11.4.1-3 respectively.

Table A.7.6.11.4.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1 | Cell 1 | Cell 1 is the PCell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| Neighbour cell |  | 1 | Cell 2 | Cell 2 is a neighbour cell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| RF Channel Number |  | 1 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1 | 100: NRB,c = 66 |  |
| SSB configuration |  | 1 | SSB.2 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| PRS processing window |  | TBD | TBD |  |
| CP length |  | 1 | Normal |  |
| DRX |  | 1 | OFF |  |
| Time offset between serving and neighbour cells | μs | 1 | 0.58, 2.25 or 3 Note 1 |  |
| Expected RSTD | μs | 1 | 0 |  |
| Expected RSTD uncertainty | μs | 1 | Same as time offset between serving and neighbour cells |  |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 20 |  |
| NOTE 1: The value is up to the UE capability. The possible UE capability value: (1/4 symbol, 1/2 symbol, CP length, half of slot). When the UE reported value is > 3us, the time offset between serving and neighbour cells is set to 3us; when the UE reported value is < 3us, the time offset between serving and neighbour cells is set to the UE reported value. | | | | |

Table A.7.6.11.4.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  | Sub-test 1 | Sub-test 2 | Sub-tets 1 | Sub-test 2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 |  | 1 | Rough | | Rough | |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | | N/A | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | | N/A | |
| PRS configuration |  | 1 | PRS.1.1 FR2 | | PRS.1.1 FR2 | |
| PRS BW |  | 1 | 48 PRBs | 24 PRBs | 48 PRBs | 24 PRBs |
| PRS muting info |  | 1 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1 | POS-SRS.3 | | N/A | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
| PRS | dB | 1 | -3 | -2.41 | -6 | -12.12 |
| PRS | dB | 1 | -1.44 | -2 | -3.65 | -10 |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -90.44 | -91 | -92.65 | -99 |
| Io | dBm/95.04 MHz | 1 | -56.65 | -57.63 | -56.65 | -57.63 |
| 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: PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | |

##### A.7.6.11.4.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9.4.6.

The UE shall perform and report the UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified UE Rx-Tx time difference measurement time starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.3.1.

#### A.7.6.11.5 UE Rx-Tx time difference measurements for single positioning frequency layer in FR2 SA with multiple RxTx TEGs

##### A.7.6.11.5.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement meets the requirements specified in clause 9.9.4.5 in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured, and when UE is requested to measure a PRS resource with multiple RxTx TEGs.

The supported test configurations in listed in Table A.7.6.11.5.1-1.

Table A.7.6.11.5.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on the same RF channel in FR2.

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The test applies to the UE supporting RxTx TEG indicated via *NR-UE-TEG-Capability* and is requested to provide the RxTx TEG in the test via *nr-UE-RxTxTEG-Request-r17* in *nr-Multi-RTT-RequestLocationInformation*. The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request. In *nr-Multi-RTT-RequestLocationInformation*, *measureSameDL-PRS-ResourceWithDifferentRxTEGs-r17* shall be set to ‘n2’.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID #13 or ID #24 before T2.

The UE is configured to transmit SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.7.6.11.5.1-2 and Table A.7.6.11.5.1-3 respectively.

Table A.7.6.11.5.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1 | Cell 1 | Cell 1 is the PCell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| Neighbour cell |  | 1 | Cell 2 | Cell 2 is a neighbour cell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| RF Channel Number |  | 1 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1 | 100: NRB,c = 66 |  |
| SSB configuration |  | 1 | SSB.2 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| Measurement gap |  | 1 | GP#24 or GP#13 Note 1 |  |
| CP length |  | 1 | Normal |  |
| DRX |  | 1 | OFF |  |
| Time offset between serving and neighbour cells | μs | 1 | 3 | Synchronous cells |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 20 |  |
| NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | |

Table A.7.6.11.5.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  | T1 | T2 | T1 | T2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 |  | 1 | Rough | | Rough | |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | | N/A | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | | N/A | |
| PRS configuration |  | 1 | PRS.1.1 FR2 | | PRS.1.1 FR2 | |
| PRS muting info |  | 1 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1 | POS-SRS.3 | | N/A | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
| PRS | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -10 |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -91 | -Infinity | -99 |
| Io | dBm/95.04 MHz | 1 | N/A | -57.63 | N/A | -57.63 |
| 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: PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | |

##### A.7.6.11.5.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9.4.5, with =2 if UE does not support or indicate value ‘n1’ for *measureSameDL-PRS-ResourceWithDifferentRxTEGsSimul*, and =1 otherwise.

The UE shall perform and report the UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified UE Rx-Tx time difference measurement time starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.3.1.

### A.7.6.12 PRS-RSRPP measurements

#### A.7.6.12.1 PRS-RSRPP reporting delay test case for single positioning frequency layer in FR2 in RRC\_CONNECTED state

##### A.7.6.12.1.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRPP measurement requirements specified in Clause 9.9.6.5 for single positioning frequency layer under AWGN propagation conditions in standalone scenario. Supported test configurations are shown in table A.7.6.12.1.1-1

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the Pcell.

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. Both cells transmit PRS during T2.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The test parameters are as given in table A.7.6.12.1.1-2, and table A.7.6.12.1.1-3.

**Table A.7.6.12.1.1-1: supported test configurations for PRS RSRPP measurement for FR2**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

**Table A.7.6.12.1.1-2: General test parameters for PRS RSRPP measurement reporting delay**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| Gap Pattern Id |  | Config 1 | GP#13 or GP#24Note1 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 |  |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| 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. |
| Expected RSTD | μs | Config 1 | 3 |  |
| Expected RSTD uncertainty | μs | Config 1 | 5 |  |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 7 |  |
| Note 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | |

**Table A.7.6.12.1.1-3: Cell-specific test parameters for PRS RSRPP measurement reporting delay**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
|  | |  | **T1** | **T2** | **T1** | **T2** |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.3.1 TDD | | - | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | - | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| PRS configuration | |  | Config 1 | PRS.1.4 FR2 | | PRS.1.4 FR2 | |
| PRS muting configuration | |  | Config 1 | ‘10’ | | ‘01’ | |
| 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 | 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 Note5 |  | -102 | | -102 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -93 | | -93 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -Infinity | -86.7 |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -Infinity | -96 | -Infinity | -103 |
| PRS | | dB | Config 1 | -Infinity | -3 | -Infinity | -10 |
| PRS | | dB | Config 1 | -Infinity | -3 | -Infinity | -10 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -58.56 | | -55.38 | |
| Propagation Condition | |  | Config 1 | 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/PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.6.12.1.2 Test Requirements

The PRS RSRPP measurement time fulfils the requirements specified in Clause 9.9.6.5.The UE shall perform and report the PRS RSRPP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 9.9.6.5 starting from the beginning of time interval T2.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRPP measurement for each correct event shall be within the PRS RSRPP reporting range specified in Clause 10.1.X, i.e., between PRS RSRPP\_0 and PRS RSRPP\_126.

#### A.7.6.12.2 PRS-RSRPP reporting delay test case for single positioning frequency layer in FR2 in RRC\_CONNECTED state

##### A.7.6.12.2.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRPP measurement requirements specified in Clause 9.9.6.5 for single positioning frequency layer under AWGN propagation conditions in standalone scenario. Supported test configurations are shown in table A.7.6.12.2.1-1

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell.

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. Both cells transmit PRS during T2.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The test parameters are as given in table A.7.6.12.2.1-2, and table A.7.6.12.2.1-3.

**Table A.7.6.12.2.1-1: supported test configurations for PRS RSRPP measurement for FR2**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

**Table A.7.6.12.2.1-2: General test parameters for PRS RSRPP measurement reporting delay**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| Gap Pattern Id |  | Config 1 | GP#13 or GP#24Note1 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 |  |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| 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. |
| Expected RSTD | μs | Config 1 | 3 |  |
| Expected RSTD uncertainty | μs | Config 1 | 5 |  |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 7 |  |
| Note 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | |

**Table A.7.6.12.2.1-3: Cell-specific test parameters for PRS RSRPP measurement reporting delay**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
|  | |  | **T1** | **T2** | **T1** | **T2** |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.3.1 TDD | | - | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | - | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| PRS configuration | |  | Config 1 | PRS.1.4 FR2 | | PRS.1.4 FR2 | |
| PRS muting configuration | |  | Config 1 | ‘10’ | | ‘01’ | |
| 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 | 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 Note5 |  | -102 | | -102 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -93 | | -93 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -Infinity | -86.7 |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -Infinity | -96 | -Infinity | -89 |
| PRS | | dB | Config 1 | -Infinity | -3 | -Infinity | 4 |
| PRS | | dB | Config 1 | -Infinity | -3 | -Infinity | 4 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -63.5 | | -61.9 | |
| Propagation Condition | |  | Config 1 | 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/PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.6.12.2.2 Test Requirements

The PRS RSRPP measurement time fulfils the requirements specified in Clause 9.9.6.5. The UE shall perform and report the PRS RSRPP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 9.9.6.5 starting from the beginning of time interval T2.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRPP measurement for each correct event shall be within the PRS RSRPP reporting range specified in Clause 10.1.X.Y, i.e., between PRS RSRPP\_0 and PRS RSRPP\_126.

#### A.7.6.12.3 PRS-RSRPP reporting delay test case for gapless measurement in FR2

##### A.7.6.12.3.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRPP measurement requirements specified in Clause 9.9.6.6 for single positioning frequency layer under AWGN propagation conditions in standalone scenario. Reporting delay test for gapless PRS measurement is conducted assuming that the PRS has higher priority, i.e., state 1, than all other DL signals/channels and is transmitted within active DL BWP of UE. Two sub-tests are defined, sub-test 1 is for Nsample = 4 and sub-test 2 is for Nsample = 1. For sub-test 2 LMF indicates UE to perform PRS measurement with Nsample = 1.

The supported test configurations are shown in table A.7.6.12.3.1-1.

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the Pcell.

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. Both cells transmit PRS during T2.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n.

The beginning of the time interval T2 shall be aligned with the beginning of the first PRS processing window instance containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The test parameters are as given in table A.7.6.12.3.1-2, and table A.7.6.12.3.1-3.

**Table A.7.6.12.3.1-1: supported test configurations for PRS RSRPP measurement for FR2-FR2**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

**Table A.7.6.12.3.1-2: General test parameters for PRS RSRPP measurement reporting delay**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| PPW configuration |  | Config 1 | Table A.3.X-1: Reference PPW configuration | As defined in A.3.X |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| 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 | μs | 1, 2, 3 | - set to the UE reported capability for receive time difference threshold if the UE reported value is < 3µs  - 3µs otherwise | Synchronous cells |
| Expected RSTD | μs | 1, 2, 3 | 0 |  |
| Expected RSTD uncertainty | μs | 1, 2, 3 | Same as time offset |  |
| T1 | s | Config 1 | 5 |  |
| T2 | ms | Config 1 | 10 | In this test UE is configured to measure single PFL within the configured PPW. |

**Table A.7.6.12.3.1-3: Cell-specific test parameters during T2**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
|  | |  | **Sub-test 1** | **Sub-test 2** | **Sub-test 1** | **Sub-test 2** |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.3.1 TDD | | - | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | - | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| PRS configuration | |  | Config 1 | PRS.1.4 FR2 | | PRS.1.4 FR2 | |
| PRS BW | |  |  | 48 PRBs for sub-test 2 | | 48 PRBs for sub-test 2 | |
| PRS muting configuration | |  | Config 1 | ‘10’ | | ‘01’ | |
| 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 | 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 Note5 |  | -102 | | -102 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -93 | | -93 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -89.7 | -89.7 |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -96 | -88 | -103 | -88 |
| PRS | | dB | Config 1 | -3 | 5 | -10 | 5 |
| PRS | | dB | Config 1 | -3 | 5 | -10 | 5 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -58.56 | | -55.38 | |
| Propagation Condition | |  | Config 1 | 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 other than those in the slots with transmitted PRS.  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/PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.6.12.3.2 Test Requirements

The UE shall perform and report the PRS-RSRPP measurements for Cell 1 and Cell 2, within the time limit specified in clause 9.9.6.5, starting from the beginning of time interval T2.

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

### A.7.6.13 UE Rx-Tx time difference measurements for PDC

#### A.7.6.13.1 UE Rx-Tx time difference measurement for propagation delay compensation using PRS in FR2

##### A.7.6.13.1.1 Test purpose and environment13

The purpose of the test is to verify that the UE Rx-Tx measurement for RTT-based PDC meets the requirements specified in clause 9.12.4.1 in AWGN propagation condition in FR2 in standalone scenario.

The supported test configurations in listed in Table A.7.6.13.1.1-1.

Table A.7.6.13.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode |

The test is considered with one cell (Cell 1) in FR2.

The test consists of two consecutive time intervals, with duration of T1 and T2. If the test is based on PRS, the Cell 1 mutes PRS transmission during T1 and transmits PRS during T2.

The *MeasObjectRxTxDiff-r17* with *prs-Ref-r17* , *measObject* with *measObjectRxTxDiff-17,* and *NR-DL-PRS-PDC-Info as defined in TS 38.331* shall be provided to the UE during T1.

The last TTI containing the RRC configuration shall be provided to the UE ΔT ms before the start of T2, where ΔT = [TBD] ms.

The beginning of the time interval T2 shall be aligned with the beginning of the first PRS resources.

The UE is configured to transmit SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.7.6.13.1.1-2. The test parameters for PRS are given Table A.7.6.13.1.1-3.

Table A.7.6.13.1.1-2: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value |
| Active cell |  | 1 | Cell 1 |
| RF Channel Number |  | 1 | 1 |
| BWchannel | MHz | 1 | 100: NRB,c = 66 |
| SSB configuration |  | 1 | SSB.2 FR2 |
| SMTC configuration |  | 1 | SMTC.1 |
| Measurement gap |  | 1 | GP#24 or GP#13 Note 1 |
| CP length |  | 1 | Normal |
| DRX |  | 1 | OFF |
| T1 | s | 1 | 5 |
| T2 | s | 1 | 20 |
| NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | |

Table A.7.6.13.1.1-3: Cell specific test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | |
|  |  | T1 | T2 |
| TDD configuration |  | 1 | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | |
| OCNG Patterns |  | 1 | OP.1 | |
| TRS Configuration |  | 1 | TRS.2.1 TDD | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | |
| PRS configuration |  | 1 | PRS.1.1 FR2 | |
| PRS muting info |  | 1 | ‘10’ | |
| SRS configuration |  | 1 | [PDC-SRS.3] | |
| Note 2 | dBm/SCS | 1 | -89 | |
| Note 2 | dBm/15 kHz | 1 | -98 | |
| PRS | dB | 1 | -Infinity | -2.41 |
| PRS | dB | 1 | -Infinity | -2 |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -91 |
| Io | dBm/95.04 MHz | 1 | N/A | -57.63 |
| 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: PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

##### A.7.6.13.1.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in 9.12.4.1.

The UE shall perform and report the UE Rx-Tx time difference measurements for Cell 1 within the specified UE Rx-Tx time difference measurement time starting from the beginning of time interval T2.

The reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.3.1, for k=5.

The UE Rx-Tx time difference measurement time fulfils the UE Rx-Tx measurement accuracy requirements specified in clause [TBD] for Cell 1.

#### A.7.6.13.2 UE Rx-Tx time difference measurement for propagation delay compensation using TRS in FR2

##### A.7.6.13.2.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement with TRS for RTT-based PDC meets the requirements specified in clause 9.12.4.2 for measurement delay and clause 10.1.X.2 for measurement accuracy in AWGN propagation condition in FR2 in standalone scenario.

The supported test configurations in listed in Table A.7.6.13.2.1-1.

Table A.7.6.13.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode |

The test is considered with one cell (Cell 1) in FR2.

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 does not have TRS transmission during T1 and transmits TRS during T2.

The *MeasObjectRxTxDiff-r17* with *csi-RS-Ref-r17*, and *measObject* with *measObjectRxTxDiff-17* *as defined in TS 38.331* shall be provided to the UE during T1.

The last TTI containing the RRC configuration shall be provided to the UE ΔT ms before the start of T2, where ΔT = [10] ms is the maximum processing time of the measurement request.

The beginning of the time interval T2 shall be aligned with the beginning of the first TRS resources.

The UE is configured to transmit SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.7.6.13.2.1-2. The test parameters for PRS are given Table A.7.6.13.2.1-3.

Table A.7.6.13.2.1-2: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value |
| Active cell |  | 1 | Cell 1 |
| RF Channel Number |  | 1 | 1 |
| BWchannel | MHz | 1 | 100: NRB,c = 66 |
| SSB configuration |  | 1 | SSB.2 FR2 |
|  |  |  |  |
|  |  |  |  |
| CP length |  | 1 | Normal |
| DRX |  | 1 | OFF |
| T1 | s | 1 | 5 |
| T2 | s | 1 | 20 |
|  | | | |

Table A.7.6.13.2.1-3: Cell specific test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | |
|  |  | T1 | T2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15  AoA setup | |
| Beam AssumptionNote 7 |  | 1 | Rough | |
| TDD configuration |  | 1 | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | |
| OCNG Patterns |  | 1 | OP.1 | |
| TRS Configuration |  | 1 | TRS.2.1 TDD | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | |
| SRS configuration |  | 1 | PDC-SRS.3 | |
| Note 2 | dBm/SCS | 1 | -89 | |
| Note 2 | dBm/15 kHz | 1 | -98 | |
| TRS | dB | 1 | -Infinity | -[2.41] |
| TRS | dB | 1 | -Infinity | -[2] |
| TRS-RSRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -[91] |
| Io | dBm/95.04 MHz | 1 | N/A | -[57.63] |
| 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: TRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: TRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

##### A.7.6.13.2.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in 9.12.4.2.

The UE shall perform and report the UE Rx-Tx time difference measurements for Cell 1 within the specified UE Rx-Tx time difference measurement time starting from the beginning of time interval T2.

The UE Rx-Tx time difference measurement time fulfils the UE Rx-Tx measurement accuracy requirements specified in clause 10.1.X.2.

The reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified [in clause 10.1.25.3.1, for k=5].

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%.

### A.7.6.14 SA event triggered reporting tests with Pre-MG

#### A.7.6.14.1 Intra-frequency measurement test with SA event triggered reporting tests: with autonomous activation/deactivation of Pre-MG in FR2

##### A.7.6.14.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event with autonomous activation/deactivation of Pre-MG. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

##### A.7.6.14.1.2 Test parameters

Supported test configurations are shown in Table A.7.6.14.1.2-1. There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.14.1.2-2, A.7.6.14.1.2-3 and A.7.6.14.1.2-4 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 A4 is used.

Before the test starts,

UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

UE is configured with 2 different UE-specific bandwidth parts for Cell 1 (PCell), BWP-1 and BWP-2, before starting the test.

BWP-1 includes bandwidth of the initial DL BWP and SSB.

BWP-2 does not include bandwidth of the initial DL BWP and SSB.

UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 in PCell.

The TE schedules ontinuous DL data on PCell throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2 and T3, respectively.

During time period T1, BWP-1 is the active BWP. The Pre-MG is expected to be deactivated. UE shall be able to measure neighbor cell without gap.

The time period T2 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.

During time period T3, BWP-2 is the active BWP. The Pre-MG is expected to be activated. UE shall be able to measure neighbor cell within Pre-MG.

Table A.7.6.14.1.2-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.6.14.1.2-2: General test parameters for intra-frequency event triggered reporting with network-controlled activation/deactivation of Pre-MG

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| Active cell |  | PCell (Cell 1) |  |
| Neighbour cell |  | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| SMTC configuration |  | SMTC.1 |  |
| A4-Offset | dB | -120 |  |
| CP length |  | Normal |  |
| Hysteresis | dB | 0 |  |
| Time To Trigger | s | 0 |  |
| Filter coefficient |  | 0 | L3 filtering is not used |
| DRX |  | OFF |  |
| Gap Pattern Id |  | 13 |  |
| Measurement gap offset | ms | 39 |  |
| Time offset between Cell 1 and Cell 2 |  | 3 μs | Synchronous cells |
| T1 | s | 0.1 |  |
| T2 | s | 0.2 |  |
| T3 | s | 5 |  |

Table A.7.6.14.1.2-3: NR Cell specific test parameters for intra-frequency event triggered reporting with network-controlled activation/deactivation of Pre-MG

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| TDD configuration |  | TDDConf.3.1 | | | TDDConf.3.1 | | |
| BWchannel | MHz | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 24 | | | 24 | | |
| Intial BWP configuration |  | DLBWP.0.1  ULBWP.0.1 | | | DLBWP.0.1  ULBWP.0.1 | | |
| BWP-1 Configuration |  | DLBWP.1.6  ULBWP.1.6 | | | N/A | | |
| BWP-2 Configuration |  | DLBWP.1.5  ULBWP.1.5 | | | N/A | | |
| RLM-RS |  | CSI-RS | | | N/A | | |
| PDSCH RMC configuration |  | SR.3.2 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | CR.3.1 TDD | | | N/A | | |
| Dedicated CORESET RMC configuration |  | CCR.3.1 TDD | | | N/A | | |
| TRS configuration |  | TRS.2.1 TDD | | | N/A | | |
| PDSCH/PDCCH TCI states |  | TCI.State.2 | | | N/A | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | | | 120 | | |
| OCNG Patterns |  | OP.5 | | | N/A | | |
| cellIndividualOffset | dB | N/A | | | 16 | | |
| SSB |  | SSB.1 FR2 | | | SSB.7 FR2 | | |
| Propagation Condition |  | AWGN | | | AWGN | | |

Table A.7.6.14.1.2-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting with network-controlled activation/deactivation of Pre-MG

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup |  | Setup 3 defined in A.3.15.3 | | | | | |
| AoA1 | | | AoA2 | | |
| Beam assumptionNote 3 |  | Rough | | | Rough | | |
| Es | dBm/SCS | -89 | -89 | -89 | -infinity | -89 | -89 |
| BB Note 4 | dB | -0.12 | -0.12 | -0.12 | -Infinity | -0.12 | -0.12 |
| SSB\_RP | dBm/SCS | -89 | -89 | -89 | -infinity | -89 | -89 |
|  | dBm/95.04MHz | -64.41 | -64.41 | -64.41 | -Infinity | -64.41 | -64.41 |
| Time multiplexing of the downlink transmissions from each AoA | | Defined in Figure A.7.6.1.1.1-1 | | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 4: 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. | | | | | | | |

##### A.7.6.14.1.3 Test Requirements

During T1, the UE shall be able to receive PDSCH and report corresponding valid ACK/NACK for those PDSCHs scheduled in the slots overlapped with the Pre-MG occasions.

During T2 and T3, the UE shall not report corresponding valid ACK/NACK for those PDSCHs scheduled in the slots overlapped with the Pre-MG occasions, starting from the 1st complete Pre-MG occasion after the beginning of PCell’s DL slot (*i+TBWPswitchDelay*) + 5ms as defined in clause 8.19.2.

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Y ms from the beginning of time period T3, where Y is

- 3.2s for a UE supporting power class 1 and 5,

- 1.92s for a UE supporting power class 2, 3 and 4

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.

#### A.7.6.14.2 Intra-frequency measurement test with SA event triggered reporting tests: with network-controlled activation/deactivation of Pre-MG in FR2

##### A.7.6.14.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event with network-controlled activation/deactivation of Pre-MG. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

##### A.7.6.14.2.2 Test parameters

Supported test configurations are shown in Table A.7.6.14.2.2-1. There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.14.2.2-2, A.7.6.14.2.2-3 and A.7.6.14.2.2-4 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.

Before the test starts,

UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

UE is configured with 2 different UE-specific bandwidth parts for Cell 1 (PCell), BWP-1 and BWP-2, before starting the test.

BWP-1 includes bandwidth of the initial DL BWP and SSB with the Pre-MG status set to ‘deactivated’.

BWP-2 does not include bandwidth of the initial DL BWP and SSB with the Pre-MG status set to ‘activated’.

UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 in PCell.

The TE schedules continuous DL data on PCell throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2 and T3, respectively.

