**3GPP TSG-RAN WG4 Meeting # 105R4-2220045**

**Toulouse, France, 14 – 18 November, 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **2653** | **rev** | 1 | **Current version:** | **17.7.0** |  |
|  | | | | | | | | |
| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Big CR for NR operation to 71GHz RRM performance requirements | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | MCC, Qualcomm | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_ext\_to\_71GHz-Perf | | | | |  | ***Date:*** | | | 2022-10-21 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Big CR to incorporate all endorsed CRs at RAN4#104-bis-e and RAN4#105 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | R4-2217196 Draft CR on test cases for SA RRC Re-establishment for extending NR operation to 71GHz   * Add test cases on test cases on SA RRC Re-establishment for 71GHz   R4-2217197 Draft CR on test cases for beam failure detection and link recovery for extending NR operation to 71GHz   * Add test cases on test cases for beam failure detection and link recovery for 71GHz   R4-2217198 Draft CR on introduction of intra-frequency and inter-frequency measurement test cases without CCA for FR2-2   * Remove the TBD values of intra-frequency and inter-frequency measurement test cases without CCA for FR2-2.   R4-2217199 Random access test cases in FR2-2   * Including 4-step random access test cases in FR2-2   R4-2217200 Introducing Beam Failure Detection and TCI state switch test cases in FR2-2   * Addition of beam failure detection and link recovery test cases, and addition of TCI state switch test cases in FR2-2   R4-2217201 DraftCR on test cases for HO for FR2-2   * Define separate test configuration tables for source cell and target cell.   R4-2217202 Test Cases on RLM for extending NR operation to 71GHz   * Add test cases on test cases on RLM for 71GHz   R4-2218774 Draft CR on introduction of intra-frequency and inter-frequency measurement test cases without CCA for FR2-2   * Remove the TBD values of intra-frequency and inter-frequency measurement test cases without CCA for FR2-2. * Change FR2 to FR2-2 in the text for test cases.   R4-2218933 Draft CR introducing connected mobility test cases with CCA in FR2-2   * Introduction of RA test cases for operation with CCA in FR2-2 * Introduction of RRC connection re-establishment test cases for operation with CCA in FR2-2   R4-2219226 DraftCR on HO test cases for FR2-2 with CCA   * Introduce test cases for HO requirements for FR2-2 with CCA   R4-2220043 Test case on PSCell addition and release delay for FR2-2   * Test case on PSCell addition and release delay for FR2-2   R4-2220445 Draft CR on test cases for beam failure detection and link recovery with CCA for FR2-2   * Add test cases on test cases for beam failure detection and link recovery in FR2-2 with CCA   R4-2220446 Draft CR on test cases for beam failure detection and link recovery with CCA for FR2-2   * Add test cases on test cases on SCell activation and deactivation for SCell in FR2-2 in non-DRX with CCA   R4-2220447 Draft CR on test cases for SCell Activation and deactivation for FR1+FR2-2 inter-band with target SCell in FR2-2 with CCA   * Add test cases on test cases on SCell activation and deactivation for FR1+FR2-2 inter-band with target SCell in FR2-2 with CCA   R4-2220448 Draft CR on introduction of intra-frequency and inter-frequency measurement test cases with CCA for FR2-2   * Introduced test cases for FR2-2 with CCA for intra-frequency measurement * Introduced test cases for FR2-2 with CCA for inter-frequency measurement   R4-2220450 Test Cases on RLM for extending NR operation to 71GHz under CCA   * Add test cases on test cases on RLM for 71GHz under CCA   R4-2220451 DraftCR on signaling characteristics test cases for FR2-2   * Introduce test cases for PSCell addition/release and TCI switching requirements for FR2-2 with CCA   R4-2220449 CR on corrections to timing test cases in FR2-2   * Change the note in timing test cases in FR2-2, so that they are aligned with previous RAN4 agreements | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Test cases for performance requirements are missing | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.7.6.1, A.7.6.2, A.7.3.1.11, A.15.2, A.7.4.1.2, A.7.4.3.2  New Clauses : A.7.3.2.1.X1, A.7.3.2.1.X2, A.7.3.2.1.X3, A.7.5.5.X1, A.7.5.5.X2, A.7.5.5.X3, A.7.3.2.2.X1, A.7.3.2.2.X2, A.7.5.5.X1, A.7.5.5.X2, A.7.5.8.X1, A.7.5.8.X2, A.7.5.1.X, A.7.5.7, A.15.2.2, A.15.2.3, A.15.2.4, A.15.2.5, A.15.2.6, A.15.3 , A.15.4  Void Clauses : A.15.2.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | R4-2217590 | | | | | | | | |