The 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 time period T3 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 *j*. The UE shall switch its bandwidth part from BWP-2 to BWP-1.

Table A.7.6.14.2.2-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.6.14.2.2-2: General test parameters for intra-frequency event triggered reporting with network-controlled activation/deactivation of Pre-MG

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| Active cell |  | PCell (Cell 1) |  |
| Neighbour cell |  | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| SMTC configuration |  | SMTC.1 |  |
| A3-Offset | dB | -11 |  |
| CP length |  | Normal |  |
| Hysteresis | dB | 0 |  |
| Time To Trigger | s | 0 |  |
| Filter coefficient |  | 0 | L3 filtering is not used |
| DRX |  | OFF |  |
| Gap Pattern Id |  | 13 |  |
| Measurement gap offset | ms | 39 |  |
| Time offset between Cell 1 and Cell 2 |  | 3 μs | Synchronous cells |
| T1 | s | 0.1 |  |
| T2 | s | 0.2 |  |
| T3 | s | 5 |  |

Table A.7.6.14.2.2-3: NR Cell specific test parameters for intra-frequency event triggered reporting with network-controlled activation/deactivation of Pre-MG

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| TDD configuration |  | TDDConf.3.1 | | | TDDConf.3.1 | | |
| BWchannel | MHz | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 24 | | | 24 | | |
| Intial BWP configuration |  | DLBWP.0.1  ULBWP.0.1 | | | DLBWP.0.1  ULBWP.0.1 | | |
| BWP-1 Configuration |  | DLBWP.1.6  ULBWP.1.6 | | | N/A | | |
| BWP-2 Configuration |  | DLBWP.1.5  ULBWP.1.5 | | | N/A | | |
| RLM-RS |  | CSI-RS | | | N/A | | |
| PDSCH RMC configuration |  | SR.3.2 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | CR.3.1 TDD | | | N/A | | |
| Dedicated CORESET RMC configuration |  | CCR.3.1 TDD | | | N/A | | |
| TRS configuration |  | TRS.2.1 TDD | | | N/A | | |
| PDSCH/PDCCH TCI states |  | TCI.State.2 | | | N/A | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | | | 120 | | |
| OCNG Patterns |  | OP.5 | | | N/A | | |
| cellIndividualOffset | dB | N/A | | | 16 | | |
| SSB |  | SSB.1 FR2 | | | SSB.7 FR2 | | |
| Propagation Condition |  | AWGN | | | AWGN | | |

Table A.7.6.14.2.2-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting with network-controlled activation/deactivation of Pre-MG

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup |  | Setup 3 defined in A.3.15.3 | | | | | |
| AoA1 | | | AoA2 | | |
| Beam assumptionNote 3 |  | Rough | | | Rough | | |
| Es | dBm/SCS | -89 | -89 | -89 | -infinity | -89 | -89 |
| BB Note 4 | dB | -0.12 | -0.12 | -0.12 | -Infinity | -0.12 | -0.12 |
| SSB\_RP | dBm/SCS | -89 | -89 | -89 | -infinity | -89 | -89 |
|  | dBm/95.04MHz | -64.41 | -64.41 | -64.41 | -Infinity | -64.41 | -64.41 |
| Time multiplexing of the downlink transmissions from each AoA | | Defined in Figure A.7.6.1.1.1-1 | | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 4: 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. | | | | | | | |

##### A.7.6.14.2.3 Test Requirements

During T1 and T2, the UE shall not report corresponding valid ACK/NACK for those PDSCHs scheduled in the slots overlapped with the Pre-MG occasions, starting from the 1st complete Pre-MG occasion after the beginning of PCell’s DL slot (*i+TBWPswitchDelay*) + 5ms as defined in clause 8.19.2.

During T3, the UE shall be able to receive PDSCH and report corresponding valid ACK/NACK for those PDSCHs scheduled in the slots overlapped with the Pre-MG occasions, starting from the 1st complete Pre-MG occasion after the beginning of PCell’s DL slot (*j+TBWPswitchDelay*) + 5ms as defined in clause 8.19.2.

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T3, where X is

- 1.6s for a UE supporting power class 1 and 5,

- 0.96s for a UE supporting power class 2, 3 and 4

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.

### A.7.6.15 SA event triggered reporting tests with concurrent gaps

#### A.7.6.15.1 SA event triggered reporting tests For FR2 with fully non-overlapping concurrent MGs for SSB-based inter-frequency measurements

##### A.7.6.15.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event with fully non-overlapping concurrent MGs for SSB-based inter-frequency measurements. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: NR cell 1 as PCell in FR2 on NR RF channel 1, NR cell 2 as neighbour cell in FR2 on NR RF channel 2, and NR cell 3 as neighbour cell in FR2 on NR RF channel 3. The test parameters and configurations are given in Tables A.7.6.15.1.1-1, A.7.6.15.1.1-2, and A.7.6.15.1.1-3.

Two measurement gaps with pattern configuration # 14 as defined in Table A.7.6.15.1.1-2 are provided for UE. The measurement object for NR RF channel 2 is associated with MG#1, and measurement object for NR RF channel 3 is associated with MG#2.

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 2 or NR cell 3.

Supported test configurations are shown in table A.7.6.15.1.1-1.

Table A.7.6.15.1.1-1 SA event triggered reporting tests without SSB index reading for FR2 with fully non-overlapping concurrent MGs for SSB-based inter-frequency measurements

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.6.15.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with fully non-overlapping concurrent MGs for SSB-based inter-frequency measurements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1, 2, 3 | Three FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1 | NR cell 2 and 3 | NR cell 2 is on NR RF channel number 2. NR cell 3 is on NR RF channel number 3. |
| Gap Pattern Id |  | Config 1 | 14 for both gaps | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 79 for MG#1  19 for MG#2 |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| offsetMO | dB | Config 1 | 16 | Applied to NR Cell 2 and 3 measurement object |
| A3-Offset | dB | Config 1 | -11 |  |
| 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 | Cell 2 and 3 are synchronous cells to cell 1. |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 5.2 for PC1; 3.5 for other PC |  |

Table A.7.6.15.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with fully non-overlapping concurrent MGs for SSB-based inter-frequency measurements

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | | Cell 2 | | **Cell 3** | | |
|  | |  |  | T1 | | T2 | T1 | T2 | T1 | | T2 |
| AoA setup | |  | Config 1 | Setup 3 as specified in clause A.3.15 | | | | | | | |
|  | |  |  | AoA1 | | | AoA2 | | AoA2 | | |
| Beam AssumptionNote 4 | |  | 1,2 | Rough | | | Rough | | Rough | | |
| NR RF Channel Number | |  | Config 1 | 1 | | | 2 | | 3 | | |
| Duplex mode | |  | Config 1 | TDD | | | TDD | | TDD | | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | | TDDConf.3.1 | | TDDConf.3.1 | | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Data RBs allocated | |  | Config 1 | 66 | | | 66 | | 66 | | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | | N/A | |  | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | | N/A | |  | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | | N/A | |  | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | | N/A | |  | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | | OP.1 | | OP.1 | | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | | - | | - | | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | | - | | - | | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.1 | | | SMTC.1 | | SMTC.1 | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | | 120 | | 120 | | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | | N/A | | N/A | | |
| PDSCH/PDCCH TCI state | |  | Config 1 | TCI.State.2 | | | N/A | | N/A | | |
| 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 | 0 | | | 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) | |  |  |  | | |  | |  | | |
| Ês | | dBm/SCS | Config 1 | -87 | -87 | | -Infinity | -87 | -Infinity | -87 | |
| SSBRP Note 2 | | dBm/SCS Note3 | Config 1 | -87 | -87 | | -Infinity | -87 | -Infinity | -87 | |
| BB Note 5 | | dB | Config 1 | 1.89 | 1.89 | | -Infinity | 1.89 | -Infinity | 1.89 | |
| IoNote 2 | | dBm/95.04 MHz Note3 | Config 1 | -58.01 | -58.01 | | -Infinity | -58.01 | -Infinity | -58.01 | |
| Propagation Condition | |  | Config 1 | 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: SSBRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | | | | |

##### A.7.6.15.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report for each neighboring cell, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

10240 for UE supporting power class 1, or

6400 for UE supporting other power class.

The UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.15.2 SA event triggered reporting tests For FR2 with concurrent measurement gaps without SSB time index detection when DRX is not used (PCell in FR2)

##### A.7.6.15.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event for each neighbour cell. This test will partly verify the SA inter-frequency NR cell search requirements and collision handling between two partially-partial overlapping gaps in clause 9.1.8.

In this test, there are three cells: NR cell 1 as PCell in FR2 on NR RF channel 1, NR cell 2 as neighbour cell in FR2 on NR RF channel 2 and NR cell 3 as another neighbour cell in FR2 on NR RF channel 3. The test parameters and configurations are given in Tables A.7.6.15.2.1-1, A.7.6.15.2.1-2, and A.7.6.15.2.1-3.

Two measurement gaps are configured to UE with measurement gap pattern configuration #13 and #14 respectively. Measurement gap with pattern #13 is associated with inter-frequency measurement on NR cell 2, and measurement gap with pattern #14 is associated with inter-frequency measurement on NR cell 3. Measurement gap pattern configuration # 13 and #14 as defined in Table A.7.6.15.2.1-2 are provided to for UE that does not support per-FR gap and for UE that supports per-FR gap.

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 2 and NR cell 3.

Supported test configurations are shown in table A.7.6.15.2.1-1.

Table A.7.6.15.2.1-1 SA event triggered reporting tests without SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: Void. | |

Table A.7.6.15.2.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 concurrent gap with partially partial overlapping scenario for SSB-based measurements without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1, 2, 3 | Three FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| 1st Neighbour cell |  | Config 1 | NR cell 2 | NR cell 2 is on NR RF channel number 2. |
| 2nd Neighbour cell |  | Config 1 | NR cell 3 | NR cell 3 is on NR RF channel number 3. |
| 1st Gap Pattern Id |  | Config 1 | 13 | As specified in clause 9.1.2-1. |
| 2nd Gap Pattern Id |  | Config 1 | 14 | As specified in clause 9.1.2-1. |
| 1st gap offset |  | Config 1 | 39 |  |
| 2nd gap offset |  | Config 1 | 4 |  |
| 1st gap priority |  | Config 1 | 1 | Second level priority |
| 2nd gap priority |  | Config 1 | 2 | Highest priority |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| offsetMO | dB | Config 1 | 16 | Applied to NR Cell 2 and NR Cell 3 measurement objects |
| A3-Offset | dB | Config 1 | -11 |  |
| 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 | 5.2 for PC1; 3.5 for other PC |  |

Table A.7.6.15.2.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | | Cell 3 | | | |
|  | |  |  | T1 | T2 | T1 | T2 | T1 | | T2 | |
| AoA setup | |  | Config 1 | Setup 3 as specified in clause A.3.15 | | | | | | | |
|  | |  |  | AoA1 | | AoA2 | | AoA3 | | | |
| Beam AssumptionNote 7 | |  | 1,2 | Rough | | Rough | | Rough | | | |
| NR RF Channel Number | |  | Config 1 | 1 | | 2 | | 3 | | | |
| Duplex mode | |  | Config 1 | TDD | | TDD | | TDD | | | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | | | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | | | |
| Data RBs allocated | |  | Config 1 | 66 | | 66 | | 66 | | | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | | | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | | N/A | | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | | N/A | | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | | N/A | | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | | N/A | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | | OP.1 | | | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | | - | | | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | | - | | | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.1 | | SMTC.1 | | SMTC.Y | | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | | 120 | | | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | N/A | | N/A | | | |
| PDSCH/PDCCH TCI state | |  | Config 1 | TCI.State.2 | | N/A | | N/A | | | |
| 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 | 0 | | 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) | |  |  |  | |  | |  | | | |
| Ês | | dBm/SCS | Config 1 | -87 | -87 | -Infinity | -87 | -Infinity | | | -87 |
| SSBRP Note 3 | | dBm/SCS Note5 | Config 1 | -87 | -87 | -Infinity | -87 | -Infinity | | | -87 |
| BB Note 8 | | dB | Config 1 | 1.89 | 1.89 | -Infinity | 1.89 | -Infinity | | | 1.89 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -58.01 | -58.01 | -Infinity | -58.01 | -Infinity | | | -58.01 |
| 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: Void  Note 3: SSBRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | | | | |

##### A.7.6.15.2.2 Test Requirements

For both NR cell 2 and NR cell 3, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

10240 for UE supporting power class 1, or

6400 for UE supporting other power class.

The UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.7.6.15.3 SA event triggered reporting tests for FR2 concurrent gap with partially partial overalpping scenario for SSB-based measurements and PRS-based measurement

##### A.7.6.15.3.1 Test Purpose and Environment

The purpose of this test is to verify that the concurrent gap capable UE makes correct reporting of events. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4 and PRS-RSRP measurement delay requirements specified in clause 9.9.3.5.

In this test, there are three cells: NR cell 1 as PCell in FR2 on NR RF channel 1, NR cell 2 as neighbour cell in FR2 on NR RF channel 2, and NR cell 3 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.7.6.15.3.1-1, A.7.6.15.3.1-2 and A.7.6.15.3.1-3.

Two measurement gap patterns (MeasGapId #0 and MeasGapId #1) are configured with the gap pattern ID #0 and #1 as defined in Table A.7.6.15.3.1-2. MeasGapId #1 is configured with a higher priority than MeasGapId #0. MeasGapId #0 and MeasGapId #1 are associated with the MOs for RF channel numbers #1 and #2, respectively.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used for carrier 2. 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 and NR cell 3. Cell 1 and cell 3 transmit PRS during T2.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance of MeasGapId #1 containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

Table A.7.6.15.3.1-1: SA event triggered reporting tests for FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.6.15.3.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 concurrent gap with partially partial overalpping scenario for SSB-based measurements and PRS measurement

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 3  2: Cell 2 | Two TDD carrier frequencies are used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2, NR cell 3 | Cell 2 is an inter-frequency cell neighbor cell  Cell 3 is a neighbour cell in the positioning assistance data. |
| Gap Pattern Id |  | Config 1 | 0 for MeasGapId #0  1 for MeasGapId #1 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 7 for MeasGapId #0  11 for MeasGapId #1 |  |
| 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 cell 1 and neighbour cell 2 |  | Config 1 | 3μs | Synchronous cells. |
| Time offset between cell 1 and neighbour cell 3 |  | Config 1 | 3μs | Synchronous cells. |
| Expected RSTD between cell 1 and cell 3 | μs | Config 1 | 3 |  |
| Expected RSTD uncertainty between cell 1 and cell 3 | μs | Config 1 | 5 |  |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 11 |  |

Table A.7.6.15.3.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 concurrent gap with partially-partial overalpping scenario for SSB-based measurements and PRS measurement

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | | | Cell 3 | |
|  | |  | T1 | T2 | T1 | T2 | | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | | | Rough | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | | |  | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | | |  | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | | |  | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | | |  | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | | | - | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.3.1 TDD | | - | | | - | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | - | | | - | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | | | 120 | |
| SSB parameters | |  | Config 1 | SSB.1 FR2 | | SSB.1 FR2 | | | SSB.1 FR2 | |
| SMTC configuration defined in A.3.11 | |  | Config 1 | SMTC.4 | | SMTC.4 | | | SMTC.4 | |
| PRS configuration | |  | Config 1 | PRS.1.1 FR2 | | N/A | | | PRS.1.2 FR2 | |
| PRS muting configuration | |  | Config 1 | ‘10’ | | N/A | | | ‘01’ | |
| 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 | 0 | | 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 Note5 |  | -102 | | -104.7 | | | -102 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -93 | | -95.7 | | | -93 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -Infinity | | -86.7 | -Infinity | -86.7 |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -Infinity | -96 | N/A | | N/A | -Infinity | -103 |
| PRS | | dB | Config 1 | -Infinity | -3 | N/A | | N/A | -Infinity | -10 |
| PRS | | dB | Config 1 | -Infinity | -3 | N/A | | N/A | -Infinity | -10 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -58.56 | | -66.7 | | -57.2 | -57.2 | |
| Propagation Condition | |  | Config 1 | 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/PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | | |

##### A.7.6.15.3.2 Test Requirements

The UE shall send one Event A3 triggered measurement report for cell 2, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

10240 for UE supporting power class 1, or

6400 for UE supporting other power class.

The PRS RSRP measurement time fulfils the requirements specified in Clause 9.9.3.5. The UE shall perform and report the PRS RSRP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 9.9.3.5 starting from the beginning of time interval T2.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRP measurement for each correct event shall be within the PRS RSRP reporting range specified in Clause 10.1.24.3, i.e., between PRS RSRP\_0 and PRS RSRP\_126.

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%.

IUE 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.

### A.7.6.16 SA event triggered reporting tests with NCSG

#### A.7.6.16.1 SA event triggered reporting test with per-UE NCSG under non-DRX

##### A.7.6.16.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.7.1 and 9.2.7.2, and also verify the scheduling availability during intra-frequency measurement with NCSG in clause 9.2.7.3. Supported test configurations are shown in table A.7.6.16.1.1-1.

The serving frequency should be selected for which UE reports ‘ncsg’.

Table A.7.6.16.1.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 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. | |

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.16.1.1-2 ~ 4 below.

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.

During T2, the UE is continuously scheduled with data on the PCell.

The UE is capable of NCSG and report ‘*ncsg*’ through *NeedForGapNCSG-InfoNR* for PCell.

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 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.

Table A.7.6.16.1.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE NCSG without DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| Active cell |  | 1, 2 | PCell (Cell 1) |  |
| Neighbour cell |  | 1, 2 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1, 2 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| NCSG type |  | 1, 2 | Per-FR |  |
| NCSG pattern |  | 1, 2 | 13 |  |
| NCSG repitition periodicity | ms | 1, 2 | 40 |  |
| ML | ms | 1, 2 | 5 |  |
| NCSG offset | ms | 1, 2 | 39 |  |
| SMTC configuration |  | 1, 2 | SMTC.1 |  |
| CSI-RS parameters |  | 1, 2 | CSI-RS.3.2 TDD |  |
| A3-Offset | dB | 1, 2 | -11 |  |
| 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 Cell 1 and Cell 2 |  | 1, 2 | 3 μs | Synchronous cells |
| T1 | s | 1, 2 | 5 |  |
| T2 | s | 1, 2 | 5 |  |

Table A.7.6.16.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE NCSG without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1 | 24 | | 24 | |
| 2 | 48 | | 48 | |
| Intial 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 | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| 2 | SR.3.3 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | CR.3.1 TDD | |
| 2 | CR.3.2 TDD | | CR.3.2 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| 2 | CCR.3.7 TDD | | CCR.3.7 TDD | |
| TRS configuration |  | 1, 2 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1, 2 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 120 | | 120 | |
| OCNG Patterns |  | 1, 2 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1~2 | N/A | | 16 | |
| SSB |  | 1 | SSB.3 FR2 | | SSB.7 FR2 | |
|  |  | 2 | SSB.4 FR2 | | SSB.8 FR2 | |
| Propagation Condition |  | 1, 2 | AWGN | | AWGN | |

Table A.7.6.16.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE NCSG without DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | | |
| T1 | T2 | T1 | | T2 |
| AoA setup |  | 1, 2 | Setup 3 defined in A.3.15.3 | | | | |
|  |  |  | AoA1 | | AoA2 | | |
| Beam AssumptionNote 4 |  | 1,2 | Rough | | Rough | | |
| Es | dBm/SCS | 1 | -89 | -89 | | -Infinity | -89 |
|  |  | 2 | -86 | -86 | | -Infinity | -86 |
| BB Note 5 | dB | 1, 2 | -0.12 | -0.12 | | -Infinity | -0.12 |
| SSB\_RP | dBm/SCS | 1 | -89 | -89 | -Infinity | | -89 |
|  |  | 2 | -86 | -86 | -Infinity | | -86 |
|  | dBm/95.04MHz | 1 | -64.41 | -64.41 | -Infinity | | -64.41 |
| 2 | -61.41 | -61.41 | -Infinity | | -61.41 |
| Time multiplexing of the downlink transmissions from each AoA | | 1 | Defined in Figure A.7.6.16.1.1-1 | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Void  Note 3: Es/Iot, SSB\_RP and Io 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. | | | | | | | |



Figure A.7.6.16.1.1-1: Time multiplexed downlink transmissions (Config 1 example)

##### A.7.6.16.1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 3.2s for a UE supporting power class 1,

- 1.92s for a UE supporting power class 2, 3 and 4

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%.

During T2, UE shall send HARQ ACK/NACK for the corresponding PDSCH scheduled in PCell in all the slots except for the case where PDSCH or PUCCH is overlapped with the VIL of NCSG pattern.

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

#### A.7.6.16.2 SA event triggered reporting tests on inter-frequency measurement with NCSG for FR2 when DRX is not used (PCell in FR2)

##### A.7.6.16.2.1 Test Purpose and Environment

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 9.3.10. The test will partly verify the interruption requirements on PCell in clause 9.1.9.1.

The serving frequency and the target frequency should be selected such that UE reports ‘ncsg’ for the target frequency given the serving frequency.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.16.2.1-1, A.7.6.16.2.1-2, and A.7.6.16.2.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in A.7.6.162.1-2 is provided for a UE that does not support *ncsg-MeasGapPerFR-r17*, and in test 2 measurement gap pattern configuration #13 as defined in Table A.7.6.16.2.1-2 is provided for UE that support *ncsg-MeasGapPerFR-r17*. If a UE supports *ncsg-MeasGapPerFR-r17*, it is only required to pass test 2. Otherwise it is only required to pass test 1.

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 2.

Supported test configurations are shown in table A.7.6.16.2.1-1.

Table A.7.6.16.2.1-1 SA event triggered reporting tests with NCSG without SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: Void. | |

Table A.7.6.16.2.1-2: General test parameters for SA inter-frequency event triggered reporting with NCSG for FR2 without SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| NR RF Channel Number |  | Config 1 | 1, 2 | | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| NCSG Pattern Id |  | Config 1 | 0 | 13 | As specified in clause 9.1.9.3-1. |
| NCSG offset |  | Config 1 | 39 | |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| offsetMO | dB | Config 1 | 16 | | Applied to NR Cell 2 measurement object |
| A3-Offset | dB | Config 1 | -11 | |  |
| 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 | 5.2 for PC1; 3.5 for other PC | |  |

Table A.7.6.16.2.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting with NCSG for FR2 without SSB time index detection

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | | |
|  | |  |  | T1 | T2 | T1 | | T2 |
| AoA setup | |  | Config 1 | Setup 3 as specified in clause A.3.15 | | | | |
|  | |  |  | AoA1 | | AoA2 | | |
| Beam AssumptionNote 7 | |  | 1,2 | Rough | | Rough | | |
| NR RF Channel Number | |  | Config 1 | 1 | | 2 | | |
| Duplex mode | |  | Config 1 | TDD | | TDD | | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Data RBs allocated | |  | Config 1 | 66 | | 66 | | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | | |
| OCNG Patterns defined in A.3.2.1.1 | |  | Config 1 | OP.2 | | OP.2 | | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.1 | | SMTC.1 | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | N/A | | |
| PDSCH/PDCCH TCI state | |  | Config 1 | TCI.State.2 | | N/A | | |
| 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 | 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 Note5 |  | -104.7 | | -104.7 | | |
| Note2 | | dBm/SCS Note4 | Config 1 | -95.7 | | -95.7 | | |
|  | | dB | Config 1 | 6 | 6 | -Infinity | | 9 |
| SSB\_RP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -Infinity | | -86.7 |
| BB Note 8 | | dB | Config 1 | 6 | 6 | -Infinity | | 9 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -59.74 | -59.74 | -Infinity | | -57.2 |
| 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: Void  Note 3: SSB\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | |

##### A.7.6.16.2.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

The UE is not required to report SSB time index. 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 shall be scheduled on PCell continuously throughout the test. During the time duration T2, the interruption on PCell shall not be more than the values specified for SA in clause 9.1.9.1.

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.

NOTE: For a UE that supports per-FR NCSG, it only needs to pass test case with per-FR NCSG, otherwise, it only needs to pass test case with per-UE NCSG.