### < Start of change 1, R4-2217196>

A.7.3.2.1.X1 Intra-frequency RRC Re-establishment in FR2-2

A.7.3.2.1.X1.1 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.X1.1-1, table A.7.3.2.1.X1.1-2 and table A.7.3.2.1.X1.1-3 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.X1.1-1: 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.X1.1-2: 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.X1.1-3: 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.X1.2 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.X2 Inter-frequency RRC Re-establishment in FR2-2

A.7.3.2.1.X2.1 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.X2.1-1, table A.7.3.2.1.X2.1-2 and table A.7.3.2.1.X2.1-3 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.X2.1-1: 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.X2.1-2: 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.X2.1-3: 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.X2.2 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.X3 Intra-frequency RRC Re-establishment in FR2-2 without serving cell timing

A.7.3.2.1.X3.1 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.X3.1-1, table A.7.3.2.1.X3.1-2 and table A.7.3.2.1.X3.1-3 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.X3.1-1: 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.X3.1-2: 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.X3.1-3: 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.X3.2 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.

### < End of change 1, R4-2217196>

### < Start of change 2, R4-2217197>

#### A.7.5.5.X1 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.X1.1 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.X1.1-1, A.7.5.5.X1.1-2, and A.7.5.5.X1.1-3 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.X1.1-1 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.X1.1-1 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.X1.1-1: 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.X1.1-2: 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.X1.1-3: 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.X1.1-1.  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.X1.1-4: Void

Table A.7.5.5.X1.1-5: Void



**Figure A.7.5.5.X1.1-1: SNR and L1-RSRP variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode**

##### A.7.5.5.X1.2 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.X2 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.X2.1 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.X2.1-1, A.7.5.5.X2.1-2, A.7.5.5.X2.1-3, and A.7.5.5.X2.1-4 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.X2.1-1 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.X2.1-1 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.X2.1-1: 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.X2.1-2: 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.X2.1-3: 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.X2.1-1.  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.X2.1-4: Void

Table A.7.5.5.X2.1-5: Void

Table A.7.5.5.X2.1-6: Void



**Figure A.7.5.5.X2.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode**

##### A.7.5.5.X2.2 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.X3 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.X3.1 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.X3.1-1, A.7.5.5.X3.1-2 and A.7.5.5.X3.1-3 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.X3.1-1 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.X3.1-1 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.X3.1-1: 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.X3.1-2: 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.X3.1-3: 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.X3.1-1.  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.X3.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode**

##### A.7.5.5.X3.2 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.

### < End of change 2, R4-2217197>

### < Start of change 3, R4-2217198, R4-2218774>

#### 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.7.6.1.7.1-5 |
| 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.7.6.1.10.1-1 | | | | |
| 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.7.6.1.11.1-1 | | | | |
| 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.

### < End of change 3, R4-2217198, R4-2218774>

### < Start of change 4, R4-2217198, R4-2218774>

#### 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 FR2-2 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.7.6.2.12.1-1, 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 FR2-2 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 FR2-2 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.7.6.2.13.1-1, 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.7.6.2.13.1-1.

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 FR2-2 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 Configuration 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 Configuration 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 Configuration 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 FR2-2 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 FR2-2 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 FR2-2 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 FR2-2 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 FR2-2 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 FR2-2 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 FR2-2 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 FR2-2 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.

### < End of change 4, R4-2217198, R4-2218774>

### < Start of change 5, R4-2217199>

##### A.7.3.2.2.X1 4-step RA type contention based random access test in FR2-2 for NR Standalone

A.7.3.2.2.X1.1 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 FR2-2. Supported test parameters are shown in Table A.7.3.2.2.X1.1-1. UE capable of SA with PCell or SCell in FR2-2 needs to be tested by using the parameters in Table A.7.3.2.2.X1.1-2 and Table A.7.3.2.2.X1.1-3.

Table A.7.3.2.2.X1.1-1: Supported test configurations for contention based random access test in FR2-2 for NR Standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR PSCell/SCell 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | NR PSCell/SCell 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR2-2 | |

Table A.7.3.2.2.X1.1-2: General test parameters for contention based random access test in FR2-2 for NR Standalone

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test-1 | Comments |
| SSB Configuration | Config 1 | |  | SSB.1 FR2-2 | As defined in A.3.10 |
|  | Config 2 | |  | SSB.9 FR2-2 |  |
|  | Config 3 | |  | SSB.10 FR2-2 |  |
| CSI-RS for tracking | Config 1 | |  | TRS.2.1 TDD |  |
|  | Config 2 | |  | TBD |  |
|  | Config 3 | |  | TBD |  |
| Duplex Mode for Cell 1 | Config 1, 2, 3 | |  | TDD |  |
| TDD Configuration | Config 1 | |  | TDDConf.3.1 | As defined in A.3.1.4 |
|  | Config 2 | |  | TBD |  |
|  | Config 3 | |  | TBD |  |
| BWchannel | Config 1 | | MHz | 100: NRB,c = 66 |  |
|  | Config 2 | |  | 400; NRB,c = 66 |  |
|  | Config 3 | |  | 400; NRB,c = 33 |  |
| Data RBs allocated | Config 1, 2, 3 | |  | 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. |
|  | Config 2 | |  | TBD |  |
|  | Config 3 | |  | TBD |  |
| 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 | | Config 1 |  | FR2-2 PRACH configuration 1 | As defined in A.3.8.3, with exceptions as defined below |
|  | | Config 2 |  | TBD |  |
|  | | Config 2 |  | TBD |  |
| 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.X1.1-3: OTA-related test parameters for contention based random access test in FR2-2 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.X1.2 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.X1.2.1 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.X1.2.2 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.X1.2.3 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.X1.2.4 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.X1.2.5 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.X1.2.6 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.X1.2.7 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.X2 4-step RA type n on-contention based random access test in FR2-2 for NR Standalone

A.7.3.2.2.X2.1 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 FR2-2. Supported test parameters are shown in Table A.7.3.2.2.X2.1-1. UE capable of SA with PCell or SCell in FR2-2 needs to be tested by using the parameters in Table A.7.3.2.2.X2.1-2 and Table A.7.3.2.2.X2.1-3 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.X2.1-1: Supported test configurations for non-contention based random access test in FR2-2 for NR Standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR PSCell/SCell 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | NR PSCell/SCell 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR2-2 | |

Table A.7.3.2.2.X2.1-2: General test parameters for non-contention based random access test in FR2-2 for NR Standalone

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Test-2 | Comments |
| SSB Configuration | Config 1 |  | SSB.1 FR2-2 | SSB.1 FR2-2 | As defined in A.3.10 |
|  | Config 2 |  | TBD | TBD |  |
|  | Config 3 |  | TBD | TBD |  |
| CSI-RS for tracking | Config 1 |  | TRS.2.1 TDD | TRS.2.1 TDD |  |
|  | Config 2 |  | TBD | TBD |  |
|  | Config 3 |  | TBD | TBD |  |
| 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 |  |
|  | Config 2 |  | TDDConf.3.1 | TDDConf.3.1 |  |
|  | Config 3 |  | TDDConf.3.1 | TDDConf.3.1 |  |
| BWchannel | Config 1 | MHz | 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 |  | 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 | |  | FR2-2 PRACH configuration 2 | FR2-2 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.X2.1-3: OTA-related test parameters for non-contention based random access test in FR2-2 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.X2.2 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.X2.2.1 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.X2.2.2 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.X2.2.3 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.X2.2.4 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.