#### A.7.6.16.3 Event triggered reporting test on deactivated Scell measurement via NCSG in FR2 in non-DRX

##### A.7.6.16.3.1 Test Purpose and Environment

The purpose of this test is to verify that the delay and interruption requirements for deactived SCell measurement stated in clause 9.2.7 and 8.2 respectively, when both PCell and SCell are in FR2.

The supported test configurations are shown in Table A.7.6.16.3.1-1 below. The general test parameters are defined in Table A.7.6.16.3.1-2. Three cells are deployed in the test, which are one FR2 PCell (Cell 1) on frequency 1 and one FR2 SCell (Cell 2) on frequency 2 and one neighboring cell (Cell3) on frequency 2. The cell-specific test parameters are given in A.7.6.16.3.1-3 below. OTA related test parameters are shown in table A.7.6.16.3.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the SCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of 2 successive time periods, with duration of T1 and T2, respectively.

Before the test starts the UE is connected to PCell (Cell 1) but is not aware of SCell (Cell 2) nor the neighboring cell (Cell 3). The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the deactivated SCC.

NCSG is configured with the NCSG pattern ID #0 as defined in Table A.7.6.16.3.1-2.

Table A.7.6.16.3.1-1: Supported test configurations for FR2 deactivated Scell measurement via NCSG

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note 1: Same configuration applies to both PCell and SCell | |

Table A.7.6.16.3.1-2: General test parameters for FR2 deactivated Scell measurement via NCSG

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 | Two NR radio channels are used for this test. Cell 1 uses RF channel 1. Cell 2 and Cell 3 use RF channel 2. |
| Hysteresis | dB | 0 |  |
| A3-Offset | dBm | -11 |  |
| TimeToTrigger | s | 0 |  |
| Filter coefficient |  | 0 | L3 filtering is not used |
| DRX |  | OFF | DRX is not used |
| NCSG Pattern Id |  | 0 | As specified in clause Table 9.1.9.3-1. |
| NCSG offset | ms | 39 |  |
| NCSG mgta | ms | 0 |  |
| Time offset between Cell 2 and Cell 3 | us | 3 | Synchronous cells |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| T1 | s | 5 |  |
| T2 | s | 15 |  |

Table A.7.6.16.3.1-3: Cell specific test parameters for FR2 deactivated Scell measurement via NCSG

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ParameterNote 5 | Unit | Cell 1 | Cell 2 | Cell 3 |
| SSB ARFCN |  | freq1 | freq2 | freq2 |
| Duplex mode |  | TDD | | |
| TDD configuration |  | TDDConf.3.1 | | |
| Downlink initial BWP Configuration |  | DLBWP.0.1 | DLBWP.0.1 | DLBWP.0.1 |
| Downlink dedicated BWP Configuration |  | DLBWP.1.1 | DLBWP.1.1 | DLBWP.1.1 |
| Uplink initial BWP configuration |  | ULBWP.0.1 | ULBWP.0.1 | ULBWP.0.1 |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | ULBWP.1.1 | ULBWP.1.1 |
| TRS configuration |  | TRS.2.1 TDD | TRS.2.1 TDD | N/A |
| TCI state |  | TCI.State.0 | TCI.State.0 | N/A |
| BWchannel | MHz | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 24 | 24 | 24 |
| PDSCH Reference measurement channel |  | SR.3.2 TDD | SR.3.2 TDD | N/A |
| RMSI CORESET Parameters |  | CR.3.1 TDD | - | N/A |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | CCR.3.1 TDD | N/A |
| OCNG Patterns |  | OP.1 | OP.5 | N/A |
| SSB Configuration |  | SSB.1 FR2 | SSB.1 FR2 | SSB.7 FR2 |
| SMTC Configuration |  | SMTC.1 | SMTC.1 | |
| cellIndividualOffset |  | N/A | N/A | 16 |
| 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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | |

Table A.7.6.16.3.1-4: OTA related test parameters for FR2 deactivated Scell measurement via NCSG

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | Cell 2 | | | Cell 3 | | |
|  |  | T1 | T2 | T1 | | T2 | T1 | | T2 |
| Angle of arrival configuration |  | Setup 3 defined in A.3.15.3 | | | | | | | |
| AoA1 | | AoA1 | | | AoA2 | | |
| Assumption for UE beams Note 3 |  | Rough | | Rough | | | Rough | | |
| Es | dB | -89 | | -89 | -89 | | -infinity | -89 | |
| SSB\_RPNote2 | dBm/SCS Note4 | -89 | | -89 | -89 | | -infinity | -89 | |
| BB Note 4 | dB | -0.12 | | -0.12 | -0.12 | | -infinity | -0.12 | |
| IoNote2 | dBm/95.04 MHz Note4 | -64.41 | | -64.41 | -64.41 | | --infinity | -64.41 | |
| Time multiplexing of the downlink transmissions from each AoA | | N/A | | Defined in Figure A.7.6.1.1.1-1 | | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 4: 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 | | | | | | | | | |

##### A.7.6.16.3.2 Test Requirements

UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

12.8s for UE supporting power class 1 and 5, or

7.68s for UE supporting other power class.

UE is not required to report SSB time index. 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%.

During the T1 and T2, UE be able to report ACK/NACK for all slots with PDCCH/PDSCH on PCell excluding those slots overlapped with

VIL1, ML and VIL2 of NCSG for intra-band FR2 CA

VIL1 and VIL2 of NCSG for inter-band FR2 CA

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

## A.7.7 Measurement Performance requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 10 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 10 for at least 90% of the reported cases.

- Measurements are performed in RRC\_CONNECTED state.

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

### A.7.7.1 SS-RSRP

#### A.7.7.1.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

##### A.7.7.1.1.1 Test Purpose and Environment

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 10.1.3.1.1 and 10.1.3.1.2 for intra-frequency measurements.

##### A.7.7.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table A.7.7.1.1.2-2 and A.7.7.1.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1. The test consists of two time phases T1 and T2.

Table A.7.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.7.1.1.2-2: SS-RSRP Intra frequency general test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | T1 | | T2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Cell ID |  | 489 | 0 | 489 | 0 |
| 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 | |
| Data RBs allocated |  | 24 | | 24 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | - | DLBWP.1.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - | ULBWP.1.1 | - |
| DRX cycle configuration |  | Not applicable | - | Not applicable | - |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3. 2TDD | - | SR.3. 2 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Reference channel |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 | OP.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |
| Propagation conditions |  | 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: Void  Note 3: Void  Note 4: Void  Note 5: Void | | | | | |

Table A.7.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | T1 | | T2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 7 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -91.6 | | N/A | |
| Note1 | dBm/SCSNote4 | -82.6 | | N/A | |
|  | dB | 6.0 | 1.0 | N/A | N/A |
| Es | dBm/SCSNote4 |  |  | (Table B.2.2-2 Rx Beam Peak +2.1dB) | (Table B.2.2-2 Rx Beam Peak +2.1dB) |
| SSB\_RPNote2 | dBm/SCS | -76.6 | -81.6 | (Table B.2.2-2 Rx Beam Peak +2.1dB) | (Table B.2.2-2 Rx Beam Peak +2.1dB) |
| BB Note6 | dB | 2.44 | -5.98 | -5.98 | -5.98 |
| IoNote2 | dBm/95.04 MHz Note4 | -50.05 | | (Table B.2.2-2 Rx Beam Peak +29.70dB) | |
| 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: 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.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.7.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.1.1 and relative accuracy requirements in clause 10.1.3.1.2. The following requirements are to be verified:

During T1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.7.7.1.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.7.7.1.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T1 and T2:

Relative accuracy of Cell 1 during T2 compared with Cell 1 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

Table A.7.7.1.1.3-1: SS-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | SSB\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ SSB\_RP1 +δ +Gmax |
| Cell 2 | SSB\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ SSB\_RP2 +δ +Gmax |
| Note 1: SSB\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.3.1.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class | |

#### A.7.7.1.2 SA inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

##### A.7.7.1.2.1 Test Purpose and Environment

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 10.1.5.1.1 and 10.1.5.1.2 for intrer-frequency measurements with the testing configurations for NR cells in Table A.7.7.1.2.1-1.

Table A.7.7.1.2.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

##### A.7.7.1.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.1.2.2-1 and Table A.7.7.1.2.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.1.2.2-1 and Table A.7.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.7.7.1.2.2-1: SS-RSRP inter-frequency test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | | Test 2 | |
|  |  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN | 1~2 |  | freq1 | freq2 | freq1 | freq2 |
| BWchannel | 1~2 |  | 100:  NRB,c = 66 | | 100:  NRB,c = 66 | |
| Data RBs allocated | 1 |  | 24 | | 24 | |
| 2 | 48 | | 48 | |
| Gap pattern ID |  |  | 0 | | 0 | |
| Duplex mode | 1~2 |  | TDD | | TDD | |
| TDD configuration | 1~2 |  | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH Reference measurement channel | 1 |  | SR.3. 2 TDD | - | SR.3. 2 TDD | - |
| 2 | SR.3.3 TDD | SR.3.3 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| 2 | CR.3.2 TDD | CR.3.2 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| 2 | CCR.3.7 TDD | CCR.3.7 TDD |
| SSB configuration | 1 |  | SSB.3 FR2 | | SSB.3 FR2 | |
|  | 2 |  | SSB.4 FR2 | | SSB.4 FR2 | |
| PDSCH/PDCCH subcarrier spacing | 1~2 | kHz | 120 | | 120 | |
| OCNG Patterns | 1~2 |  | OP.3 | | OP.3 | |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.3  ULBWP.1.3 | | DLBWP.1.3  ULBWP.1.3 | |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD | | TRS.2.1 TDD | |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 | | TCI.State.2 | |
| SMTC configuration | 1~2 |  | SMTC.1 | | SMTC.1 | |
| Time offset between Cell 2 and Cell 1 | 1~2 | μs | 3 | | 3 | |
| EPRE ratio of PSS to SSS | 1~2 | 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 DMRS |  |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |  |
| Propagation condition | 1~2 | - | AWGN | AWGN | AWGN | AWGN |
| Antenna configuration | 1~2 | - | 1x2 | 1x2 | 1x2 | 1x2 |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void. | | | | | | |

Table A.7.7.1.2.2-2: SS-RSRP inter frequency OTA related test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | | Test 2 | |
|  |  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration | 1~2 |  | Setup 4b according to clause A.3.15.4.2 | | Setup 4b according to clause A.3.15.4.2 | |
|  |  |  | AoA1  Spherical coverage | AoA2  Rx Beam Peak | AoA1  Spherical coverage | AoA2  Rx Beam Peak |
| Assumption for UE beamsNote 7 | 1~2 |  | Rough | | Rough | |
| Note1 | 1 | dBm/15kHzNote4 | -90.6 | -90.6 | (Table B.2.3-2 Rx Beam PeakNote 8 +1.97dB) | (Table B.2.3-2 Rx Beam PeakNote 8 -3.03dB) |
|  | 2 |  | -93.7 | -93.7 |
| Note1 | 1 | dBm/SCSNote4 | -81.6 | -81.6 | (Table B.2.3-2 Rx Beam PeakNote 8 +11.0dB) | (Table B.2.3-2 Rx Beam PeakNote 8 +6.0dB) |
|  | 2 |  | -81.7 | -81.7 | (Table B.2.3-2 Rx Beam PeakNote 8 +14.0dB) | (Table B.2.3-2 Rx Beam PeakNote 8 +9.0dB) |
|  | 1~2 | dB | 6.0 | 6.0 | 17.0 | -1.0 |
| SSB\_RPNote2 | 1 | dBm/SCS | -75.6 | -75.6 | (Table B.2.3-2 Rx Beam PeakNote 8 +28.0dB) | (Table B.2. 3-2 Rx Beam PeakNote 8 +5.0dB) |
|  | 2 |  | -75.7 | -75.7 | (Table B.2.3-2 Rx Beam PeakNote 8 +31.0dB) | (Table B.2. 3-2 Rx Beam PeakNote 8 +8.0dB) |
| (SSB\_RPCell 1 – SSB\_RPCell 2) | 1~2 | dB | 0 | | 23.00 | |
| BBNote6 | 1 | dB | 5.26 | 5.96 | 9.53 | -3.46 |
|  | 2 |  | 4. 61 | 5.91 |  |  |
| IoNote2 | 1 | dBm/95.04 MHz Note4 | -50.00 | -50.00 | (Table B.2.3-2 Rx Beam PeakNote 8 +52.68dB) | (Table B.2.3-2 Rx Beam PeakNote 8 +33.13dB) |
|  | 2 |  | -50.09 | -50.09 | (Table B.2.3-2 Rx Beam PeakNote 8 +55.69dB) | (Table B.2.3-2 Rx Beam PeakNote 8 +36.14dB) |
| (Iofreq 1 – Io freq 2) | 1~2 | dB | 0 | | 19.55 | |
| 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, Io, (SSB\_RPCell 2 – SSB\_RPCell 1) and (Iofreq 2 – Io freq 1) 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: 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 or ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: The value in Table B.2.3-2 is the Minimum SSB\_RP for SCSSSB = 120 kHz, selected according to the operating band of Cell 2 and UE power class, without ∆MBP,n adjustment. | | | | | | |

##### A.7.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirements in clause 10.1.5.1.1 and the relative requirements in clause 10.1.5.1.2.

Test 1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.7.7.1.2.3-2.

Test 2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.7.7.1.2.3-2.

Table A.7.7.1.2.3-1: SS-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3,4 |
| Cell 1 | SSB\_RP1 -δ +Gmin +X ≤ Reported RSRP(dBm) ≤ SSB\_RP1 +δ +Gmax |
| Cell 2 | SSB\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ SSB\_RP2 +δ+Gmax |
| Note 1: SSB\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.5.1.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class  Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value. | |

Table A.7.7.1.2.3-2: SS-RSRP relative accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3,4, 5, 6 |
| Cell 2 – Cell 1 | SSB\_RP2 - SSB\_RP1 -δ - D - Ginter ≤ Reported RSRP(dB) ≤ SSB\_RP2 - SSB\_RP1 +δ + Ginter–(X) + [3] |
| Note 1: SSB\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration  Note 2: δ is the RSRP relative accuracy requirement from Table 10.1.5.1.2-1  Note 3: Void  Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value.  Note 5: D is the margin due to mis-alignment between fine beam and rough beam. D is the Rough Beam gain reduction in Rx beam peak direction from Table B.2.1.5.3-1, selected according to the UE power class. D is always a positive value.  Note 6: Ginter is the margin due to different antenna gain caused by frequency separation. Ginter is from Table B.2.1.5.2-1, selected according to the UE power class, and is always a positive value | |

#### A.7.7.1.3 SA inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

##### A.7.7.1.3.1 Test Purpose and Environment

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 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.7.7.1.3.1-1.

Table A.7.7.1.3.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

|  |  |  |
| --- | --- | --- |
| Config | Description of serving cell | Description of target cell |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

##### A.7.7.1.3.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) in FR1 and Cell 2 in FR2 . The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2 below. Absolute accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.7.7.1.3.2-1: SS-RSRP inter-frequency test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | | Test 2 | |
|  |  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN | 1~3 |  | freq1 | freq2 | freq1 | freq2 |
| BWchannel | 1 | MHz | 10:  NRB,c = 52 | 100:  NRB,c = 66 | 10:  NRB,c = 52 | 100:  NRB,c = 66 |
|  | 2 |  | 10:  NRB,c = 52 |  | 10:  NRB,c = 52 |  |
|  | 3 |  | 40:  NRB,c = 106 |  | 40:  NRB,c = 106 |  |
| Data RBs allocated | 1,2 |  | 52 | 24 | 52 | 66 |
| 3 | 106 | 106 |
| Duplex mode | 1 |  | FDD | TDD | FDD | TDD |
|  | 2 |  | TDD |  | TDD |  |
|  | 3 |  | TDD |  | TDD |  |
| TDD configuration | 1 |  | N/A | TDDConf.3.1 | N/A | TDDConf.3.1 |
|  | 2 |  | TDDConf.1.1 |  | TDDConf.1.1 |  |
|  | 3 |  | TDDConf.2.1 |  | TDDConf.2.1 |  |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | - | SR.1.1 FDD | - |
|  | 2 |  | SR.1.1 TDD |  | SR.1.1 TDD |  |
|  | 3 |  | SR.2.1 FDD |  | SR.2.1 FDD |  |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | - | CR.1.1 FDD | - |
|  | 2 |  | CR.1.1 TDD | - | CR.1.1 TDD | - |
|  | 3 |  | CR.2.1 FDD | - | CR.2.1 FDD | - |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | - | CCR.1.1 FDD | - |
|  | 2 |  | CCR.1.1 TDD | - | CCR.1.1 TDD | - |
|  | 3 |  | CCR.2.1 TDD | - | CCR.2.1 TDD | - |
| SSB configuration | 1 |  | SSB.1 FR1 | SSB.3 FR2 | SSB.1 FR1 | SSB.3 FR2 |
|  | 2 |  | SSB.1 FR1 |  | SSB.1 FR1 |  |
|  | 3 |  | SSB.2 FR1 |  | SSB.2 FR1 |  |
| OCNG Patterns | 1~3 |  | OP.1 | OP.3 | OP.1 | OP.1 |
| Initial BWP Configuration | 1~3 |  | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP configuration | 1~3 |  | DLBWP.1.3  ULBWP.1.3 | | DLBWP.1.3  ULBWP.1.3 | |
| TRS Configuration | 1~3 |  | TRS.2.1 TDD | | TRS.2.1 TDD | |
| PDCCH/PDSCH TCI Configuration | 1~3 |  | TCI.State.2 | | TCI.State.2 | |
| SMTC configuration | 1~3 |  | SMTC.1 | | SMTC.1 | |
| Time offset between Cell 2 and Cell 1 | 1~3 | μs | 3 | | 3 | |
| EPRE ratio of PSS to SSS | 1~3 | 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 DMRS |  |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |  |
| Propagation condition | 1~3 | - | NA  Link only, see clause A.3.7A | AWGN | NA  Link only, see clause A.3.7A | AWGN |
| Antenna configuration | 1~3 | - |  | 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: Void | | | | | | |

Table A.7.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | | Test 2 NOTE 3 | |
|  |  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration according to clause A.3.15 |  |  | NA | Setup 2b | NA | Setup 2b |
| Assumption for UE beamsNote 4 |  |  | N/A | Rough | N/A | Rough |
|  | 1~3 | dBm/15kHz | Link only, see clause A.3.7A | -90 | Link only, see clause A.3.7A | NA |
|  | 1~3 | dBm/SSB SCS |  | NA |
|  | 1~3 | dB | 5 | NA |
| Es | 1~3 | dBm/SCS |  | (Table B.2.3-2 Spherical coverage +1dB) |
| SSB\_RPNote1 | 1~3 | dBm/SCS | -76.0 | (Table B.2.3-2 Spherical coverage +1dB) |
|  |  |
| BBNote6 | 1~3 | dB | 4.35 | -3.81 |
| IoNote1 | 1~3 | dBm/  95.04MHz | -50.18 | SSB\_RP+28.98 |
| Note 1: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: Void  Note 3: No additional noise is added by the test system in Test 2.  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: 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 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | |

##### A.7.7.1.3.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the Absolute requirement in clause 10.1.5.1.1.

Test 1:

Absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.3.3.

Test 2:

Absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.3.3.

Table A.7.7.1.3.3: SS-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3,4 |
| Cell 2 | SSB\_RP1 -δ +Gmin +X ≤ Reported RSRP(dBm) ≤ SSB\_RP1 +δ +Gmax |
| Note 1: SSB\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.5.1.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class  Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value. | |

### A.7.7.2 SS-RSRQ

#### A.7.7.2.1 SA intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell

##### A.7.7.2.1.1 Test Purpose and Environment

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 10.1.8.1.1.

##### A.7.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.2.1.2-1. . The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.7.7.2.1.2-2 and Table A.7.7.2.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

Table A.7.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | Test 2 | | |
|  | |  | Cell 1 | | Cell 2 | Cell 1 | 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 | | |
| Data RBs allocated | |  | 66 | | | 66 | | |
| 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 | | | | | |
| TRS configuration | |  | TRS.2.1 TDD | |  | TRS.2.1 TDD |  | |
| TCI state | |  | TCI.State.0 | |  | TCI.State.0 |  | |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD | |  | SR.3.1 TDD |  | |
| RMSI CORESET Reference Channel | |  | CR.3.1 TDD | | - | CR.3.1 TDD |  | |
| Control channel RMC | |  | CCR.3.1 TDD | | - | CCR.3.1 TDD | - | |
| OCNG Patterns | |  | OP.1 | | OP.1 | OP.1 | OP.1 | |
| SMTC configuration | |  | SMTC.1 | | | | | |
| SSB configuration | |  | SSB.1 FR2 | | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 120 | | 120 | 120 | 120 | |
| SS-RSSI-Measurement | |  | Not Applicable | | | | | |
| 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\_DMRS | |  |  | |  |  |  | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |  |  | |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |  | |  |  |  | |
| Propagation condition | |  | 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: Void  Note 3: Void  Note 4: Void  Note 5: Void. | | | | | | | | |

Table A.7.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Unit | Test 1 | | | Test 2 | | | |
|  |  | Cell 1 | Cell 2 | | Cell 1 | | Cell 2 | |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | Setup 1according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 9 |  | Rough | | | | | | |
| Note1 | dBm/15kHzNote4 | -95 | | | | -95 | | |
| Note1 | dBm/SCSNote3 | -86 | | | | -86 | | |
|  | dB | 3 | | | | 3 | | |
| SSB\_RPNote2 | dBm/SCS Note4 | -83 | | -83 | | -89 | | -89 |
| SS-RSRQ Note2 | dB | -14.77 | | -14.77 | | -16.81 | | -16.81 |
|  | dB | -1.76 | | -1.76 | | -4.76 | | -4.76 |
| IoNote2 | dBm/95.04 MHz Note4 | -50 | | | | -54 | | |
| 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: SS-RSRQ, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Void  Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

##### A.7.7.2.1.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ-2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal RSRQ+3.5dB to Nominal RSRQ-3.5dB according to the requirements in clause 10.1.8.1.1.Nominal RSRQ is the value shown in table A.7.7.2.1.2-3.

#### A.7.7.2.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

##### A.7.7.2.2.1 Test Purpose and Environment

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 10.1.9.1.1 and 10.1.9.1.2 for inter-frequency measurement.

##### A.7.7.2.2.2 Test Parameters

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 A.7.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.7.7.2.2.2-2 and Table A.7.7.2.2.2-3.. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A. 7.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.7.2.2.2-2: SS-RSRQ Inter frequency general test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | Test 2 | |
|  | |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN | |  | Freq1 | freq2 | freq1 | Freq2 |
| SSB Configuration | |  | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 |
| Duplex mode | |  | TDD | | TDD | |
| TDD configuration | |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP  Dedicated DL BWP |  | DLBWP.0.1 | | | |
|  | DLBWP.1.1 | | | |
| Initial UL BWP  Dedicated UL BWP |  | ULBWP.0.1 | | | |
|  | ULBWP.1.1 | | | |
| TRS configuration | |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state | |  | TCI.State.0 | - | TCI.State.0 | - |
| Data RBs allocated | |  | 66 | | 66 | |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel | |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| OCNG Patterns | |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration | |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| PDSCH/PDCCH subcarrier spacing | | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS | |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |  |  |  |  |
| Propagation conditions | |  | 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: Void  Note 3: Void  Note 4: Void | | | | | | |

Table A.7.7.2.2.2-3: SS-RSRQ Inter frequency OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| AoA setup |  | Setup 1 in clause A.3.15. | | Setup 1 in clause A.3.15. | |
| Assumption for UE beamsNote 8 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -94.03 | -94.03 | -94.03 | -94.03 |
| Note1 | dBm/SCSNote3 | -85.0 | -85.0 | -85.0 | -85.0 |
|  | dB | -1.75 | | -1.75 | |
| SSB\_RPNote2 | dBm/SCS Note4 | -86.75 | -86.75 | -88 | -88 |
| SS-RSRQNote2 | dB | -14.75 | -14.75 | -15.56 | -15.56 |
|  | dB | -1.75 | -1.75 | -3 | -3 |
| IoNote2 | dBm/95.04 MHz Note4 | -53.8 | -53.8 | -54.25 | -54.25 |
| 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: SS-RSRQ, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  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 | | | | | |

##### A.7.7.2.2.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ -2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ +3.5dB to Nominal SS-RSRQ -3.5dB according to the requirements in clause 10.1.10.1.1.