### < End of change 5, R4-2217199>

### < Start of change 6, R4-2217200>

#### A.7.5.5.X1 Beam Failure Detection and Link Recovery Test for FR2-2 PCell configured with SSB-based BFD and LR in non-DRX mode

##### A.7.5.5.X1.1 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 FR2-2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.X1.1-1, A.7.5.5.X1.1-2, A.7.5.5.X1.1-3 and A.7.5.5.X1.1-4 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.X1.1-1 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.X1.1-1 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.X1.1-1: 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.X1.1-2: 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 | | 1-2-3 |  | Cell 1 |  |
| RF Channel Number | | 1-2-3 |  | 1 |  |
| Duplex mode | | 1-2-3 |  | TDD |  |
| TDD Configuration | | 1-2-3 |  | TDDConf.3.1 |  |
| BWchannel | | 1-2 |  | 100: NRB,c = 66 |  |
|  | | 3 |  | 400: NRB,c = 33 |  |
| Data RBs allocated | | 1-2 |  | 66 |  |
|  | | 3 |  | 33 |  |
| PDSCH/PDCCH subcarrier spacing | | 1 | kHz | 120 |  |
|  | | 2 |  | 480 |  |
|  | | 3 |  | 960 |  |
| DL initial BWP configuration | | 1-2-3 |  | TBD |  |
| DL dedicated BWP configuration | | 1-2-3 |  | TBD |  |
| UL initial BWP configuration | | 1-2-3 |  | TBD |  |
| UL dedicated BWP configuration | | 1-2-3 |  | TBD |  |
| PDSCH Reference Channel | | 1 |  | TBD |  |
| 2 | TBD |  |
|  | | 3 |  | TBD |  |
| RMSI CORESET Reference Channel | | 1 |  | TBD |  |
| 2 | TBD |  |
|  | | 3 |  | TBD |  |
| Dedicated CORESET Reference Channel | | 1 |  | TBD |  |
| 2 | TBD |  |
|  | | 3 |  | TBD |  |
| 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 |  | TBD |  |
| SSB Configuration | | 1 |  | TBD |  |
| 2 | TBD |  |
|  | | 3 |  |  |  |
| SMTC Configuration | | 1-2-3 |  | SMTC.3 |  |
| PRACH Configuration | | 1-2-3 |  | TBD | A.3.8.3.2 |
| DRX configuration | | 1-2-3 |  | OFF |  |
| SSB index assigned as BFD RS (q0) | | 1-2-3 |  | 0 |  |
| SSB index assigned as CBD RS (q1) | | 1-2-3 |  | 1 |  |
| SSB 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 |  | gp0 |  |
| gapOffset | | 1-2-3 | ms | 0 |  |
| rlmInSyncOutOfSyncThreshold | | 1-2-3 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| 2 | -89 |
|  | | 3 |  | -86 |  |
| 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 |  | TBD |  |
| 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 | TBD |  |
| T3 | | 1-2-3 | s | TBD |  |
| T4 | | 1-2-3 | s | 0 |  |
| T5 | | 1-2-3 | s | TBD |  |
| D1 | | 1-2-3 | s | TBD |  |
| 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.X1.1-3: 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 | |  | 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 1-2-3 | dB | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1-2-3 | 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 | -98.5 | -98.5 | -78.5 | -78.5 | -78.5 |
|  | Config 3 |  | -95.5 | -95.5 | -75.5 | -75.5 | -75.5 |
|  | 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: 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.X1.1-1.  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.X1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode**