The SS-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.1.2.

### A.7.7.3 SS-SINR

#### A.7.7.3.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

##### A.7.7.3.1.1 Test Purpose and Environment

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 10.1.13.1.1.

##### A.7.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.3.1.2-1. . The absolute accuracy of SS-SINR intra-frequency measurement is test by using the parameters in Table A.7.7.3.1.2-2 and Table A.7.7.3.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.7.3.1.2-2: SS-SINR Intra frequency test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN |  | Freq2 | | Freq2 | |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 66 | | 66 | |
| 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 |  | TRS.2.1 TDD | | | |
| TCI state |  | TCI.State.0 | | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD |  | SR.3.1 TDD |  |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD |  |
| Dedicated RMSI CORESET Reference Channel |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 | | | |
| SSB configuration |  | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| SS-RSSI-Measurement |  | Not Applicable | | | |
| 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\_DMRS |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |
| Propagation conditions |  | 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: Void  Note 3: Void  Note 4: Void | | | | | |

Table A.7.7.3.1.2-3: SS-SINR Intra frequency OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 3 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 9 |  | Rough | | Rough | |
| Note1 | dBm/15kHz Note4 | -105 | | -105 | |
| Note1 | dBm/SCS Note3 | -96 | | -96 | |
|  | dB | 4.54 | | 2.66 | |
| SSB\_RPNote2 | dBm/SCS Note4 | -91.46 | -93.34 | -99 | -99 |
| SS-SINR Note2 | dB | 0 | -3.2 | -4.76 | -4.76 |
|  | dB | 0 | -3.2 | -4.76 | -4.76 |
| IoNote2 | dBm/95.04 MHz Note4 | -59.2 | | -64 | |
| 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: SS-SINR, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Void  Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.7.7.3.1.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3B to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.10.13.1.

#### A.7.7.3.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

##### A.7.7.3.2.1 Test Purpose and Environment

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 10.1.15.1.1 and 10.1.15.1.2 for inter-frequency measurement.

##### A.7.7.3.2.2 Test Parameters

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 A.7.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.7.7.3.2.2-2 and Table A.7.7.3.2.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.7.3.2.2-2: SS-SINR Inter frequency general test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 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 |  | 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 | |
| Data RBs allocated |  | 66 | | 66 | | 66 | |
| 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 |  | TRS.2.1 TDD | | | | | |
| TCI state |  | TCI.State.0 | | | | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 | 120 | 120 |
| 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\_DMRS |  |  |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |  |  |
| Propagation conditions |  | AWGN | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna configuration |  | 1x2 | 1x2 | 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: Void  Note 3: Void  Note 4: Void | | | | | | | |

Table A.7.7.3.2.2-3: SS-SINR Inter frequency OTA related test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration | degrees | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 10 |  | Rough | | Rough | | Rough | |
| Note1 | dBm/15kHz Note4 | -105 | -105 | -105 | -105 | -105 | -105 |
| Note1 | dBm/SCS Note3 | -96 | -96 | -96 | -96 | -96 | -96 |
|  | dB | -0.5 | | -0.5 | | 11.0 | |
| SSB\_RPNote2 | dBm/SCS Note4 | -96.5 | -96.5 | -85 | -85 | -99 | -99 |
| SS-SINRNote2 | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
|  | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
| IoNote2 | dBm/95.04 MHz Note4 | -69.3 | -69.3 | -55.4 | -55.4 | -65.24 | -65.24 |
| 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: SS-SINR, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Void  Note 9: Void  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.7.3.2.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR +3dB to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.15.1.1.

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.1.2.

### A.7.7.4 L1-RSRP measurement for beam reporting

#### A.7.7.4.1 SSB based L1-RSRP measurement

##### A.7.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.5.2 and clause 10.1.20.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.7.7.4.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.4.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 240 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 in each supported band | |

##### A.7.7.4.1.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.4.1.2-1 and Table A.7.7.4.1.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.7.7.4.1.2-1 and Table A.7.7.4.1.2-2.

Here 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.

Table A.7.7.4.1.2-1: FR2 SSB based L1-RSRP general test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | Test 2 |
| SSB GSCN | 1~2 |  | freq1 | freq1 |
| Duplex mode | 1~2 |  | TDD | TDD |
| TDD Configuration | 1~2 |  | TDDConf.3.1 | TDDConf.3.1 |
| BWchannel | 1~2 | MHz | 100: NRB,c = 66 | 100: NRB,c = 66 |
| Data RBs allocated | 1~2 |  | 66 | 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.2 TDD | SR.3.2 TDD |
| 2 | SR.3.3 TDD | SR.3.3 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD | CR.3.1 TDD |
| 2 | CR.3.2 TDD | CR.3.2 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD | CCR.3.1 TDD |
| 2 | CCR.3.7 TDD | CCR.3.7 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 | SSB.1 FR2 |
|  | 2 |  | SSB.2 FR2 | SSB.2 FR2 |
| OCNG Patterns | 1~2 |  | OP.1 | OP.1 |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.3  ULBWP.1.3 | DLBWP.1.3  ULBWP.1.3 |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 | TCI.State.2 |
| SMTC configuration | 1~2 |  | SMTC.1 | SMTC.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 |  | slot320 | slot320 |
| Propagation condition | 1~2 |  | AWGN | AWGN |
| Antenna configuration | 1~2 |  | 1x2 | 1x2 |
| EPRE ratio of PSS to SSS | 1~2 | 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 |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 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. | | | | |

Table A.7.7.4.1.2-2: FR2 SSB based L1-RSRP OTA related test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | | Test 2 NOTE 3 | |
|  |  |  | SSB0 | SSB1 | SSB0 | SSB1 |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 4 |  |  | Rough | | Rough | |
|  | 1~2 | dBm/15kHz | -100 | | n.a. | |
|  | 1 | dBm/SSB SCS | -91 | | n.a. | |
|  | 2 |  | -88 | | n.a. | |
|  | 1~2 | dB | 10 | -2 | n.a. | |
| SSB\_RPNote1 | 1 | dBm/SCS | -81 | -93 | As in Table B.2.4-2 | |
|  | 2 |  | -78 | -90 | As in Table B.2.4-2 | |
| IoNote1 | 1~2 | dBm/  95.04MHz | -51.57 | | SSB\_RP+28.98 | |
|  | 1~2 | dB | 10 | -2 | n.a. | |
| Note 1: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: Void  Note 3: No additional noise is added by the test system in Test 2.  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 | | | | | | |

##### A.7.7.4.1.3 Test Requirements

After 320ms from the beginning of the test, , the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.20.1. The following requirements are to be verified:

For Test 1:

Absolute accuracy of SSB0. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

For Test 2:

Absolute accuracy of SSB resource reported by UE in L1-RSRP report (SSB0 or SSB1). The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

Table A.7.7.4.1.3-1: L1-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| SSB0 | SSB\_RP0 -δ + Gmin ≤ Reported RSRP(dBm) ≤ SSB\_RP0 +δ + Gmax |
| SSB1 | SSB\_RP1 -δ + Gmin ≤ Reported RSRP(dBm) ≤ SSB\_RP1 +δ + Gmax |
| Note 1: SSB\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the SSB n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.1.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class | |

#### A.7.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

##### A.7.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.5.3 and clause 10.1.20.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.7.7.4.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |

##### A.7.7.4.2.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.4.2.2-1 and Table A.7.7.4.2.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.7.7.4.2.2-1 and Table A.7.7.4.2.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.7.7.4.2.2-1: FR2 CSI-RS based L1-RSRP general test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | Test 2 |
| SSB GSCN | 1 |  | freq1 | freq1 |
| Duplex mode | 1 |  | TDD | TDD |
| TDD Configuration | 1 |  | TDDConf.3.1 | TDDConf.3.1 |
| BWchannel | 1 | MHz | 100: NRB,c = 66 | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.1 TDD | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD | CCR.3.1 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 | SSB.1 FR2 |
| OCNG Patterns | 1 |  | OP.1 | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.1  ULBWP.1.1 | DLBWP.1.1  ULBWP.1.1 |
| TRS Configuration | 1 |  | TRS.2.1 TDD | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1 |  | TCI.State.2 | TCI.State.2 |
| SMTC configuration | 1 |  | SMTC.1 | SMTC.1 |
| CSI-RS | 1 |  | CSI-RS.3.2 TDD | CSI-RS.3.2 TDD |
| reportConfigType | 1 |  | periodic | periodic |
| reportQuantity | 1 |  | cri-RSRP | cri-RSRP |
| Number of reported RS | 1 |  | 2 | 2 |
| L1-RSRP reporting period | 1 |  | slot80 | slot80 |
| Propagation condition | 1 |  | AWGN | AWGN |
| Antenna configuration | 1 |  | 1x2 | 1x2 |
| EPRE ratio of PSS to SSS | 1 | 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 |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 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. | | | | |

Table A.7.7.4.2.2-2: FR2 CSI-RS based L1-RSRP OTA related test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | | Test 2 NOTE 3 | |
|  |  |  | CSI-RS0 | CSI-RS1 | CSI-RS0 | CSI-RS1 |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 4 |  |  | Rough | | Rough | |
|  | 1~2 | dBm/15kHz | -100 | | n.a. | |
|  | 1~2 | dBm/SSB SCS | -91 | | n.a.  n.a. | |
|  | 1~2 | dB | 10 | -2 | n.a. | |
| CSI-RS-RSRPNote1 | 1~2 | dBm/SCS | -81 | -93 | As in Table B.2.4-2 | |
| IoNote1 | 1~2 | dBm/  95.04MHz | -59.86 | | SS-RSRP+28.98 | |
|  | 1~2 | dB | -51.57 | -2 | n.a. | |
| Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 3: No additional noise is added by the test system in Test 2.  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 | | | | | | |

##### A.7.7.4.2.3 Test Requirements

After 640ms from the beginning of the test, the L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in clause 10.1.20.2. The following requirements are to be verified:

For Test 1:

Absolute accuracy of CSI-RS0. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

For Test 2:

Absolute accuracy of CSI-RS resource reported by UE in L1-RSRP report (CSI-RS0 or CSI-RS1). The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.7.7.4.2.3-1: L1-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| CSI-RS0 | CSI-RS \_RP0 -δ + Gmin ≤ Reported RSRP(dBm) ≤CSI-RS \_RP0 +δ + Gmax |
| CSI-RS1 | CSI-RS \_RP1 -δ + Gmin ≤ Reported RSRP(dBm) ≤CSI-RS \_RP1 +δ + Gmax |
| Note 1: CSI-RS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class | |

### A.7.7.5 CLI measurements

#### A.7.7.5.1 SA SRS-RSRP measurement accuracy with FR2 serving cell

##### A.7.7.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SRS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.22.1.1 with the testing configurations for NR cells in Table A.7.7.5.1.1-1.

Table A.7.7.5.1.1-1: Applicable NR configurations for FR2 SRS-RSRP accuracy test

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SRS SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

##### A.7.7.5.1.2 Test parameters

In this set of test cases there is one cell in the test, FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.5.1.2-1 and A.7.7.5.1.2-2 below. The test parameter for the (virtual) neighbor cell UE transmitting SRS are given in Table A.7.7.5.1.2-2.

Before the test UE is configured to perform SRS-RSRP measurement. During the test, the test system transmits SRS resources for measurement in the DL slots according to the SRS configuration in Table A.7.7.5.1.2-3. There is no measurement gap configured in the test. During the test, the test system does not transmit PDCCH/PDSCH/OCNG on SRS symbol to be transmitted and on 2 data symbols before SRS to be transmitted.

Table A.7.7.5.1.2-1: FR2 test parameters for SRS-RSRP accuracy

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | Test 2 |
| SSB GSCN | 1 |  | freq1 | freq1 |
| Duplex mode | 1 |  | TDD | TDD |
| TDD configuration | 1 |  | TDDConf.3.1 | TDDConf.3.1 |
| BWchannel | 1 | MHz | 100: NRB,c = 66 | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.1 TDD | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD | CCR.3.1 TDD |
| SSB configuration | 1 |  | SSB.3 FR2 | SSB.3 FR2 |
| OCNG Patterns | 1 |  | OP.1 | OP.1 |
| TRS configuration | 1 |  | TRS.2.1 TDD | TRS.2.1 TDD |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.3  ULBWP.1.3 | DLBWP.1.3  ULBWP.1.3 |
| SMTC configuration | 1 |  | SMTC.1 | SMTC.1 |
| Time offset between DL from serving cell and SRS from test system | 1 | μs | 10.76 | 10.67 |
| EPRE ratio of PSS to SSS | 1 | 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 |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |
| Propagation condition | 1 |  | AWGN | AWGN |
| Antenna configuration | 1 |  | 1x2 | 1x2 |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | |

Table A.7.7.5.1.2-2: SRS-RSRP accuracy OTA related test parameters for PCell and Neighbour cell UE in FR2

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | T1 | T2 |
| Angle of arrival configuration |  | Setup 1 defined A.3.15.1 | Setup 1 defined A.3.15.1 |
| Beam assumption Note 5 |  | Fine | Fine |
| Note1 | dBm/15kHzNote3 | -100 | N/A |
| Note1 | dBm/SCSNote3 | -91 | N/A |
|  | dB | 2 | N/A |
| Es | dBm/SCSNote3 |  | (Table B.2.7-2 Rx Beam Peak) |
| SRS\_RPNote2 | dBm/SCS | -89 | (Table B.2.7-2 Rx Beam Peak) |
| BB Note4 | dB | >1 | 1 |
| IoNote2 | dBm/95.04 MHz Note3 | -57.89 | (Table B.2.7-2 Rx Beam Peak +50.79dB) |
| 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: SRS\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 4: 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 [19], and an allowance of 2dB for UE multi-band relaxation factor ∑MBP from TS 38.101-2 [19] Table 6.2.1.3-4.  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 A.7.7.5.1.2-3: SRS configuration parameters for FR2 SRS-RSRP accuracy

|  |  |  |
| --- | --- | --- |
|  | Field | SRSConf.1 |
| SRS-ResourceSet | srs-ResourceSetId | 0 |
|  | srs-ResourceIdList | 0 |
|  | resourceType | Periodic |
|  | Usage | Codebook |
| SRS-Resource | SRS-ResourceId | 0 |
|  | nrofSRS-Ports | Port1 |
|  | transmissionComb | n2 |
|  | combOffset-n2 | 0 |
|  | cyclicShift-n2 | 0 |
|  | resourceMapping  startPosition | 0 |
|  | resourceMapping  nrofSymbols | n1 |
|  | resourceMapping  repetitionFactor | n1 |
|  | freqDomainPosition | 0 |
|  | freqDomainShift | 0 |
|  | freqHopping  c-SRS | 12 |
|  | freqHopping  b-SRS | 0 |
|  | freqHopping  b-hop | 0 |
|  | groupOrSequenceHopping | Neither |
|  | resourceType | Periodic |
|  | periodicityAndOffset-p | sl160,25 |
|  | sequenceId | 0 |

##### A.7.7.5.1.3 Test Requirements

The SRS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.22.1.1. The following requirements are to be verified:

During T1:

The UE is deemed to meet the requirement if the reported SRS-RSRP is in the range shown in table A.7.7.5.1.3-1.

During T2:

The UE is deemed to meet the requirement if the reported SRS-RSRP is in the range shown in table A.7.7.5.1.3-1.

Table A.7.7.5.1.3-1: SRS-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| SRS | SRS\_RP -δ +Gmin ≤ Reported SRS-RSRP(dBm) ≤SRS\_RP +δ +Gmax |
| Note 1: SRS\_RP is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.22.1.1-2, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class | |

#### A.7.7.5.2 SA CLI-RSSI measurement accuracy with FR2 serving cell

##### A.7.7.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CLI-RSSI measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.22.2.1 with the testing configurations for NR cells in Table A.7.7.5.2.1-1.

Table A.7.7.5.2.1-1: Applicable NR configurations for FR2 CLI-RSSI accuracy test

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SRS SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

##### A.7.7.5.2.2 Test parameters

In this set of test cases there is one cell in the test, FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.5.2.2-1 and A.7.7.5.2.2-2 below.

Before the test UE is configured to perform CLI-RSSI measurement. There is no measurement gap configured in the test. During the test, the test system does not transmit PDCCH/PDSCH/OCNG on symbols for CLI-RSSI resource and on 2 data symbol before. The CLI-RSSI measurement resource configuration is in Table A.7.7.5.2.2-3.

Table A.7.7.5.2.2-1: FR2 test parameters for CLI-RSSI accuracy

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | Test 2 |
| SSB GSCN | 1 |  | freq1 | freq1 |
| Duplex mode | 1 |  | TDD | TDD |
| TDD configuration | 1 |  | TDDConf.3.1 | TDDConf.3.1 |
| BWchannel | 1 | MHz | 100: NRB,c = 66 | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.1 TDD | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD | CCR.3.1 TDD |
| SSB configuration | 1 |  | SSB.3 FR2 | SSB.3 FR2 |
| OCNG Patterns Note2 | 1 |  | OP.1 | OP.1 |
| TRS configuration | 1 |  | TRS.2.1 TDD | TRS.2.1 TDD |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.3  ULBWP.1.3 | DLBWP.1.3  ULBWP.1.3 |
| SMTC configuration | 1 |  | SMTC.1 | SMTC.1 |
| Time offset between DL from serving cell and OCNG from test system | 1 | μs | 10.67 | 10.67 |
| EPRE ratio of PSS to SSS | 1 | 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 |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |
| Propagation condition | 1 |  | AWGN | AWGN |
| Antenna configuration | 1 |  | 1x2 | 1x2 |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: OCNG is not transmitted in the CLI-RSSI measurement resources. | | | | |

Table A.7.7.5.2.2-2: CLI-RSSI accuracy OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | T1 | T2 |
| Angle of arrival configuration |  | Setup 1 defined A.3.15.1 | |
| Beam assumption Note 5 |  | Fine | |
| on CLI-RSSI measurement resource Note1 | dBm/15kHzNote3 | -100 | |
| on CLI-RSSI measurement resource Note1 | dBm/SCSNote3 | -91 | |
| on CLI-RSSI measurement resource | dB | -Infinity | |
| RSRP on CLI-RSSI measurement resource Note2 | dBm/SCS | -Infinity | |
| BBon CLI-RSSI measurement resource Note4 | dB | -Infinity | |
| Io on CLI-RSSI measurement resource Note2 | dBm/95.04 MHz Note3 | -62.01 | |
| Io on CLI-RSSI measurement resource Note2 | dBm/1.08 MHz | -81.46 | |
| 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: SRS\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 4: 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 [19], and an allowance of 2dB for UE multi-band relaxation factor ∑MBP from TS 38.101-2 [19] Table 6.2.1.3-4.  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 A.7.7.5.2.2-3: CLI-RSSI measurement resource configuration for FR2 CLI-RSSI accuracy

|  |  |  |
| --- | --- | --- |
|  | Field | SRSConf.1 |
| CLI-RSSI measurement resource | rssi-ResourceId | 0 |
|  | rssi-SCS | 120kHz |
|  | startPRB | 0 |
|  | nrofPRBs | 66 |
|  | startPosition | 3 |
|  | nrofSymbols | 11 |
|  | rssi-PeriodicityAndOffset | sl160, 25 |

##### A.7.7.5.2.3 Test Requirements

The CLI-RSSI measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.22.2.1. The following requirements are to be verified:

During T1:

The UE is deemed to meet the requirement if the reported CLI-RSSI is in the range shown in table A.7.7.5.2.3-1.

During T2:

The UE is deemed to meet the requirement if the reported CLI-RSSI is in the range shown in table A.7.7.5.2.3-1.

Table A.7.7.5.2.3-1: CLI-RSSI absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
|  | Io -δ +Gmin ≤ Reported CLI-RSSI(dBm) ≤Io +δ +Gmax |
| Note 1: Io is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for 1.08MHz  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.22.1.1-2, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class | |

### A.7.7.6 L1-SINR measurement for beam reporting

A.7.7.6.1 L1-SINR measurement with CSI-RS based CMR and no dedicated IMR configured and CSI-RS resource set with repetition off

##### A.7.7.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.8.4.1 and clause 10.1.28.1 for L1-SINR measurements based on CSI-RS with the testing configurations for NR cells in Table A.7.7.6.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.6.1.1-1: Applicable NR configurations for FR2 L1-SINR test with CSI-RS based CMR and no dedicated IMR configured

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |

##### A.7.7.6.1.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.6.1.2-1 and Table A.7.7.6.1.2-2 below. The absolute and relative accuracy of L1-SINR measurements are tested by using the parameters in Table A.7.7.6.1.2-1 and Table A.7.7.6.1.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

**Table A.7.7.6.1.2-1: FR2 CSI-RS based L1-SINR general test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** |
| SSB GSCN | 1 |  | freq1 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.3.1 |
| BWchannel | 1 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.3  ULBWP.1.3 |
| TRS Configuration | 1 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1 |  | TCI.State.2 |
| SMTC configuration | 1 |  | SMTC.1 |
| CSI-RS | 1 |  | CSI-RS.3.2 TDD |
| reportConfigType | 1 |  | periodic |
| reportQuantity | 1 |  | cri-SINR-r16 |
| nrofReportedRS | 1 |  | 2 |
| L1-SINR reporting period | 1 |  | slot80 |
| Propagation condition | 1 |  | AWGN |
| Antenna configuration | 1 |  | 1x2 |
| EPRE ratio of PSS to SSS | 1 | 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 |
| 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. | | | |

**Table A.7.7.6.1.2-2: FR2 CSI-RS based L1-SINR OTA related test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Config** | | **Unit** | **Test 1** | |
| **CSI-RS0** | **CSI-RS1** |
| Angle of arrival configuration |  | |  | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 4 | |  |  | Rough | |
|  | 1~2 | | dBm/15kHz | -100 | |
|  | 1~2 | | dBm/SSB SCS | -91 | |
|  | 1~2 | | dB | 10 | -2 |
| CSI-RS-RSRPNote1 | 1~2 | | dBm/SCS | -81 | -93 |
| IoNote1 | 1~2 | | dBm/  95.04MHz | -51.57 | -59.86 |
|  | 1~2 | | dB | 10 | -2 |
| Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 3: Void.  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 | | | | | |

##### A.7.7.6.1.3 Test Requirements

After 640ms from the beginning of the test, the L1-SINR measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in clauses 10.1.28.1. The following requirements are to be verified:

For Test 1:

Absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1. The UE is deemed to meet the requirement if the reported L1-SINR is in the range shown in Table A.7.7.6.1.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-SINR meets the requirements in Table 10.1.28.1.2-1.

Table A.7.7.6.1.3-1: L1-SINR absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2 |
| CSI-RS0 | L1-SINR0-δ≤ Reported SINR(dB) ≤L1-SINR0+δ |
| CSI-RS1 | L1-SINR1-δ ≤ Reported SINR(dB) ≤L1-SINR1+δ |
| Note 1: L1-SINRn is the equivalent SINR received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration  Note 2: δ is the SINR absolute accuracy requirement from Table 10.1.28.2.1-1, selected according to the Io used in the test | |

#### A.7.7.6.2 L1-SINR measurement with SSB based CMR and dedicated IMR

##### A.7.7.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.8.4.2 and clause 10.1.28.2 for L1-SINR measurements with SSB based CMR and CSI-IM based IMR, with the testing configurations for NR cells in Table A.7.7.6.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.6.2.1-1: Applicable NR configurations for FR2 L1-SINR measurement test with SSB based CMR and CSI-IM based IMR

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE FDD, NR 240 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 in each supported band | |

##### A.7.7.6.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.6.2.2-1 and Table A.7.7.6.2.2-2 below. The absolute and relative accuracy of L1-SINR measurements are tested by using the parameters in Table A.7.7.6.2.2-1 and Table A.7.7.6.2.2-2.

Here is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources and one CSI-IM resource set with two CSI-IM resource. UE is configured to perform RLM and BFD measurement based on the SSB resources 0 and 1. UE is configured to perform L1-SINR measurement based on the SSBs as CMR and the CSI-IM resources as IMR.

Table A.7.7.6.2.2-1: FR2 L1-SINR general test parameters with SSB based CMR and CSI-IM based IMR

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 |
| SSB GSCN | 1~2 |  | freq1 |
| Duplex mode | 1~2 |  | TDD |
| TDD Configuration | 1~2 |  | TDDConf.3.1 |
| BWchannel | 1~2 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1~2 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1~2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1~2 |  | CCR.3.1 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
| 2 | SSB.2 FR2 |
| CSI-IM configuration | 1~2 |  | CSI-IM 3.1 TDD |
| OCNG Patterns | 1~2 |  | OP.1 |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.3  ULBWP.1.3 |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 |
| SMTC configuration | 1~2 |  | SMTC.1 |
| reportConfigType | 1~2 |  | periodic |
| reportQuantity-r16 | 1~2 |  | ssb-Index-SINR-r16 |
| Number of reported RS | 1~2 |  | 2 |
| L1-SINR reporting period | 1~2 |  | slot640 |
| Propagation condition | 1~2 |  | AWGN |
| Antenna configuration | 1~2 |  | 1x2 |
| EPRE ratio of PSS to SSS | 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 DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 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. | | | |

Table A.7.7.6.2.2-2: FR2 L1-SINR SSB specific test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | |
| SSB0 | SSB1 |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 4 |  |  | Rough | |
|  | 1~2 | dBm/15kHz | -100 | |
|  | 1 | dBm/SSB SCS | -91 | |
| 2 | -88 | |
|  | 1~2 | dB | 10 | -2 |
| SS-RSRPNote1 | 1 | dBm/SCS | -81 | -93 |
| 2 | -78 | -90 |
| IoNote1 | 1~2 | dBm/95.04 MHz | -51.57 | -59.86 |
|  | 1~2 | dB | 10 | -2 |
| Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

##### A.7.7.6.2.3 Test Requirements

After 640ms from the beginning of the test, the L1-SINR measurement accuracy for SSB#0+CSI-IM#0 and SSB#1+CSI-IM#1 of Cell 1 shall fulfil the requirements in clauses 10.1.28.2. The following requirements are to be verified:

For Test 1:

Absolute accuracy of SSB#0+CSI-IM#0 and absolute accuracy of SSB#1+CSI-IM#1. The UE is deemed to meet the requirement if the reported L1-SINR is in the range shown in Table A.7.7.6.2.3-1.

Relative accuracy of SSB#0+CSI-IM#0 compared with SSB#1+CSI-IM#1. The UE is deemed to meet the requirement if the difference in reported L1-SINR meets the requirements in Table 10.1.28.2.2-2.

Table A.7.7.6.2.3-1: L1-SINR absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2 |
| SSB#0+CSI-IM#0 | L1\_SINR0 -δ ≤ Reported SINR(dB) ≤ L1\_SINR0 +δ |
| SSB#1+CSI-IM#1 | L1\_SINR1 -δ ≤ Reported SINR(dB) ≤ L1\_SINR1 +δ |
| Note 1: L1\_SINRn is the equivalent SINR received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the SSB#n+CSI-IM#n under consideration  Note 2: δ is the SINR absolute accuracy requirement from Table 10.1.28.2.1-2, selected according to the Io used in the test | |

#### A.7.7.6.3 L1-SINR measurement with CSI-RS based CMR and dedicated IMR

##### A.7.7.6.3.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-SINR measurement accuracy is within the specified limits. This test will partly verify the requirements in Clauses 9.8.4.3 and clause 10.1.28.3 for L1-SINR measurements based on CSI-RS as both CMR and IMR with the testing configurations for NR cell in Table A.7.7.6.3.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.6.3.1-1: Applicable NR configurations for FR2 L1-SINR measurement test with CSI-RS based both CMR based IMR

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |

##### A.7.7.6.3.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.6.3.2-1 and Table A.7.7.6.3.2-2 below. The absolute and relative accuracy of L1-SINR measurements are tested by using the parameters in Table A.7.7.6.3.2-1 and Table A.7.7.6.3.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured two CSI-RS resource sets with two CSI-RS resources for each set. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB. UE is configured to perform L1-SINR measurement based on the configured CSI-RS as both CMR and IMR.

Table A.7.7.6.3.2-1: FR2 L1-SINR measurement test with CSI-RS based both CMR and IMR

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 |
| SSB GSCN | 1 |  | freq1 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.3.1 |
| BWchannel | 1 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.1  ULBWP.1.1 |
| TRS Configuration | 1 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1 |  | TCI.State.2 |
| SMTC configuration | 1 |  | SMTC.1 |
| CSI-RS configuration as CMR | 1 |  | CSI-RS.3.2 TDD |
| CSI-RS configuration as IMR | 1 |  | CSI-RS.3.3A TDD |
| reportConfigType | 1 |  | periodic |
| reportQuantity-r16 | 1 |  | cri-SINR-r16 |
| nrofReportedRS | 1 |  | 2 |
| L1-RSRP reporting period | 1 |  | slot80 |
| Propagation condition | 1 |  | AWGN |
| Antenna configuration | 1 |  | 1x2 |
| EPRE ratio of PSS to SSS | 1 | 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 |  |  |  |
| 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. | | | |

Table A.7.7.6.3.2-2: FR2 CSI-RS based L1-SINR measurement OTA related test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | |
|  |  |  | CSI-RS0 | CSI-RS1 |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 4 |  |  | Rough | |
|  | 1~2 | dBm/15kHz | -100 | |
|  | 1~2 | dBm/SSB SCS | -91 | |
|  | 1~2 | dB | 10 | 0 |
| CSI-RS-RSRPNote1 | 1~2 | dBm/SCS | -81 | -91 |
| IoNote1 | 1~2 | dBm/  95.04MHz | -51.57 | -59.86 |
|  | 1~2 | dB | 10 | 0 |
| Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 3: No additional noise is added by the test system in Test 2.  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 | | | | |

##### A.7.7.6.3.3 Test Requirements

After 640ms from the beginning of the test, the L1-SINR measurement accuracy for CSI-RS#0+CSI-RS#2 and CSI-RS#1+CSI-RS#3 of Cell 1 shall fulfil the requirements in clause 10.1.28.3. The following requirements are to be verified:

Absolute accuracy of CSI-RS#0 and absolute accuracy of CSI-RS#1. The UE is deemed to meet the requirement if the reported L1-SINR is in the range shown in Table A.7.7.6.3.3-1.

Relative accuracy of CSI-RS#0 compared with CSI-RS#1. The UE is deemed to meet the requirement if the difference in reported L1-SINR meets the requirements in Table 10.1.28.3.2-1.

Table A.7.7.6.3.3-1: L1-SINR absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2 |
| CSI-RS#0 | L1-SINR0 -δ≤ Reported SINR(dBm) ≤L1-SINR 0 +δ |
| CSI-RS#1 | L1-SINR 1 -δ≤ Reported SINR(dBm) ≤L1-SINR 1 +δ |
| Note 1: L1-SINRn is the equivalent SINR received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS#n under consideration  Note 2: δ is the SINR absolute accuracy requirement from Table 10.1.28.3.1-1. | |

### A.7.7.7 CSI-RSRP

#### A.7.7.7.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

##### A.7.7.7.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.3.2.1 and 10.1.3.2.2 for intra-frequency measurements.

##### A.7.7.7.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.7.1.2-1. Both absolute and relative accuracy of CSI-RSRP intra-frequency measurements are tested by using the parameters in Table A.7.7.7.1.2-2 and A.7.7.7.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1. The test consists of two time phases T1 and T2.

Table A.7.7.7.1.2-1: CSI-RSRP Intra frequency CSI-RSRP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.7.7.1.2-2: CSI-RSRP Intra frequency general test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | T1 | | T2 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 24 | | 100: NRB,c = 24 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | - | DLBWP.1.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - | ULBWP.1.1 | - |
| DRX cycle configuration |  | Not applicable | - | Not applicable | - |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 | OP.3 | OP.3 |
| SMTC configuration |  | SMTC.1 | | SMTC.1 | |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| CSI-RS configuration for RRM |  | CSI-RS.RRM.FR2.1 TDD | | | |
| Time offset with Cell 1 | μs | - | 0.58 | - | 0.58 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | 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. | | | | | |

Table A.7.7.7.1.2-3: CSI-RSRP Intra frequency OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | T1 | | T2 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 7 |  | Rough | | Assumption for UE beamsNote 7 | |
| Note1 | dBm/15kHzNote4 | -91.6 | | N/A | |
| Note1 | dBm/SCSNote4 | -82.6 | | N/A | |
|  | dB | 6.0 | 1.0 | N/A | N/A |
| Es | dBm/SCSNote4 |  |  | (Table B.2.2.2-2 Rx Beam Peak +2.1dB) | (Table B.2.2.2-2 Rx Beam Peak +2.1dB) |
| CSI-RS\_RPNote2 | dBm/SCS | -76.6 | -81.6 | (Table B.2.2.2-2 Rx Beam Peak +2.1dB) | (Table B.2.2.2-2 Rx Beam Peak +2.1dB) |
| BB Note6 | dB | 2.44 | -5.98 | -5.98 | -5.98 |
| IoNote2 | dBm/95.04 MHz Note4 | -50.05 | | (Table B.2.2.2-2 Rx Beam Peak +29.70dB) | |
| 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: CSI-RS\_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: 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 [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.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.7.7.7.1.3 Test Requirements

The CSI-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.2.1 and relative accuracy requirements in clause 10.1.3.2.2. The following requirements are to be verified:

During T1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported CSI-RSRP is in the range shown in table A.7.7.7.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in Table 10.1.3.2.2-1.

During T2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported CSI-RSRP is in the range shown in table A.7.7.7.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in Table 10.1.3.2.2-1.

During T1 and T2:

Relative accuracy of Cell 1 during T2 compared with Cell 1 during T1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in Table 10.1.3.2.2-1

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in Table 10.1.3.2.2-1.

Table A.7.7.7.1.3-1: CSI-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | CSI-RS\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ CSI-RS\_RP1 +δ +Gmax |
| Cell 2 | CSI-RS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ CSI-RS\_RP2 +δ +Gmax |
| Note 1: CSI-RS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.3.2.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class | |

#### A.7.7.7.2 SA inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

##### A.7.7.7.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.2.1 and 10.1.5.2.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.7.7.7.2.1-1.

Table A.7.7.7.2.1-1: Applicable NR configurations for FR2 inter-frequency CSI-RSRP accuracy test

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |

##### A.7.7.7.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.7.2.2-1 and Table A.7.7.7.2.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.7.2.2-1 and Table A.7.7.7.2.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.7.7.7.2.2-1: CSI-RSRP inter-frequency test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter |  | Unit | Test 1 | | Test 2 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| BWchannel |  |  | 100:  NRB,c = 24 | | 100:  NRB,c = 24 | |
| Gap pattern ID |  |  | 0 | | 0 | |
| Duplex mode |  |  | TDD | TDD | TDD | TDD |
| TDD configuration |  |  | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH Reference measurement channel |  |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Reference Channel |  |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| SSB configuration |  |  | SSB.3 FR2 | | SSB.3 FR2 | |
| SMTC configuration |  |  | SMTC.1 | | SMTC.1 | |
| OCNG Patterns |  |  | OP.3 | | OP.3 | |
| Initial BWP Configuration |  |  | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP configuration |  |  | DLBWP.1.3  ULBWP.1.3 | | DLBWP.1.3  ULBWP.1.3 | |
| TRS Configuration |  |  | TRS.2.1 TDD | | TRS.2.1 TDD | |
| PDCCH/PDSCH TCI Configuration |  |  | TCI.State.2 | | TCI.State.2 | |
| CSI-RS configuration for RRM |  |  | CSI-RS.RRM.FR2.1 TDD | | CSI-RS.RRM.FR2.1 TDD | |
| Time offset between Cell 2 and Cell 3 |  | μs | 0.58 | | 0.58 | |
| 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 DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| 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. | | | | | | |

Table A.7.7.7.2.2-2: SS-RSRP inter frequency OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 4b according to clause A.3.15.4.2 | | Setup 4b according to clause A.3.15.4.2 | |
| AoA1  Spherical coverage | AoA2  Rx Beam Peak | AoA1  Spherical coverage | AoA2  Rx Beam Peak |
| Note1 | dBm/15kHzNote4 | -90.6 | -90.6 | (Table B.2.3.2-2 Rx Beam Peak +1.97dB) | (Table B.2.3.2-2 Rx Beam Peak -3.03dB) |
| Assumption for UE beamsNote 7 |  | Rough | | Rough | |
| Note1 | dBm/SCSNote4 | -81.6 | -81.6 | (Table B.2.3.2-2 Rx Beam Peak +11.0dB) | (Table B.2.3.2-2 Rx Beam Peak +6.0dB) |
|  | dB | 6.0 | 6.0 | 17.0 | -1.0 |
| CSI-RS\_RPNote2 | dBm/SCS | -75.60 | -75.60 | (Table B.2.3.2-2 Rx Beam Peak +28.0dB) | (Table B.2.3.2-2 Rx Beam Peak +5.0dB) |
| (CSI-RS\_RPCell 1 – CSI-RS\_RPCell 2) | dB | 0 | | 23.00 | |
| BB Note6 | dB | 5.29 | 5.96 | 8.86 | -3.92 |
| IoNote2 | dBm/95.04 MHz Note4 | -50.03 | -50.03 | (Table B.2.3.2-2 Rx Beam Peak +52.68dB) | (Table B.2.3.2-2 Rx Beam Peak +33.13dB) |
| (Iofreq 1 – Io freq 2) | dB | 0 | | 19.55 | |
| 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: CSI-RS\_RP, Es/Iot, Io, (CSI-RS\_RPCell 2 – CSI-RS\_RPCell 1) and (Iofreq 2 – Io freq 1) 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: 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 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP or ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.7.7.7.2.3 Test Requirements

The CSI-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirements in clause 10.1.5.2.1 and the relative requirements in clause 10.1.5.2.2.

Test 1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported CSI-RSRP is in the range shown in Table A.7.7.7.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in A.7.7.7.2.3-2.

Test 2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported CSI-RSRP is in the range shown in Table A.7.7.7.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in A.7.7.7.2.3-2.

Table A.7.7.7.2.3-1: CSI-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3,4 |
| Cell 1 | CSI-RS\_RP1 -δ +Gmin +X ≤ Reported RSRP(dBm) ≤ CSI-RS\_RP1 +δ +Gmax |
| Cell 2 | CSI-RS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ CSI-RS\_RP2 +δ+Gmax |
| Note 1: CSI-RS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.5.2.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class  Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value. | |

Table A.7.7.7.2.3-2: CSI-RSRP relative accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3,4 |
| Cell 2 – Cell 1 | CSI-RS\_RP2 – CSI-RS\_RP1 -δ ≤ Reported RSRP(dB) ≤ CSI-RS\_RP2 – CSI-RS\_RP1 +δ–(X) |
| Note 1: CSI-RS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration  Note 2: δ is the RSRP relative accuracy requirement from Table 10.1.5.2.2-1  Note 3: Void  Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value. | |

### A.7.7.8 CSI-RSRQ

#### A.7.7.8.1 SA intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell

##### A.7.7.8.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.8.2.1.

##### A.7.7.8.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.8.1.2-1. The absolute accuracy of CSI-RSRQ intra-frequency measurement is tested by using the parameters in Table A.7.7.8.1.2-2 and Table A.7.7.8.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

Table A.7.7.8.1.2-1: CSI-RSRQ Intra frequency CSI-RSRQ supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.7.8.1.2-2: CSI-RSRQ Intra frequency test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | Test 2 | |
| Cell 1 | Cell 2 | Cell 1 | 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 | |
| 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 | | | |
| TRS configuration | |  | TRS.2.1 TDD |  | TRS.2.1 TDD |  |
| TCI state | |  | TCI.State.0 |  | TCI.State.0 |  |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD |  | SR.3.1 TDD |  |
| RMSI CORESET Reference Channel | |  | CR.3.1 TDD | - | CR.3.1 TDD |  |
| Control channel RMC | |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns | |  | OP.1 | OP.1 | OP.1 | OP.1 |
| Time offset with Cell 1 | | μs | - | 0.58 | - | 0.58 |
| SMTC configuration | |  | SMTC.1 | | | |
| SSB configuration | |  | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 |
| PDSCH/PDCCH subcarrier spacing | | kHz | 120 | 120 | 120 | 120 |
| CSI-RS configuration for RRM | |  | CSI-RS.RRM.FR2.1 TDD | | | |
| EPRE ratio of CSI-RS to SSS | | dB | 0 | 0 | 0 | 0 |
| 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 | |
| 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 | |
|  | | dB | 3 | 3 | -3 | -3 |
| Propagation condition | |  | 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. | | | | | | |

Table A.7.7.8.1.2-3: CSI-RSRQ Intra frequency OTA related test parameters

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Unit | Test 1 | | | Test 2 | | | |
| Cell 1 | Cell 2 | | Cell 1 | | Cell 2 | |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | Setup 1according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 9 |  | Rough | | | | | | |
| Note1 | dBm/15kHzNote4 | -95 | | | | -95 | | |
| Note1 | dBm/SCSNote3 | -86 | | | | -86 | | |
| CSI-RSRPNote2 | dBm/SCS Note4 | -83 | | -83 | | -89 | | -89 |
| CSI-RSRQ Note2 | dB | -14.77 | | -14.77 | | -16.81 | | -16.81 |
|  | dB | -1.76 | | -1.76 | | -4.76 | | -4.76 |
| IoNote2 | dBm/95.04 MHz Note4 | -50 | | | | -54 | | -54 |
| 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: CSI-RSRQ, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: CSI-RSRQ and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: NR operating band groups are as defined in Clause 3.5.2.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

##### A.7.7.8.1.3 Test Requirements

The CSI-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal CSI-RSRQ+2.5 dB to Nominal CSI-RSRQ-3.5 dB and the CSI-RSRQ measurement accuracy in test 2 shall be within the range Nominal CSI-RSRQ+3.5 dB to Nominal CSI-RSRQ-4.5 dB according to the requirements in clause 10.1.8.2.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test. Nominal RSRQ is the value shown in table A.7.7.8.1.2-3.

#### A.7.7.8.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

##### A.7.7.8.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.10.2.1 and 10.1.10.2.2 for inter-frequency measurement.

##### A.7.7.8.2.2 Test Parameters

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 A.7.7.8.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-RSRQ inter-frequency measurement are tested by using test parameters in Table A.7.7.8.2.2-2 and Table A.7.7.8.2.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A. 7.7.8.2.2-1: CSI-RSRQ Inter frequency supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.7.8.2.2-2: CSI-RSRQ Inter frequency general test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN |  | Freq1 | freq2 | freq1 | Freq2 |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| Time offset with Cell 1 | μs | - | 0.58 | - | 0.58 |
| SMTC configuration |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| CSI-RS configuration for RRM |  | CSI-RS.RRM.FR2.1 TDD | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of CSI-RS to SSS |
|  | dB | -1.75 | -1.75 | -3 | -1.75 |
| 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. | | | | | |

Table A.7.7.8.2.2-3: CSI-RSRQ Inter frequency OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| AoA setup |  | Setup 1 in clause A.3.15. | | Setup 1 in clause A.3.15. | |
| Assumption for UE beamsNote 8 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -94.03 | | -94.03 | |
| Note1 | dBm/SCSNote3 | -85.0 | | -85.0 | |
| CSI-RSRPNote2 | dBm/SCS Note4 | -86.75 | -86.75 | -88 | -88 |
| CSI-RSRQNote2 | dB | -14.75 | -14.75 | -15.56 | -15.56 |
|  | dB | -1.75 | -1.75 | -3 | -3 |
| IoNote2 | dBm/95.04 MHz Note4 | -53.8 | -53.8 | -54.25 | -54.25 |
| 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: CSI-RSRQ, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: CSI-RSRQ and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.7.7.8.2.3 Test Requirements

The CSI-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal CSI-RSRQ+2.5dB to Nominal CSI-RSRQ -3.5dB and the CSI-RSRQ measurement accuracy in test 2 shall be within the range Nominal CSI-RSRQ +3.5dB to Nominal CSI-RSRQ -4.5dB according to the requirements in clause 10.1.10.2.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test.

The CSI-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.2.2.

### A.7.7.9 CSI-SINR

#### A.7.7.9.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

##### A.7.7.9.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.13.2.1.

##### A.7.7.9.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.9.1.2-1. . The absolute accuracy of CSI-SINR intra-frequency measurement is test by using the parameters in Table A.7.7.9.1.2-2 and Table A.7.7.9.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.9.1.2-1: CSI-SINR Intra frequency CSI-SINR supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.7.9.1.2-2: CSI-SINR Intra frequency test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN |  | Freq2 | | Freq2 | |
| 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 | | | |
| 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 |  | TRS.2.1 TDD | | | |
| TCI state |  | TCI.State.0 | | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD |  | SR.3.1 TDD |  |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD |  |
| Dedicated RMSI CORESET Reference Channel |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| Time offset with Cell 1 | μs | - | 0.29 | - | 0.29 |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 | | | |
| SSB configuration |  | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 |
| CSI-RS configuration for RRM |  | CSI-RS.RRM.FR2.1 TDD | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| SS-RSSI-Measurement |  | Not Applicable | | | |
| 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\_DMRS |
| EPRE ratio of CSI-RS to SSS |
| EPRE ratio of OCNG to SSSNote 1 |
|  | dB | 4.54 | 2.66 | -3 | -3 |
| Propagation conditions |  | 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: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | |

Table A.7.7.9.1.2-3: CSI-SINR Intra frequency OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 3 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 9 |  | Rough | | Rough | |
| Note1 | dBm/15kHz Note4 | -105 | | -105 | |
| Note1 | dBm/SCS Note3 | -96 | | -96 | |
| CSI-RSRPNote2 | dBm/SCS Note4 | -91.46 | -93.34 | -99 | -99 |
| CSI-SINR Note2 | dB | 0 | -3.2 | -4.76 | -4.76 |
|  | dB | 0 | -3.2 | -4.76 | -4.76 |
| IoNote2 | dBm/95.04 MHz Note4 | -59.2 | | -64 | |
| 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: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: NR operating band groups are as defined in clause 3.5.2.  Note 7: Void  Note 8: Void  Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.7.7.9.1.3 Test Requirements

The CSI-SINR absolute measurement accuracy in test 1 shall be within the range Nominal CSI-SINR+XdB to Nominal CSI-SINR –X-1dB and the CSI-SINR measurement accuracy in test 2 shall be within the range Nominal CSI-SINR +YdB to Nominal CSI-SINR –Y-1dB according to the requirements in clause 10.1.13.2.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test. The relative CSI-SINR measurement accuracy shall fulfil the requirements in clause 10.1.13.2.1.

Editor’s note: The values of X and Y are pending on the accuracy requirement discussion

#### A.7.7.9.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

##### A.7.7.9.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.15.2.1 and 10.1.15.2.2 for inter-frequency measurement.

##### A.7.7.9.2.2 Test Parameters

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 A.7.7.9.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-SINR inter-frequency measurement are tested by using test parameters in Table A.7.7.9.2.2-2 and Table A.7.7.9.2.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.9.2.2-1: CSI-SINR Inter frequency CSI-SINR supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.7.9.2.2-2: CSI-SINR Inter frequency general test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 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 |  | 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 | | | | | |
| 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 |  | TRS.2.1 TDD | | | | | |
| TCI state |  | TCI.State.0 | | | | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Time offset with Cell 1 | μs | - | 0.29 | - | 0.29 | - | 0.29 |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| CSI-RS configuration for RRM |  | CSI-RS.RRM.FR2.1 TDD | | | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 | 120 | 120 |
| 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\_DMRS |
| EPRE ratio of OCNG to SSSNote 1 |
|  | dB | -0.5 | -0.5 | 11.0 | 11.0 | -3.0 | -3.0 |
| Propagation conditions |  | 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: CSI-SINR, CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | |

Table A.7.7.9.2.2-3: CSI-SINR Inter frequency OTA related test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration | degrees | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 10 |  | Rough | | Rough | | Rough | |
| Note1 | dBm/15kHz Note4 | -105 | | -105 | | -105 | |
| Note1 | dBm/SCS Note3 | -96 | | -96 | | -96 | |
| CSI-RSRPNote2 | dBm/SCS Note4 | -96.5 | -96.5 | -85 | -85 | -99 | -99 |
| CSI-SINRNote2 | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
|  | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
| IoNote2 | dBm/95.04 MHz Note4 | -69.3 | | -55.4 | | -65.24 | |
| 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: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: NR operating band groups are as defined in clause 3.5.2.  Note 7: Void  Note 8: Void  Note 9: Void  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.7.9.2.3 Test Requirements

The CSI-SINR absolute measurement accuracy in test 1 shall be within the range Nominal CSI-SINR +XdB to Nominal CSI-SINR –X-1dB and the CSI-SINR measurement accuracy in test 2 shall be within the range Nominal CSI-SINR +YdB to Nominal CSI-SINR –Y-1dB according to the requirements in clause 10.1.15.2.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test.

The CSI-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.2.2.

### A.7.7.10 RSTD measurements

#### A.7.7.10.1 RSTD measurement accuracy test case for single positioning frequency layer

##### A.7.7.10.1.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the accuracy requirements specified in clause 10.1.23.2 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.7.7.10.1.1-1.

Table A.7.7.10.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell. Cell 2 is a neighbour cells. Both cells are on the same NR RF channel in FR2. GP#24 is configured if UE supports GP#24, otherwise, GP#13 is configured for the test. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 9.9.2.

Table A.7.7.10.1.1-2: RSTD accuracy test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| PRS 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 | |
| Measurement gap |  | GP#24 or GP#13 | | GP#24 or GP#13 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | - | DLBWP.1.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - | ULBWP.1.1 | - |
| DRX cycle configuration |  | Not applicable | - | Not applicable | - |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| PRS configuration |  | PRS.1.2 FR2 | PRS.1.2 FR2 | PRS.1.2 FR2 | PRS.1.2 FR2 |
| PRS Resource slot offset | slot | 0 | 4 | 0 | 4 |
| Expected RSTD | μs | N/A | 3 | N/A | 3 |
| Expected RSTD uncertainty | μs | N/A | 5 | N/A | 5 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |
| EPRE ratio of PRS to SSS | dB | 0 | 0 | 0 | 0 |
| Propagation conditions |  | 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 other than those in the slots with transmitted PRS. | | | | | |

Table A.7.7.10.1.1-3: RSTD accuracy OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 5 |  | Rough | | Rough | |
| Note1 | dBm/SCSNote3 | -98 | | -98 | |
| PRS | dB | -5.7 | -11.9 | -5.7 | -11.9 |
| PRPNote2 | dBm/SCS | -103.7 | -109.9 | -103.7 | -109.9 |
| PRS | dB | -6 | -13 | -6 | -13 |
| IoNote2 | dBm/95.04 MHz Note3 | -67.76 | -67.76 | -67.76 | -67.76 |
| 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: PRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. The Io is calculated based only on the symbols in which PRS is transmitted.  Note 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 4: Calculation of Es/Iot 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.  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 | | | | | |

##### A.7.7.10.1.2 Test Requirements

The RSTD measurement accuracy for Cell 2 shall fulfil the absolute requirement in clause 10.1.23.2.

#### A.7.7.10.2 RSTD measurement accuracy test case for dual positioning frequency layer

##### A.7.7.10.2.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the accuracy requirements specified in clause 10.1.23.2 in an environment with AWGN propagation conditions. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 9.9.2.

The supported test configurations are specified in Table A.7.7.10.2.1-1.

Table A.7.7.10.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell on NR RF channel #1 in FR2. Cell 2 is a neighbour cell on a different NR RF channel #2 in FR2. GP#24 is configured if UE supports GP#24, otherwise, GP#13 is configured for the test.

Table A.7.7.10.2.1-2: RSTD accuracy test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| PRS ARFCN |  | freq1 | freq2 | freq1 | freq2 |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Measurement gap |  | GP#24 or GP#13 | | GP#24 or GP#13 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | - | DLBWP.1.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - | ULBWP.1.1 | - |
| DRX cycle configuration |  | Not applicable | - | Not applicable | - |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| PRS configuration |  | PRS.1.1 FR2 | PRS.1.1 FR2 | PRS.1.2 FR2 | PRS.1.2 FR2 |
| PRS Resource slot offset | slot | 0 | 4 | 0 | 4 |
| Expected RSTD | μs | N/A | 3 | N/A | 3 |
| Expected RSTD uncertainty | μs | N/A | 5 | N/A | 5 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |
| EPRE ratio of PRS to SSS | dB | 0 | 0 | 0 | 0 |
| Propagation conditions |  | 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 other than those in the slots with transmitted PRS. | | | | | |

Table A.7.7.10.2.1-3: RSTD accuracy OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 5 |  | Rough | | Rough | |
| Note1 | dBm/SCSNote3 | -98 | | -98 | |
| PRS | dB | -6 | -13 | -6 | -13 |
| PRPNote2 | dBm/SCS | -104 | -111 | -104 | -111 |
| PRS | dB | -6 | -13 | -6 | -13 |
| IoNote2 | dBm/95.04 MHz Note3 | -68.04 | -68.80 | -68.04 | -68.80 |
| 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: PRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. The Io is calculated based only on the symbols in which PRS is transmitted.Note 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 4: Calculation of Es/Iot 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.  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 | | | | | |

##### A.7.7.10.2.2 Test Requirements

The RSTD measurement accuracy for Cell 2 shall fulfil the absolute requirement in clause 10.1.23.2.

#### A.7.7.10.3 RSTD measurement accuracy test case with reduced number of samples for single positioning frequency layer in FR2 in RRC\_CONNECTED state

##### A.7.7.10.3.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the accuracy requirements specified in clause 10.1.23.2 in an environment with AWGN propagation conditions. In this test UE that supports *supportedDL-PRS-ProcessingSamples* is configured by LMF to perform PRS measurement with reduced number of samples.

The supported test configurations are specified in Table A.7.7.10.3.1-1.

Table A.7.7.10.3.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell. Cell 2 is a neighbour cell. Both cells are on the same NR RF channel in FR2. GP#24 is configured if UE supports GP#24, otherwise, GP#13 is configured for the test. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the UE before the start of the test. The test duration should be longer than the UE measurement period as defined in clause 9.9.2.7.

Table A.7.7.10.3.1-2: RSTD accuracy test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| PRS 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 | - | DLBWP.0.1 | - |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | - | DLBWP.1.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - | ULBWP.1.1 | - |
| DRX cycle configuration |  | Not applicable | - | Not applicable | - |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 | OP.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| PRS configuration |  | PRS.1.4 FR2 | PRS.1.4 FR2 | PRS.1.4 FR2 | PRS.1.4 FR2 |
| PRS BW |  | 48 PRBs | | | |
| PRS Resource slot offset | slot | 0 | 4 | 0 | 4 |
| Expected RSTD | μs | N/A | 3 | N/A | 3 |
| Expected RSTD uncertainty | μs | N/A | 5 | N/A | 5 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |
| Propagation conditions |  | 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. | | | | | |

Table A.7.7.10.3.1-3: RSTD accuracy OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 5 |  | Rough | | Rough | |
| Note1 | dBm/SCSNote3 | -98 | | -98 | |
|  | dB | -3 | 5 | -3 | 5 |
| PRS-RSRPNote2 | dBm/SCS | -101 | -93 | -101 | -93 |
| SS-RSRPNote2 | dBm/SCS | -89.7 | N/A | -89.7 | N/A |
| BB Note4 | dB | -3 | 5 | -3 | 5 |
| IoNote2 | dBm/95.04 MHz Note3 | -68.5 | -66.9 | -68.5 | -66.9 |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 4: 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 [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.  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 | | | | | |

##### A.7.7.10.3.2 Test Requirements

The RSTD measurement accuracy for Cell 2 shall fulfil the absolute requirement in clause 10.1.23.2.

#### A.7.7.10.4 RSTD measurement accuracy test case with Rx TEG

##### A.7.7.10.4.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement when the measurements of reference cell and neighbor cell are within the same Rx TEG meets the accuracy requirements specified in clause 10.1.23.2 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.7.7.10.4.1-1.

Table A.7.7.10.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell. Cell 2 is a neighbour cell. Both cells are on the same NR RF channel in FR2. GP#24 is configured if UE supports GP#24, otherwise, GP#13 is configured for the test. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the UE before the start of the test.

The UE is requested to provide the Rx TEG in the test via *nr-UE-RxTEG-Request-r17* in *NR-TDOA-RequestLocationInformation*.

The test applies to the UE supporting *Rx TEG* defiend in *NR-UE-TEG-Capability* and reporting the same Rx TEG for the measurements of reference cell and neighbour cell.

Table A.7.7.10.4.1-2: RSTD accuracy test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| PRS 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 | - | DLBWP.0.1 | - |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | - | DLBWP.1.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - | ULBWP.1.1 | - |
| DRX cycle configuration |  | Not applicable | - | Not applicable | - |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| PRS configuration |  | PRS.1.1 FR2 | PRS.1.1 FR2 | PRS.1.2 FR2 | PRS.1.2 FR2 |
| PRS Resource slot offset | slot | 0 | 4 | 0 | 4 |
| Expected RSTD | μs | N/A | 3 | N/A | 3 |
| Expected RSTD uncertainty | μs | N/A | 5 | N/A | 5 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |
| EPRE ratio of PRS to SSS |  |  |  |  |  |
| Propagation conditions |  | 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. | | | | | |

Table A.7.7.10.4.1-3: RSTD accuracy OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 5 |  | Rough | | Rough | |
| Note1 | dBm/SCSNote3 | -98 | | -98 | |
| PRS | dB | -5 | -11 | -5 | -11 |
| PRPNote2 | dBm/SCS | -103 | -109 | -103 | -109 |
| PRS  Note4 | dB | -5.33 | -12.19 | -5.33 | -12.19 |
| IoNote2 | dBm/95.04 MHz Note3 | -67.57 | -67.57 | -67.57 | -67.57 |
| 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: PRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 4: Calculation of Es/Iot 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.  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 | | | | | |

##### A.7.7.10.4.2 Test Requirements

The RSTD measurement for Cell 1 and Cell 2 should both fulfil the absolute accuracy requirements with same Rx TEG for reference cell and neighbour cell defined in clause 10.1.23.2.

### A.7.7.11 PRS-RSRP measurements

#### A.7.7.11.1 SA measurement accuracy with PRS in FR2

##### A.7.7.11.1.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.24.2.1 and 10.1.24.2.2.

##### A.7.7.11.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.11.1.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in Table A.7.7.11.1.2-2 and A.7.7.11.1.2-3. In all test cases, Cell 1 is the PCell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.11.1.2-1: PRS-RSRP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.7.11.1.2-2: PRS-RSRP general test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Cell ID |  | 489 | 0 | 489 | 0 |
| SSB ARFCN |  | freq1 | | freq1 | |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 24 | | 100: NRB,c = 24 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | - | DLBWP.1.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - | ULBWP.1.1 | - |
| DRX cycle configuration |  | Not applicable | - | Not applicable | - |
| Measurement gap |  | GP#13 or GP#24 Note2 | | | |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| Expected RSTD | μs | 3 | | | |
| Expected RSTD uncertainty | μs | 5 | | | |
| PRS configuration |  | PRS.1.3 FR2 | PRS.1.3 FR2 | PRS.1.4 FR2 | PRS.1.4 FR2 |
| PRS Resource slot offset | slot | 0 | 4 | 0 | 4 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |
| EPRE ratio of PRS to SSS | dB | 0 | 0 | 0 | 0 |
| Propagation conditions |  | 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: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | | |

Table A.7.7.11.1.2-3: PRS-RSRP OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 7 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -91.6 | | -91.6 | |
| Note1 | dBm/SCSNote4 | -82.6 | | -82.6 | |
| PRS | dB | -3 | -10 | -3 | -10 |
| PRPNote2 | dBm/SCS | -85.6 | -92.6 | -85.6 | -92.6 |
| PRS | dB | -3.41 | -11.76 | -3.41 | -11.76 |
| IoNote2 | dBm/95.04 MHz Note4 | -51.57 | | -51.57 | |
| 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: PRP, 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: Calculation of Es/Iot 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.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.7.7.11.1.3 Test Requirements

In each test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1.24.2.1 if the reported PRS-RSRP is in the range shown in table A.7.7.11.1.3-1. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1.24.2.2.

Table A.7.7.11.1.3-1: PRS-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| Note 1: PRS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration.  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.24.2.1-2, selected according to the Io used in the test.  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.6.1-1, selected according to the UE power class | |

#### A.7.7.11.2 SA measurement accuracy with PRS in FR2 with reduced sample number

##### A.7.7.11.2.1 Test Purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRP measurement with reduced sample number is within the specified limits. This test will verify the requirements in clauses 10.1.24.2.1 and 10.1.24.2.2.

##### A.7.7.11.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.11.2.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in Table A.7.7.11.2.2-2 and A.7.7.11.2.2-3. In all test cases, Cell 1 is the PCell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.11.2.2-1: PRS-RSRP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.7.11.2.2-2: PRS-RSRP general test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| Cell ID |  | 489 | 0 |
| SSB ARFCN |  | freq1 | |
| Duplex mode |  | TDD | |
| TDD configuration |  | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | |
| 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 |  | Not applicable | - |
| Measurement gap |  | GP#13 or GP#24 Note2 | |
| TRS configuration |  | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 |
| PRS configuration |  | PRS.1.4 FR2 | PRS.1.4 FR2 |
| PRS BW | RB | 64 | 64 |
| PRS Resource slot offset | slot | 0 | 4 |
| 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 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation conditions |  | 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: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | |

Table A.7.7.11.2.2-3: PRS-RSRP OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 7 |  | Rough | |
| Note1 | dBm/15kHzNote4 | -91.6 | |
| Note1 | dBm/SCSNote4 | -82.6 | |
|  | dB | -6 | -6 |
| Es | dBm/SCSNote4 | - | - |
| PRS\_RPNote2 | dBm/SCS | -88.6 | -88.6 |
| SSB\_RP Note2 | dBm/SCS | -88.6 | -88.6 |
| BB Note6 | dB | -6 | -6 |
| IoNote2 | dBm/95.04 MHz Note4 | -52.64 | |
| 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, PRS\_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: 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 [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.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | |

##### A.7.7.11.2.3 Test Requirements

In the test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1.24.2.1 if the reported PRS-RSRP is in the range shown in table A.7.7.11.2.3-1. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1.24.2.2.

Table A.7.7.11.2.3-1: PRS-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| Note 1: PRS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration.  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.24.2.1-2, selected according to the Io used in the test.  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.6.1-1, selected according to the UE power class | |

### A.7.7.12 UE Rx-Tx time difference measurements

#### A.7.7.12.1 UE Rx-Tx time difference measurement accuracy for single positioning frequency layer in FR2 SA

##### A.7.7.12.1.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx time difference measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.25.2. The test is conducted in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configuration is listed in Table A.7.7.12.1.1-1.

Table A.7.7.12.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). Both cells are on the same RF channel in FR2.

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE before the start of the test.

The UE is configured with measurement gap pattern ID #13 or ID #24 before the test.

The UE is configured to transmit positioning SRS on Cell 1 during the test.

The test equipment measures the transmit timing of the UE using the transmitted SRS and measures the receive timing using the PRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE for each cell.

##### A.7.7.12.1.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.7.7.12.1.2-1.

Table A.7.7.12.1.2-1: UE Rx-Tx time difference measurement accuracy test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Test 1 | | Test 2 | |
|  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 |  | 1 | Rough | Rough | Rough | Rough |
| Measurement gap |  | 1 | GP#24 or GP#13 Note 8 | | GP#24 or GP#13 Note 8 | |
| DRX |  | 1 | OFF | | OFF | |
| Time offset with Cell 1 | μs | 1 | N/A | 3 | N/A | 3 |
| TDD configuration |  | 1 | TDDConf.3.1 | TDDConf.3.1 | TDDConf.3.1 | TDDConf.3.1 |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | N/A | SR.3.1 TDD | N/A |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | N/A | CR.3.1 TDD | N/A |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | N/A | CCR.3.1 TDD | N/A |
| OCNG Patterns |  | 1 | OP.1 | OP.1 | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS | dB | 1 | 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 DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.2.1 TDD | N/A | TRS.2.1 TDD | N/A |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | N/A | DLBWP.0.1 ULBWP.0.1 | N/A |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | N/A | DLBWP.1.1 | N/A |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | N/A | ULBWP.1.1 | N/A |
| PRS configuration |  | 1 | PRS.1.1 FR2 | PRS.1.1 FR2 | PRS.1.2 FR2 | PRS.1.2 FR2 |
| PRS Resource slot offset | slot | 1 | 0 | 4 | 0 | 4 |
| SRS configuration |  | 1 | POS-SRS.3 | N/A | POS-SRS.3 | N/A |
| Note 2 | dBm/SCS | 1 | -89 | | -89 | |
| Note 2 | dBm/15 kHz | 1 | -98 | | -98 | |
| PRS | dB | 1 | -2.41 | -12.12 | -2.41 | -12.12 |
| PRS | dB | 1 | -2 | -10 | -2 | -10 |
| PRP Note 3 | dBm/SCS kHz | 1 | -91 | -99 | -91 | -99 |
| Io | dBm/95.04 MHz | 1 | -57.63 | -57.63 | -57.63 | -57.63 |
| Propagation Condition |  | 1 | AWGN | | AWGN | |
| Note 1: Void.  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: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | | | |

Table A.7.7.12.1.2-2: Void

##### A.7.7.12.1.3 Test requirements

The UE Rx-Tx time difference measurement fulfils the UE Rx-Tx measurement accuracy requirements specified in clause 10.1.25.2 for both Cell 1 and Cell 2.

#### A.7.7.12.2 UE Rx-Tx time difference measurement accuracy with reduced number of samples in FR2 SA

##### A.7.7.12.2.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx time difference measurement accuracy with reduced number of samples is within the specified limits. This test will verify the requirements in clause 10.1.25.2. The test is conducted in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configuration is listed in Table A.7.7.12.2.1-1.

**Table A.7.7.12.2.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on the same RF channel in FR2.

The *NR-Multi-RTT-ProvideAssistanceData* and *NR-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE before the start of the test.

The UE is configured to measure UE Rx-Tx time difference using reduced number of samples via *requestedDL-PRS-ProcessingSamples* in *NR-Multi-RTT-RequestLocationInformation* during the test.

The UE is configured with measurement gap pattern ID #13 or ID #24 before the test.

The UE is configured to transmit positioning SRS on Cell 1 during the test.

The test equipment measures the transmit timing of the UE using the transmitted SRS and measures the receive timing using the PRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE for each cell.

##### A.7.7.12.2.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.7.7.12.2.2-1.

Table A.7.7.12.2.2-1: UE Rx-Tx time difference measurement accuracy test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Test 1 | |
|  | Cell 1 | Cell 2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 |  | 1 | Rough | Rough |
| Measurement gap |  | 1 | GP#24 or GP#13 Note 8 | |
| DRX |  | 1 | OFF | |
| Time offset with Cell 1 | μs | 1 | N/A | 3 |
| TDD configuration |  | 1 | TDDConf.3.1 | TDDConf.3.1 |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | N/A |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | N/A |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | N/A |
| OCNG Patterns |  | 1 | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS | dB | 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 DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.2.1 TDD | N/A |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | N/A |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | N/A |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | N/A |
| PRS configuration |  | 1 | PRS.1.1 FR2 | PRS.1.1 FR2 |
| PRS BW |  | 1 | 48 PRBs | 48 PRBs |
| PRS Resource slot offset | slot | 1 | 0 | 4 |
| SRS configuration |  | 1 | POS-SRS.3 | N/A |
| Note 2 | dBm/SCS | 1 | -89 | |
| Note 2 | dBm/15 kHz | 1 | -98 | |
| PRS | dB | 1 | -1.76 | -6.01 |
| PRS | dB | 1 | 0 | -3 |
| PRP Note 3 | dBm/SCS kHz | 1 | -89 | -92 |
| Io | dBm/95.04 MHz | 1 | -56.03 | -56.03 |
| Propagation Condition |  | 1 | AWGN | |
| Note 1: Void.  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: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | |

##### A.7.7.12.2.3 Test requirements

The UE Rx-Tx time difference measurement with reduced number of samples fulfils the UE Rx-Tx measurement accuracy requirements specified in clause 10.1.25.2 for both Cell 1 and Cell 2.

#### A.7.7.12.3 UE Rx-Tx time difference measurement accuracy with RxTx TEG

##### A.7.7.12.3.1 Test purpose and environment

The purpose of the test is to verify that the relative UE Rx-Tx time difference measurement accuracy when the two measurements are within the same RxTx TEG is within the specified limits. This test will verify the requirements in clause 10.1.25.x. The test is conducted in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configuration is listed in Table A.7.7.12.3.1-1.

Table A.7.7.12.3.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). Both cells are on the same RF channel in FR2.

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE before the start of the test.

The UE is requested to provide the RxTx TEG in the test via *nr-UE-RxTxTEG-Request-r17* in *NR-Multi-RTT-RequestLocationInformation*.

The test applies to the UE supporting *RxTx TEG* defiend in *NR-UE-TEG-Capability* and reporting the same RxTx TEG for the two UE Rx-Tx measurements.

The UE is configured with measurement gap pattern ID #13 or ID #24 before the test.

The UE is configured to transmit positioning SRS on Cell 1 during the test.

The test equipment measures the transmit timing of the UE using the transmitted SRS and measures the receive timing using the PRS. The UE Rx-Tx time difference is derived by the difference of the receiving timing and the transmit timing for each cell.

##### A.7.7.12.3.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.7.7.12.3.2-1.

Table A.7.7.12.3.2-1: UE Rx-Tx time difference measurement accuracy test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Test 1** | | **Test 2** | |
|  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 |  | 1 | Rough | Rough | Rough | Rough |
| Measurement gap |  | 1 | GP#24 or GP#13 Note 8 | | GP#24 or GP#13 Note 8 | |
| DRX |  | 1 | OFF | | OFF | |
| Time offset with Cell 1 | μs | 1 | N/A | 3 | N/A | 3 |
| TDD configuration |  | 1 | TDDConf.3.1 | TDDConf.3.1 | TDDConf.3.1 | TDDConf.3.1 |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | N/A | SR.3.1 TDD | N/A |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | N/A | CR.3.1 TDD | N/A |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | N/A | CCR.3.1 TDD | N/A |
| OCNG Patterns |  | 1 | OP.1 | OP.1 | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS | dB | 1 | 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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.2.1 TDD | N/A | TRS.2.1 TDD | N/A |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | N/A | DLBWP.0.1 ULBWP.0.1 | N/A |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | N/A | DLBWP.1.1 | N/A |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | N/A | ULBWP.1.1 | N/A |
| PRS configuration |  | 1 | PRS.1.1 FR2 | PRS.1.1 FR2 | PRS.1.2 FR2 | PRS.1.2 FR2 |
| PRS Resource slot offset | slot | 1 | 0 | 4 | 0 | 4 |
| SRS configuration |  | 1 | POS-SRS.3 | N/A | POS-SRS.3 | N/A |
| Note 2 | dBm/SCS | 1 | -89 | | -89 | |
| Note 2 | dBm/15 kHz | 1 | -98 | | -98 | |
| PRS | dB | 1 | -5.33 | -12.19 | -5.33 | -12.19 |
| PRS | dB | 1 | -5 | -11 | -5 | -11 |
| PRP Note 3 | dBm/SCS kHz | 1 | -94 | -100 | -94 | -100 |
| Io | dBm/95.04 MHz | 1 | -58.57 | -58.57 | -58.57 | -58.57 |
| Propagation Condition |  | 1 | AWGN | | AWGN | |
| Note 1: Void.  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: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | | | |

##### A.7.7.12.3.3 Test requirements

The relative accuracy is derived by the difference of the UE Rx-Tx measurements on the two cells.

The UE Rx-Tx time difference measurements for Cell 1 and Cell 2 fulfil the relative UE Rx-Tx measurement accuracy requirements specified in clause 10.1.25.x.

### A.7.7.13 PRS-RSRPP measurements

#### A.7.7.13.1 SA measurement accuracy with PRS in FR2

##### A.7.7.13.1.1 Test Purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRPP measurement in RRC\_CONNECTED is within the specified limits. This test will verify the requirements in clauses 10.1.24.X.y and 10.1.24.X.z.

##### A.7.7.13.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.13.1.2-1. Both absolute and relative accuracy of PRS-RSRPP measurements are tested by using the parameters in Table A.7.7.131.2-2 and A.7.7.13.1.2-3. In all test cases, Cell 1 is the PCell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.13.1.2-1: PRS-RSRPP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.7.13.1.2-2: PRS-RSRPP general test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Cell ID |  | 489 | 0 | 489 | 0 |
| SSB ARFCN |  | freq1 | | freq1 | |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 24 | | 100: NRB,c = 24 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | - | DLBWP.1.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - | ULBWP.1.1 | - |
| DRX cycle configuration |  | Not applicable | - | Not applicable | - |
| Measurement gap |  | GP#13 or GP#24 Note2 | | | |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 | OP.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PRS configuration |  | PRS.1.3 FR2 | PRS.1.3 FR2 | PRS.1.4 FR2 | PRS.1.4 FR2 |
| PRS Resource slot offset | slot | 0 | 4 | 0 | 4 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |
| Propagation conditions |  | Two-tap channel defined in 38.101-4 Annex B.2.4,  *a* = 1, µs and Hz | | | |
| 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: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | | |

Table A.7.7.13.1.2-3: PRS-RSRPP OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
|  |  | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 7 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -91.6 | | Test 1 | |
| Note1 | dBm/SCSNote4 | -82.6 | | Test 1 | |
|  | dB | 6.0 | 1.0 | 6.0 | 1.0 |
| Es | dBm/SCSNote4 | - | - | - | - |
| PRS\_RPNote2 | dBm/SCS | -76.6 | -81.6 | -76.6 | -81.6 |
| BB Note6 | dB | 2.44 | -5.98 | 2.44 | -5.98 |
| IoNote2 | dBm/95.04 MHz Note4 | -50.05 | | -50.05 | |
| 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: PRS\_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: 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 [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.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.7.7.13.1.3 Test Requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1.24.X.y if the reported PRS-RSRPP is in the range shown in table A.7.7.13.1.2-1. The relative PRS-RSRPP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1.24.X.z.

Table A.7.7.13.1.3-1: PRS-RSRPP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| Note 1: PRS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration.  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.24.2.1-2, selected according to the Io used in the test.  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.6.1-1, selected according to the UE power class | |

#### A.7.7.13.2 SA measurement accuracy with reduced PRS samples in FR2

##### A.7.7.13.2.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRPP measurement accuracy with = 1 in FR2 is within the specified limits. This test will verify the requirements in clauses [10.1.24.Z.1] and [10.1.24.Z.2].

The UE under test should support [*supportedDL-PRS-ProcessingSamples* ], and the TE indicates the UE to perform positioning measurements with reduced number of samples. The PRS bandwidth is contained within the active BWP and the power difference between the serving cell SS-RSRP and neighbour cell PRS-RSRP is within [6] dB, so that = 1 is assumed.

##### A.7.7.13.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.13.2.2-1. Both absolute and relative accuracy of PRS-RSRPP measurements are tested by using the parameters in Table A.7.7.13.2.2-2 and A.7.7.13.2.2-3. In all test cases, Cell 1 is the PCell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

**Table A.7.7.13.2.2-1: PRS-RSRPP supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

**Table A.7.7.13.2.2-2: PRS-RSRPP general test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| Cell ID |  | 489 | 0 |
| SSB ARFCN |  | freq1 | |
| Duplex mode |  | TDD | |
| TDD configuration |  | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 24 | |
| 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 |  | Not applicable | - |
| Measurement gap |  | GP#13 or GP#24 Note2 | |
| TRS configuration |  | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 |
| PRS configuration |  | PRS.1.4 FR2 | PRS.1.4 FR2 |
| PRS bandwidth |  | 48 PRBs | 48 PRBs |
| PRS Resource slot offset | slot | 0 | 4 |
| 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 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation conditions |  | [Two-tap channel] Note3 | |
| 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: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured.  Note 3: The two-tap channel model is defined in 38.101-4 Annex B.2.4 (a = 1, τd=0.45 µs and fD=5 Hz). | | | |

Table A.7.7.13.2.2-3: PRS-RSRPP OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 7 |  | Rough | |
| Note1 | dBm/15kHzNote4 | -91.6 | |
| Note1 | dBm/SCSNote4 | -82.6 | |
|  | dB | 6.0 | 1.0 |
| Es | dBm/SCSNote4 | - | - |
| PRS\_RPNote2 | dBm/SCS | -76.6 | -81.6 |
| SS\_RPNote2 | dBm/SCS | -76.6 | -81.6 |
| BB Note6 | dB | 2.44 | -5.98 |
| IoNote2 | dBm/95.04 MHz Note4 | -50.05 | |
| 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: PRS\_RP, SS\_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: 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 [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.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | |

##### A.7.7.13.2.3 Test Requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause [10.1.24.Z.1] if the reported PRS-RSRPP is in the range shown in table A.7.7.13.2.3-1. The relative PRS-RSRPP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause [10.1.24.Z.2].

**Table A.7.7.13.2.3-1: PRS-RSRPP absolute accuracy test requirement**

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRPP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRPP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| Note 1: PRS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration.  Note 2: δ is the RSRP absolute accuracy requirement from Table [10.1.24.Z.1-2], selected according to the Io used in the test.  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.6.1-1, selected according to the UE power class | |

## A.7.8 Measurement procedure in RRC\_INACTIVE

### A.7.8.1 RSTD measurements

#### A.7.8.1.1 NR RSTD measurement reporting delay test case for single positioning frequency layer in FR2 SA in RRC\_INACTIVE state

##### A.7.8.1.1.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 5.6.2.5 in an environment with AWGN propagation conditions in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are specified in Table A.7.8.1.1.1-1.

Table A.7.8.1.1.1-1: Supported test configurations for NR RSTD

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel distributed in single positioning frequency layers.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall be in RRC\_CONNECTED state and shall not have any timing information of Cell 2 and Cell3. During T2 UE shall be in RRC\_INACTIVE state and all cells transmit PRS resources within initial DL BWP of the UE and with the same numerology as the initial DL BWP.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The *NR-DL-TDOA-ProvideAssistanceData* and *nr-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request.

The beginning of the time interval T2 shall be aligned with the first DRX cycle containing a DL PRS resource(s).

The UE is configured with DRX cycle of 0.64s.

The general test parameters are listed in Table A.7.8.1.1.1-2, and cell specific test parameters are listed in Table Table A.7.8.1.1.1-3 and Table A.7.8.1.1.1-4.

Table A.7.8.1.1.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| BWchannel | | MHz | 100: NRB,c = 66 |  |
| SSB configuration | Config 1 |  | SSB.2 FR2 |  |
| SMTC configuration | Config 1 |  | SMTC.1 |  |
| PDSCH RMC configuration | Config 1 |  | SR.1.1 FDD |  |
| RMSI CORESET RMC configuration | Config 1 |  | CR.3.1 TDD | As specified in clause A.3.1.2.1 |
| Dedicated CORESET RMC configuration | Config 1 |  | CR.1.1 FDD |  |
| PRS Configuration | Config 1 |  | PRS.1.4. FR2 | As specified in clause A.3. 31 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | | s | 0.64 |  |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 16 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [24] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | [1.28] | The length of the time interval that follows immediately after time interval T1 |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Beam assumption | |  | Rough | Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

Table A.7.8.1.1.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.5 FDD | N/A | N/A |
| Note 3 | Config 1 | dBm/SCS | -89 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  95.04MHz | -58.86 | -60.01 | -60.01 |
| SSB RP Note4 | Config 1 | dBm/SCS | -89 | -Infinity | -Infinity |
|  |  | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The resources for uplink transmission are assigned after the end of time period T2 to UEs that do not support SDT for measurement reporting.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.7.8.1.1.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
|  | |  | T2 | T2 | T2 |
| RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| PRACH configuration | |  | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 |
| Note 3 | Config 1 | dBm/SCS | -89 | -89 | -89 |
| PRS | Config 1 | dB | -5.44 | -11.67 | -11.67 |
| Io | Config 1 | dBm/  9.36MHz | -59.65 | -59.92 | -59.92 |
| PRS | | dB | -6 | -13 | -13 |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  Note 2: The resources for uplink transmission are assigned after the end of time period T2 to UEs that do not support SDT for measurement reporting.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | |

##### A.7.8.1.1.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 5.6.2.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 5.6.2.5 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1.23.3, i.e., between RSTD\_0000000 and RSTD\_1970049.

#### A.7.8.1.2 NR RSTD measurement reporting delay test case with reduced number of samples in RRC\_INACTIVE, FR1 SA

##### A.7.8.1.2.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 5.6.2 in an environment with AWGN propagation conditions in FR2 in standalone scenario when single-sample measurements are requested by the LMF. This test is applicable to UEs that support [FG 14-2 PRS measurement for reduced sample in RRC\_inactive state].

The supported test configurations are specified in Table A.7.8.1.2.1-1.

Table A.7.8.1.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All 3 cells are on the same RF channel in FR2.

The test consists of two consecutive time intervals, with duration of T1 and T2. The UE shall be in RRC\_CONNECTED state during T1 and in RRC\_INACTIVE state during T2. During time duration T1, the UE shall not have any timing information of Cell 2 and Cell 3. All three cells transmit PRS during T2. PRS resources from all three cells are transmitted within the initial DL BWP of the UE and with the same numerology as the initial DL BWP.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The beginning of the time interval T2 shall be aligned with the beginning of the first DRX cycle in RRC\_INACTIVE.

The *NR-DL-TDOA-ProvideAssistanceData* and *nr-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request.

The *nr-DL-TDOA-RequestLocationInformation* IE should indicate to the UE that single-sample measurements are requested, i.e. requestedDL-PRS-ProcessingSamples-r17 is set to m1.

The general test parameters are listed in Table A.7.8.1.2.1-2, and cell specific test parameters are listed in Table A.7.8.1.2.1-3 and A.7.8.1.2.1-4.

Table A.7.8.1.2.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| SSB configuration | Config 1 |  | SSB.2 FR2 |  |
| SMTC configuration | Config 1 |  | SMTC.1 |  |
| Initial BWP configuration | Config 1 |  | DLBWP.0.1  ULBWP.0.1 |  |
| PDSCH RMC configuration | Config 1 |  | SR.1.1 FDD |  |
| RMSI CORESET RMC configuration | Config 1 |  | CR.3.1 TDD | As specified in clause A.3.1.2.1 |
| Dedicated CORESET RMC configuration | Config 1 |  | CR.1.1 FDD |  |
| PRS Configuration | Config 1 |  | PRS.1.2 FR2 | As specified in clause A.3. 31.  The number of PRS RBs is the same as for the channel BW. |
| PRS Resource slot offset | Config 1 | slots | Cell 1, 2, 3: 0 |  |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX cycle length | | s | 0.64 |  |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 16 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [24] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | [5] | The length of the time interval that follows immediately after time interval T1 |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Beam assumption | |  | Rough | Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

Table A.7.8.1.2.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | N/A | N/A |
| Note 3 | Config 1 | dBm/SCS | -89 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  95.04MHz | -57.01 | -57.01 | -57.01 |
| SSB RP Note4 | Config 1 | dBm/SCS | -89 | -Infinity | -Infinity |
|  |  | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.7.8.1.2.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| T2 | T2 | T2 |
| RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| PRACH configuration | |  | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 |
| Note 3 | Config 1 | dBm/SCS | -89 | -89 | -89 |
| PRS | Config 1 | dB | 0 | -3 | -3 |
| Io Note 4 | Config 1 | dBm/  95.04MHz | -56.03 | -58.25 | -56.03 |
| PRS | | dB | 0 | -3 | -3 |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that all active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols, except for slots where PRS is transmitted by any of the cells.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: Io levels apply only for symbols where PRS is transmitted. | | | | | |

##### A.7.8.1.2.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 5.6.2.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 5.6.2.5 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1.23.3, i.e., between RSTD\_0000000 and RSTD\_1970049.

### A.7.8.2 PRS-RSRP measurements

#### A.7.8.2.1 PRS-RSRP reporting delay test case for single positioning frequency layer in RRC\_INACTIVE

##### A.7.8.2.1.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRP measurement requirements specified in Clause 5.6.3.5 for single positioning frequency layer under AWGN propagation conditions in RRC\_INACTIVE. Supported test configurations are shown in table A.7.8.2.1.1-1

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell.

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. Both cells transmit PRS during T2.

During T1 UE is in RRC\_CONNECTED, the *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n. In the next DL slot after slot #n, UE is released into RRC\_INACTIVE.

The beginning of the time interval T2 is the first PRS resource occasion occurring ΔT after the slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The test parameters are as given in table A.7.81. 2.1.1-2, and table A.7.8.2.1.1-3.

Table A.7.8.2.1.1-1: supported test configurations for PRS RSRP measurement for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.8.2.1.1-2: General test parameters for PRS RSRP measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| CP length |  | Config 1 | Normal |  |
| DRX |  | Config 1 | 0.64s |  |
| Time offset between serving and neighbour cells |  | Config 1 | 3μs | Synchronous cells. |
| Expected RSTD | μs | Config 1 | 3 |  |
| Expected RSTD uncertainty | μs | Config 1 | 5 |  |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | [41] |  |

Table A.7.8.2.1.1-3: Cell-specific test parameters for PRS RSRP measurement reporting delay

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.3.1 TDD | | - | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| PRS configuration | |  | Config 1 | PRS.1.2 FR2 | | PRS.1.2 FR2 | |
| PRS muting configuration | |  | Config 1 | ‘10’ | | ‘01’ | |
| 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 | 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 Note5 |  | -102 | | -102 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -93 | | -93 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -Infinity | -86.7 |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -Infinity | -96 | -Infinity | -103 |
| PRS | | dB | Config 1 | -Infinity | -3 | -Infinity | -10 |
| PRS | | dB | Config 1 | -Infinity | -3 | -Infinity | -10 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -58.56 | | -55.38 | |
| Propagation Condition | |  | Config 1 | 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/PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.8.2.1.2 Test Requirements

The PRS RSRP measurement time fulfils the requirements specified in Clause 5.6.3.5.The UE shall perform and report the PRS RSRP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 5.6.3.5 starting from the beginning of time interval T2.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRP measurement for each correct event shall be within the PRS RSRP reporting range specified in Clause 10.1.24.3, i.e., between PRS RSRP\_0 and PRS RSRP\_126.

#### A.7.8.2.2 PRS-RSRP reporting delay test case with reduced number of samples in RRC\_INACTIVE

##### A.7.8.2.2.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRP measurement meets the delay requirements specified in clause 5.6.3.5 in an environment with AWGN propagation conditions when single-sample measurements are requested by the LMF. This test is applicable to UEs that support [FG 14-2 PRS measurement for reduced sample in RRC\_inactive state].

The supported test configurations are specified in Table A.7. 8.2.2.1-1.

Table A.7.8.2.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell. Cell 2 is a neighbour cell. Both cells are on the same NR RF channel in FR2.

The test consists of two consecutive time intervals, with duration of T1 and T2. The UE shall be in RRC\_CONNECTED state during T1 and in RRC\_INACTIVE state during T2. During time duration T1, the UE shall not have any timing information of Cell 2. Both cells transmit PRS during T2. PRS resources from both cells are transmitted within the initial DL BWP of the UE and with the same numerology as the initial DL BWP.

The beginning of the time interval T2 shall be aligned with the beginning of the first DRX cycle in RRC\_INACTIVE.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-AoD assistance* data and location information request.

The *nr-DL-AoD-RequestLocationInformation* IE should indicate to the UE that single-sample measurements are requested, i.e. requestedDL-PRS-ProcessingSamples-r17 is set to m1.

The general test parameters are listed in Table A.7.8.2.2.1-2, and cell specific test parameters are listed in Table A.7.8.2.2.1-3.

Table A.7.8.2.2.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| 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 cycle length | s | Config 1 | 0.64 |  |
| Time offset between serving and neighbour cells |  | Config 1 | 3μs | Synchronous cells. |
| Expected RSTD | μs | Config 1 | 3 |  |
| Expected RSTD uncertainty | μs | Config 1 | 5 |  |
| T1 | s | Config 1 | 3 |  |
| T2 | s | Config 1 | [5] |  |

Table A.7.8.2.2.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.3.1 TDD | | - | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | - | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| PRS configurationNote8 | |  | Config 1 | PRS.1.2 FR2 | | PRS.1.2 FR2 | |
| PRS Resource slot offset | | slots | Config 1 | 0 | | 0 | |
| PRS muting configuration | |  | Config 1 | ‘10’ | | ‘01’ | |
| 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 | 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 Note5 |  | -98 | | -98 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -89 | | -89 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89 | -89 | -89 | -89 |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -Infinity | -89 | -Infinity | -92 |
| PRS | | dB | Config 1 | -Infinity | 0 | -Infinity | -3 |
| PRS | | dB | Config 1 | -Infinity | 0 | -Infinity | -3 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | N/A | -57.01 | N/A | -58.25 |
| Propagation Condition | |  | Config 1 | AWGN | | | |
| Note 1: OCNG shall be used such that all active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols, except for slots where PRS is transmitted by any of the cells.  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/PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels apply only for symbols where PRS is transmitted.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: The number of PRS RBs is the same as for the channel BW. | | | | | | | |

##### A.7.8.2.2.2 Test Requirements

The UE shall perform and report the PRS-RSRP measurements for Cell 1 and Cell 2, within the time limit specified in clause 5.6.3.5, starting from the beginning of time interval T2.

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

### A.7.8.3 UE Rx-Tx time difference measurements

#### A.7.8.3.1 UE Rx-Tx time difference measurements for single positioning frequency layer in FR2 SA

##### A.7.8.3.1.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement in RRC\_INACTIVE state meets the requirements specified in clause 5.6.4 in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations in listed in Table A.7.8.3.1.1-1.

**Table A.7.8.3.1.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). Both cells are on the same RF channel in FR2.

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n. In the next DL slot after slot #n, UE is released into RRC\_INACTIVE.

The beginning of the time interval T2 is the first PRS resource occasion occurring ΔT after the slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The UE is configured to transmit positioning SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.7.8.3.1.1-2 and Table A.7.8.3.1.1-3 respectively.

**Table A.7.8.3.1.1-2: General test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| Active cell |  | 1 | Cell 1 | Cell 1 is the PCell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| Neighbour cell |  | 1 | Cell 2 | Cell 2 is a neighbour cell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| RF Channel Number |  | 1 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1 | 100: NRB,c = 66 |  |
| SSB configuration |  | 1 | SSB.2 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| CP length |  | 1 | Normal |  |
| DRX cycle |  | 1 | 0.64s |  |
| Time offset between serving and neighbour cells | μs | 1 | 3 | Synchronous cells |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 20 |  |

**Table A.7.8.3.1.1-3: Cell specific test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
|  |  | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 |  | 1 | Rough | | Rough | |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 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 DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| PRS configuration |  | 1 | PRS.1.1 FR2 | | PRS.1.1 FR2 | |
| PRS muting info |  | 1 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1 | POS-SRS.3 | | N/A | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
| PRS | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -10 |
| PRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -91 | -Infinity | -99 |
| Io | dBm/95.04 MHz | 1 | N/A | -57.63 | N/A | -57.63 |
| Propagation Condition |  | 1 | 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: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | | | | |

##### A.7.8.3.1.2 Test requirements

The UE Rx-Tx time difference measurement time in RRC\_INACTIVE state fulfils the requirements specified in clause 5.6.4.

The UE shall perform and report the UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified UE Rx-Tx time difference measurement time specified in clause 5.6.4 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.3.1.

#### A.7.8.3.2 UE Rx-Tx time difference measurement with reduced number of samples in RRC\_INACTIVE, FR2 SA

##### A.7.8.3.2.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement meets the requirements specified in clause 5.6.4.5 in AWGN propagation condition in FR2 in standalone scenario when single-sample measurements are requested by the LMF. This test is applicable to UEs that support [FG 14-2 PRS measurement for reduced sample in RRC\_inactive state].

The supported test configurations in listed in Table A.7.8.3.2.1-1.

Table A.7.8.3.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on the same RF channel in FR2.

The test consists of two consecutive time intervals, with duration of T1 and T2. The UE shall be in RRC\_CONNECTED state during T1 and in RRC\_INACTIVE state during T2. During time duration T1, the UE shall not have any timing information of Cell 2. Both cells transmit PRS during T2. PRS resources from both cells are transmitted within the initial DL BWP of the UE and with the same numerology as the initial DL BWP.

The beginning of the time interval T2 shall be aligned with the beginning of the first DRX cycle in RRC\_INACTIVE.

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request.

The *nr-Multi-RTT-RequestLocationInformation* IE should indicate to the UE that single-sample measurements are requested, i.e. requestedDL-PRS-ProcessingSamples-r17 is set to m1.

The UE is configured to transmit SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.7.8.3.2.1-2 and Table A.7.8.3.2.1-3 respectively.

Table A.7.8.3.2.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| Active cell |  | 1 | Cell 1 | Cell 1 is the PCell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| Neighbour cell |  | 1 | Cell 2 | Cell 2 is a neighbour cell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| RF Channel Number |  | 1 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1 | 100: NRB,c = 66 |  |
| SSB configuration |  | 1 | SSB.2 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| CP length |  | 1 | Normal |  |
| DRX cycle length | s | 1 | 0.64 |  |
| Time offset between serving and neighbour cells | μs | 1 | 3 | Synchronous cells |
| T1 | s | 1 | 3 |  |
| T2 | s | 1 | [5] |  |

Table A.7.8.3.2.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
|  |  | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 |  | 1 | Rough | | Rough | |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| PRS configurationNote 9 |  | 1 | PRS.1.2 FR2 | | PRS.1.2 FR2 | |
| PRS Resource slot offset | slots | 1 | 0 | | 0 | |
| PRS muting info |  | 1 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1 | POS-SRS.3 | | N/A | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
| PRS | dB | 1 | -Infinity | 0 | -Infinity | -3 |
| PRS | dB | 1 | -Infinity | 0 | -Infinity | -3 |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -89 | -Infinity | -92 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -89 | -89 | -89 | -92 |
| Io | dBm/95.04 MHz | 1 | N/A | -57.01 | N/A | -58.25 |
| 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/PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels apply only for symbols where PRS is transmitted.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: OCNG shall be used such that all active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols, except for slots where PRS is transmitted by any of the cells.  Note 9: The number of PRS RBs is the same as for the channel BW. | | | | | | |

##### A.7.8.3.2.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 5.6.4.5.

The UE shall perform and report the UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified UE Rx-Tx time difference measurement time starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.3.1.

### A.7.8.4 PRS-RSRPP measurements

#### A.7.8.4.1 PRS-RSRPP reporting delay test case for single positioning frequency layer in FR2 in RRC\_INACTIVE state

##### A.7.8.4.1.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRPP measurement requirements specified in Clause 5.6.5.5 for single positioning frequency layer under AWGN propagation conditions in standalone scenario. Supported test configurations are shown in table A.7.8.4.1.1-1.

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the Pcell.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall be in RRC\_CONNECTED state and shall not have any timing information of Cell 2. During T2 UE shall be in RRC\_INACTIVE state and both cells transmit PRS resources within initial DL BWP of the UE and with the same numerology as the initial DL BWP.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n.

The beginning of the time interval T2 shall be aligned with the beginning of the first DRX cycle containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The test parameters are as given in table A.7.8.4.1.1-2, and table A.7.8.4.1.1-3.

Table A.7.8.4.1.1-1: supported test configurations for PRS RSRPP measurement for FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.8.4.1.1-2: General test parameters for PRS RSRPP measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| 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 | s | Config 1 | 0.64 | ON |
| Time offset between serving and neighbour cells |  | Config 1 | 3μs | Synchronous cells. |
| Expected RSTD | μs | Config 1 | 3 |  |
| Expected RSTD uncertainty | μs | Config 1 | 5 |  |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 7 |  |

Table A.7.8.4.1.1-3: Cell-specific test parameters for PRS RSRPP measurement reporting delay

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.3.1 TDD | | - | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | - | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| PRS configuration | |  | Config 1 | PRS.1.4 FR2 | | PRS.1.4 FR2 | |
| PRS muting configuration | |  | Config 1 | ‘10’ | | ‘01’ | |
| 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 | 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 Note5 |  | -102 | | -102 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -93 | | -93 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -Infinity | -86.7 |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -Infinity | -96 | -Infinity | -103 |
| PRS | | dB | Config 1 | -Infinity | -3 | -Infinity | -10 |
| PRS | | dB | Config 1 | -Infinity | -3 | -Infinity | -10 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -58.56 | | -55.38 | |
| Propagation Condition | |  | Config 1 | 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 other than those in the slots with transmitted PRS.  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/PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.8.4.1.2 Test Requirements

The PRS RSRPP measurement time fulfils the requirements specified in Clause 5.6.5.5.The UE shall perform and report the PRS RSRPP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 5.6.5.5 starting from the beginning of time interval T2.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRPP measurement for each correct event shall be within the PRS RSRPP reporting range specified in Clause 10.1.X, i.e., between PRS RSRPP\_0 and PRS RSRPP\_126.

#### A.7.8.4.2 PRS-RSRPP reporting delay test with reduced number of samples for single positioning frequency layer in FR2 in RRC\_INACTIVE state

##### A.7.8.4.2.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRPP measurement requirements specified in Clause 5.6.5.5 for single positioning frequency layer under AWGN propagation conditions in standalone scenario for reduced number of samples. In this test UE that supports *supportedDL-PRS-ProcessingSamples* is configured by LMF to perform PRS measurement with reduced number of samples. Supported test configurations are shown in table A.7.8.4.2.1-1.

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the Pcell.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall be in RRC\_CONNECTED state and shall not have any timing information of Cell 2. During T2 UE shall be in RRC\_INACTIVE state and both cells transmit PRS resources within initial DL BWP of the UE and with the same numerology as the initial DL BWP.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n.

The beginning of the time interval T2 shall be aligned with the beginning of the first DRX cycle containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The test parameters are as given in table A.7.8.4.2.1-2, and table A.7.8.4.2.1-3.

Table A.7.8.4.2.1-1: supported test configurations for PRS RSRPP measurement for FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.8.4.2.1-2: General test parameters for PRS RSRPP measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| 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 | s | Config 1 | 0.64 | ON |
| Time offset between serving and neighbour cells |  | Config 1 | 3μs | Synchronous cells. |
| Expected RSTD | μs | Config 1 | 3 |  |
| Expected RSTD uncertainty | μs | Config 1 | 5 |  |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 7 |  |

Table A.7.8.4.2.1-3: Cell-specific test parameters for PRS RSRPP measurement reporting delay

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.3.1 TDD | | - | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | - | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| PRS configuration | |  | Config 1 | PRS.1.4 FR2 | | PRS.1.4 FR2 | |
| PRS BW | |  | Config 1 | 48 PRBs | | 48 PRBs | |
| PRS muting configuration | |  | Config 1 | ‘10’ | | ‘01’ | |
| 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 | 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 Note5 |  | -102 | | -102 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -93 | | -93 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -92.7 | -92.7 | -Infinity | -85.7 |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -Infinity | -96 | -Infinity | -89 |
| PRS | | dB | Config 1 | -Infinity | -3 | -Infinity | 4 |
| PRS | | dB | Config 1 | -Infinity | -3 | -Infinity | 4 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -63.5 | | -61.9 | |
| Propagation Condition | |  | Config 1 | 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/PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.8.4.2.2 Test Requirements

The PRS RSRPP measurement time fulfils the requirements specified in Clause 5.6.5.5. The UE shall perform and report the PRS RSRPP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 5.6.5.5 starting from the beginning of time interval T2.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRPP measurement for each correct event shall be within the PRS RSRPP reporting range specified in Clause 10.1.X, i.e., between PRS RSRPP\_0 and PRS RSRPP\_126.

## A.7.9 Measurement performance requirements in RRC\_INACTIVE

### A.7.9.1 RSTD measurements

#### A.7.9.1.1 RSTD measurement accuracy test case for single positioning frequency layer in FR2 in RRC\_INACTIVE state

##### A.7.9.1.1.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement in RRC\_INACTIVE state meets the accuracy requirements specified in clause 10.1.23.2 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.7.9.1.1.1-1.

Table A.7.9.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell. Cell 2 is a neighbour cells. Both cells are on the same NR RF channel in FR2. The UE is configured with DRX cycle of 0.64s. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 5.6.2.5.

Table A.7.9.1.1.1-2: RSTD accuracy test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| PRS 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 | - | DLBWP.0.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - | ULBWP.1.1 | - |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 | OP.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| PRS configuration |  | PRS.1.1 FR2 | PRS.1.1 FR2 | PRS.1.2 FR2 | PRS.1.2 FR2 |
| PRS Resource slot offset | slot | 0 | 4 | 0 | 4 |
| Expected RSTD | μs | N/A | 3 | N/A | 3 |
| Expected RSTD uncertainty | μs | N/A | 5 | N/A | 5 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |
| Propagation conditions |  | 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. | | | | | |

Table A.7.9.1.1.1-3: RSTD accuracy OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 5 |  | Rough | | Rough | |
| Note1 | dBm/SCSNote3 | -98 | | -98 | |
|  | dB | -6 | -13 | -6 | -13 |
| PRS-RSRPNote2 | dBm/SCS | -104 | -111 | -104 | -111 |
| BB Note4 | dB | -6 | -13 | -6 | -13 |
| IoNote2 | dBm/95.04 MHz Note3 | -68.04 | -68.80 | -68.04 | -68.80 |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 4: 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 [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.  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 | | | | | |

##### A.7.9.1.1.2 Test Requirements

The RSTD measurement accuracy for Cell 2 shall fulfil the absolute requirement in clause 10.1.23.2.

#### A.7.9.1.2 RSTD measurement accuracy test case with reduced number of samples for single positioning frequency layer in FR2 in RRC\_INACTIVE state

##### A.7.9.1.2.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement in RRC\_INACTIVE state meets the accuracy requirements specified in clause 10.1.23.2 in an environment with AWGN propagation conditions. In this test UE that supports *supportedDL-PRS-ProcessingSamples* is configured by LMF to perform PRS measurement with reduced number of samples.

The supported test configurations are specified in Table A.7.9.1.2.1-1.

Table A.7.9.1.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell. Cell 2 is a neighbour cells. Both cells are on the same NR RF channel in FR2. The UE is configured with DRX cycle of 0.64s. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 5.6.2.5.

Table A.7.9.1.2.1-2: RSTD accuracy test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| PRS 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 | DLBWP.0.1 | DLBWP.0.1 | DLBWP.0.1 |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - | ULBWP.1.1 | - |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 | OP.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| PRS configuration |  | PRS.1.4 FR2 | PRS.1.4 FR2 | PRS.1.4 FR2 | PRS.1.4 FR2 |
| PRS BW |  | 48 PRBs | | | |
| PRS Resource slot offset | slot | 0 | 4 | 0 | 4 |
| Expected RSTD | μs | N/A | 3 | N/A | 3 |
| Expected RSTD uncertainty | μs | N/A | 5 | N/A | 5 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |
| Propagation conditions |  | 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. | | | | | |

Table A.7.9.1.2.1-3: RSTD accuracy OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 5 |  | Rough | | Rough | |
| Note1 | dBm/SCSNote3 | -98 | | -98 | |
|  | dB | -3 | 4 | -3 | 4 |
| PRS-RSRPNote2 | dBm/SCS | -101 | -94 | -101 | -94 |
| SS-RSRPNote2 | dBm/SCS | -89.7 | N/A | -89.7 | N/A |
| BB Note4 | dB | -3 | 4 | -3 | 4 |
| IoNote2 | dBm/95.04 MHz Note3 | -68.5 | -66.9 | -68.5 | -66.9 |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 4: 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 [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.  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 | | | | | |

##### A.7.9.1.2.2 Test Requirements

The RSTD measurement accuracy for Cell 2 shall fulfil the absolute requirement in clause 10.1.23.2.

### A.7.9.2 PRS-RSRP measurements

#### A.7.9.2.1 SA measurement accuracy with PRS in FR2 in RRC\_INACTIVE

##### A.7.9.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRP measurement accuracy in RRC\_INACTIVE is within the specified limits. This test will verify the requirements in clauses 10.1.24.2.1 and 10.1.24.2.2.

##### A.7.9.2.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.9.2.1.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in Table A.7.9.2.1.2-2 and A.7.9.2.1.2-3. In all test cases, Cell 1 is the PCell.

Table A.7.9.2.1.2-1: PRS-RSRP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.9.2.1.2-2: PRS-RSRP general test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Cell ID |  | 489 | 0 | 489 | 0 |
| SSB ARFCN |  | freq1 | | freq1 | |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 24 | | 100: NRB,c = 24 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| DRX cycle configuration |  | 1.28s | - | 1.28s | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 | OP.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PRS configuration |  | PRS.1.3 FR2 | PRS.1.3 FR2 | PRS.1.4 FR2 | PRS.1.4 FR2 |
| PRS Resource slot offset | slot | 0 | 4 | 0 | 4 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |
| Propagation conditions |  | 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. | | | | | |

Table A.7.9.2.1.2-3: PRS-RSRP OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 7 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -91.6 | | Test 1 | |
| Note1 | dBm/SCSNote4 | -82.6 | | Test 1 | |
|  | dB | 6.0 | 1.0 | 6.0 | 1.0 |
| Es | dBm/SCSNote4 | - | - | - | - |
| PRS\_RPNote2 | dBm/SCS | -76.6 | -81.6 | -76.6 | -81.6 |
| BB Note6 | dB | 2.44 | -5.98 | 2.44 | -5.98 |
| IoNote2 | dBm/95.04 MHz Note4 | -50.05 | | -50.05 | |
| 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: PRS\_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: 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 [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.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.7.9.2.1.3 Test Requirements

In each test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1.24.2.1 if the reported PRS-RSRP is in the range shown in table A.7.9.2.1.3-1. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1.24.2.2.

Table A.7.9.2.1.3-1: PRS-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| Note 1: PRS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration.  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.24.2.1-2, selected according to the Io used in the test.  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.6.1-1, selected according to the UE power class | |

#### A.7.9.2.2 PRS-RSRP measurements with reduced number of sample in RRC\_INACTIVE

##### A.7.9.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.24.2.1 and 10.1.24.2.2.

##### A.7.9.2.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.9.2.2.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in Table A.7.9.2.2.2-2 and A.7.9.2.2.2-3. In all test cases, Cell 1 is the PCell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.7.9.2.2.2-1.

Table A.7.9.2.2.2-1: PRS-RSRP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.9.2.2.2-2: PRS-RSRP general test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Cell ID |  | 489 | 0 | 489 | 0 |
| 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 | - | DLBWP.0.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| DRX cycle configuration | s | 0.64 | | | |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 | OP.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PRS configuration |  | PRS.1.1 FR2 | PRS.1.1 FR2 | PRS.1.1 FR2 | PRS.1.1 FR2 |
| PRS BW |  | 48 PRBs | 48 PRBs | 48 PRBs | 48 PRBs |
| PRS Resource slot offset | slot | 0 | 4 | 0 | 4 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| Propagation conditions |  | 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. | | | | | |

Table A.7.9.2.2.2-3: PRS-RSRP OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 7 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -98 | | Test 1 | |
| Note1 | dBm/SCSNote4 | -89 | | Test 1 | |
|  | dB | -1.44 | -3.65 | -1.44 | -3.65 |
| Es | dBm/SCSNote4 | - | - | - | - |
| PRS\_RPNote2 | dBm/SCS | -90.44 | -92.65 | -90.44 | -92.65 |
| BB Note6 | dB | -3 | -6 | -3 | -6 |
| IoNote2 | dBm/95.04 MHz Note4 | -56.65 | | -56.65 | |
| 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: PRS\_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: 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 [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.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.7.9.2.2.3 Test Requirements

In each test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1.24.2.1 if the reported PRS-RSRP is in the range shown in table A.7.9.2.2.3-1. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1.24.2.2.

Table A.7.9.2.2.3-1: PRS-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| Note 1: PRS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration.  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.24.2.1-2, selected according to the Io used in the test.  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.6.1-1, selected according to the UE power class | |

### A.7.9.3 UE Rx-Tx time difference measurements

#### A.7.9.3.1 UE Rx-Tx time difference measurements in RRC\_INACTIVE

##### A.7.9.3.1.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx time difference measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.25.2. The test is conducted in AWGN propagation condition in FR2 in standalone scenario.

The supported test configuration is listed in Table A.7.9.3.1.1-1.

**Table A.7.9.3.1.1-1: Supported test configurations**

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on the same RF channel in FR2.

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE before the start of the test.

The UE is configured to transmit SRS on Cell 1 during the test.

The test equipment measures the transmit timing of the UE using the transmitted SRS and measures the receive timing using the PRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE for each cell.

##### A.7.9.3.1.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.7.9.3.1.2-1.

Table A.7.9.3.1.2-1: UE Rx-Tx time difference measurement accuracy test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Test 1 | | Test 2 | |
|  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 |  | 1 | Rough | Rough | Rough | Rough |
| DRX | s | 1 | 0.64 | | 0.64 | |
| Time offset with Cell 1 | μs | 1 | N/A | 3 | N/A | 3 |
| TDD configuration |  | 1 | TDDConf.3.1 | TDDConf.3.1 | TDDConf.3.1 | TDDConf.3.1 |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | N/A | SR.3.1 TDD | N/A |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | N/A | CR.3.1 TDD | N/A |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | N/A | CCR.3.1 TDD | N/A |
| OCNG Patterns |  | 1 | OP.1 | OP.1 | OP.1 | OP.1 |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | N/A | DLBWP.0.1 ULBWP.0.1 | N/A |
| PRS configuration |  | 1 | PRS.1.1 FR2 | PRS.1.1 FR2 | PRS.1.1 FR2 | PRS.1.1 FR2 |
| PRS Resource slot offset | slot | 1 | 0 | 4 | 0 | 4 |
| SRS configuration |  | 1 | POS-SRS.3 | N/A | POS-SRS.3 | N/A |
| Note 2 | dBm/SCS | 1 | -89 | | -89 | |
| Note 2 | dBm/15 kHz | 1 | -98 | | -98 | |
| PRS | dB | 1 | -2.41 | -12.12 | -2.41 | -12.12 |
| PRS | dB | 1 | -2 | -10 | -2 | -10 |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -91 | -99 | -91 | -99 |
| Io | dBm/95.04 MHz | 1 | -57.63 | -57.63 | -57.63 | -57.63 |
| Propagation Condition |  | 1 | AWGN | | AWGN | |
| Note 1: Void.  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: PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | |

##### A.7.9.3.1.3 Test requirements

The UE Rx-Tx time difference measurement time fulfils the UE Rx-Tx measurement accuracy requirements specified in clause 10.1.25.2 for both Cell 1 and Cell 2.

#### A.7.9.3.2 UE Rx-Tx time difference measurement accuracy with reduced number of samples in FR2 SA

##### A.7.9.3.2.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx time difference measurement accuracy with reduced number of samples in RRC\_INACTIVE state is within the specified limits. This test will verify the requirements in clause 10.1.25.2. The test is conducted in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configuration is listed in Table A.7.9.3.2.1-1.

Table A.7.9.3.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). Both cells are on the same RF channel in FR2.

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE before the start of the test. The UE is configured to measure UE Rx-Tx time difference using reduced number of samples via *requestedDL-PRS-ProcessingSamples* in *NR-Multi-RTT-RequestLocationInformation*.

UE shall be configured to enter into RRC\_INACTIVE state before the start of the test.

The UE is configured to transmit positioning SRS on Cell 1 during the test.

The test equipment measures the transmit timing of the UE using the transmitted SRS and measures the receive timing using the PRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE for each cell.

##### A.7.9.3.2.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.7.9.3.2.2-1.

Table A.7.9.3.2.2-1: UE Rx-Tx time difference measurement accuracy test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Test 1 | |
|  | Cell 1 | Cell 2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 |  | 1 | Rough | Rough |
| DRX cycle |  | 1 | 0.64s | |
| Time offset with Cell 1 | μs | 1 | N/A | 3 |
| TDD configuration |  | 1 | TDDConf.3.1 | TDDConf.3.1 |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | N/A |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | N/A |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | N/A |
| OCNG Patterns |  | 1 | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS | dB | 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 DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.2.1 TDD | N/A |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | N/A |
| PRS configuration |  | 1 | PRS.1.1 FR2 | PRS.1.1 FR2 |
| PRS BW |  | 1 | 48 PRBs | 48 PRBs |
| PRS Resource slot offset | slot | 1 | 0 | 4 |
| SRS configuration |  | 1 | POS-SRS.3 | N/A |
| Note 2 | dBm/SCS | 1 | -89 | |
| Note 2 | dBm/15 kHz | 1 | -98 | |
| PRS | dB | 1 | -1.76 | -6.01 |
| PRS | dB | 1 | 0 | -3 |
| PRP Note 3 | dBm/SCS kHz | 1 | -89 | -92 |
| Io | dBm/95.04 MHz | 1 | -56.03 | -56.03 |
| Propagation Condition |  | 1 | AWGN | |
| Note 1: Void.  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: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

##### A.7.9.3.2.3 Test requirements

The UE Rx-Tx time difference measurement with reduced number of samples in RRC\_INACTIVE state fulfils the UE Rx-Tx measurement accuracy requirements specified in clause 10.1.25.2 for both Cell 1 and Cell 2.

### A.7.9.4 PRS-RSRPP measurements

#### A.7.9.4.1 SA measurement accuracy in FR2 in RRC INACTIVE

##### A.7.9.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRPP measurement accuracy in RRC\_INACTIVE state is within the specified limits. This test will verify the requirements in clauses [10.1.24.Z.1] and [10.1.24.Z.2].

##### A.7.9.4.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.9.4.1.2-1. Both absolute and relative accuracy of PRS-RSRPP measurements are tested by using the parameters in Table A.7.9.4.1.2-2 and A.7.9.4.1.2-3. In all test cases, Cell 1 is the PCell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.7.9.4.1.2-1.

Table A.7.9.4.1.2-1: PRS-RSRPP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.9.4.1.2-2: PRS-RSRPP general test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Cell ID |  | 489 | 0 | 489 | 0 |
| SSB ARFCN |  | freq1 | | freq1 | |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 24 | | 100: NRB,c = 24 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| DRX cycle configuration | ms | 640 | | | |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 | OP.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PRS configuration |  | PRS.1.3 FR2 | PRS.1.3 FR2 | PRS.1.4 FR2 | PRS.1.4 FR2 |
| PRS Resource slot offset | slot | 0 | 4 | 0 | 4 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |
| Propagation conditions |  | [Two-tap channel ] Note 2 | | | |
| 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: The two-tap channel model is defined in 38.101-4 Annex B.2.4 (a = 1, τd=0.45 µs and fD=5 Hz). | | | | | |

Table A.7.9.4.1.2-3: PRS-RSRPP OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 7 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -91.6 | | Test 1 | |
| Note1 | dBm/SCSNote4 | -82.6 | | Test 1 | |
|  | dB | 6.0 | 1.0 | 6.0 | 1.0 |
| Es | dBm/SCSNote4 | - | - | - | - |
| PRS\_RPNote2 | dBm/SCS | -76.6 | -81.6 | -76.6 | -81.6 |
| BB Note6 | dB | 2.44 | -5.98 | 2.44 | -5.98 |
| IoNote2 | dBm/95.04 MHz Note4 | -50.05 | | -50.05 | |
| 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: PRS\_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: 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 [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.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.7.9.4.1.3 Test Requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause [10.1.24.Z.1]. if the reported PRS-RSRPP is in the range shown in table A.7.9.4.1.3-1. The relative PRS-RSRPP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause [10.1.24.Z.2].

Table A.7.9.4.1.3-1: PRS-RSRPP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRPP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRPP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| Note 1: PRS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration.  Note 2: δ is the RSRP absolute accuracy requirement from Table [10.1.24.Z.1-2], selected according to the Io used in the test.  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.6.1-1, selected according to the UE power class | |

#### A.7.9.4.2 SA measurement accuracy with reduced PRS samples in FR2 in RRC INACTIVE

##### A.7.9.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRPP measurement accuracy with = 1 in FR2in RRC\_INACTIVE state is within the specified limits. This test will verify the requirements in clauses [10.1.24.Z.1] and [10.1.24.Z.2].The UE under test should support [*supportedDL-PRS-ProcessingSamples-RRC-Inactive* ], and the TE indicates the UE to perform positioning measurements with reduced number of samples. The PRS bandwidth is contained within the initial DL BWP and the power difference between the serving cell SS-RSRP and neighbour cell PRS-RSRP is within [6]dB, so that = 1 is assumed.

##### A.7.9.4.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.9.4.2.2-1. Both absolute and relative accuracy of PRS-RSRPP measurements are tested by using the parameters in Table A.7.9.4.2.2-2 and A.7.9.4.2.2-3. In all test cases, Cell 1 is the PCell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.9.4.2.2-1: PRS-RSRPP supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.9.4.2.2-2: PRS-RSRPP general test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | |
|  |  | **Cell 1** | **Cell 2** |
| Cell ID |  | 489 | 0 |
| SSB ARFCN |  | freq1 | |
| Duplex mode |  | TDD | |
| TDD configuration |  | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 24 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - |
| DRX cycle configuration | ms | 640 | |
| TRS configuration |  | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 |
| PRS configuration |  | PRS.1.4 FR2 | PRS.1.4 FR2 |
| PRS bandwidth |  | 48 PRBs | 48 PRBs |
| PRS Resource slot offset | slot | 0 | 4 |
| 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 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation conditions |  | [Two-tap channel] Note 2 | |
| 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: The two-tap channel model is defined in 38.101-4 Annex B.2.4 (a = 1, τd=0.45 µs and fD=5 Hz). | | | |

Table A.7.9.4.2.2-3: PRS-RSRPP OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 7 |  | Rough | |
| Note1 | dBm/15kHzNote4 | -91.6 | |
| Note1 | dBm/SCSNote4 | -82.6 | |
|  | dB | 6.0 | 1.0 |
| Es | dBm/SCSNote4 | - | - |
| PRS\_RPNote2 | dBm/SCS | -76.6 | -81.6 |
| SS\_RPNote2 | dBm/SCS | -76.6 | -81.6 |
| BB Note6 | dB | 2.44 | -5.98 |
| IoNote2 | dBm/95.04 MHz Note4 | -50.05 | |
| 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: PRS\_RP, SS\_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: 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 [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.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | |

##### A.7.9.4.2.3 Test Requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause [10.1.24.Z.1] if the reported PRS-RSRPP is in the range shown in table A.7.9.4.2.3-1. The relative PRS-RSRPP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause [10.1.24.Z.2].

Table A.7.9.4.2.3-1: PRS-RSRPP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRPP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRPP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| Note 1: PRS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration.  Note 2: δ is the RSRP absolute accuracy requirement from Table [10.1.24.Z.1-2], selected according to the Io used in the test.  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.6.1-1, selected according to the UE power class | |