##### A.7.5.5.X1.2 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 = TBD+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.X2 Beam Failure Detection and Link Recovery Test for FR2-2 PCell configured with SSB-based BFD and LR in DRX mode

##### A.7.5.5.X2.1 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 FR2-2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.X2.1-1, A.7.5.5.X2.1-2, A.7.5.5.X2.1-3, A.7.5.5.X2.1-4 and A.7.5.5.X2.1-5 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.X2.1-1 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.X2.1-1 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.X2.1-1: 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.X2.1-2: General test parameters for FR2-2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Test**  **Config.** | **Unit** | **Value** | **Comment** |
|  | |  |  | **Test 1** |  |
| Active PCell | | 1-2-3 |  | 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 |  | 100: NRB,c = 33 |  |
| Data RBs allocated | | 1-2-3 |  | 66 |  |
| PDSCH/PDCCH subcarrier spacing | | 1 | kHz | 120 |  |
|  | | 2 |  | 480 |  |
|  | | 3 |  | 960 |  |
| DL initial BWP configuration | | 1-2-3 |  | TBD |  |
| DL dedicated BWP configuration | | 1-2-3 |  | TBD |  |
| UL initial BWP configuration | | 1-2-3 |  | TBD |  |
| UL dedicated BWP configuration | | 1-2-3 |  | TBD |  |
| PDSCH Reference Channel | | 1 |  | TBD |  |
| 2 | TBD |  |
|  | | 3 |  | TBD |  |
| RMSI CORESET Reference Channel | | 1 |  | TBD |  |
| 2 | TBD |  |
|  | | 3 |  | TBD |  |
| Dedicated CORESET Reference Channel | | 1 |  | TBD |  |
| 2 | TBD |  |
|  | | 3 |  | TBD |  |
| 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 |  | TBD |  |
| SSB Configuration | | 1 |  | TBD |  |
| 2 | TBD |  |
|  | | 3 |  | TBD |  |
| SMTC Configuration | | 1-2-3 |  | SMTC.3 |  |
| PRACH Configuration | | 1-2-3 |  | TBD | A.3.8.3.2 |
| DRX configuration | | 1-2-3 |  | DRX.3 | A.3.3.3 |
| SSB index assigned as BFD RS (q0) | | 1-2-3 |  | 0 |  |
| SSB index assigned as CBD RS (q1) | | 1-2-3 |  | 1 |  |
| SSB 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 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| 2 | -92 |
|  | |  |  |  |  |
| 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 |  | TBD |  |
| 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 | TBD |  |
| T3 | | 1-2-3 | s | TBD |  |
| T4 | | 1-2-3 | s | 0 |  |
| T5 | | 1-2-3 | s | TBD |  |
| D1 | | 1-2-3 | s | TBD |  |
| 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.X2.1-3: Cell specific test parameters for FR2-2 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 1,2,3 | dB | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1,2,3 | 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 |  | -98.5 | -98.5 | -78.5 | -78.5 | -78.5 |
|  | Config 3 |  | -95.5 | -95.5 | -75.5 | -75.5 | -75.5 |
|  | 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.X2.1-1.  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.X2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode**

##### A.7.5.5.X2.2 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 = TBD+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%.

### < End of change 6, R4-2217200>

### < Start of change 7, R4-2217200>

#### A.7.5.8.X1 MAC-CE based active TCI state switch in FR2-2

A.7.5.8.X1.1 NR PCell FR2-2 active TCI state switch for a known TCI state

A.7.5.8.X1.1.1 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.X1.1.1-1.

The test scenario comprises of one NR PCell (Cell 1) as given in Table A.7.5.8.X1.1.1-2. Cell-specific parameters of NR PCell are specified in Table A.7.5.8.X1.1.1-3 below. The OTA related test parameters for FR2-2 are shown in Table A.7.5.8.X1.1.1-4.

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.X1.1.1-1 and Figure A.7.5.8.X1.1.1-2 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.X1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | NR 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR2-2 | |

Table A.7.5.8.X1.1.1-2: 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.X1.1.1-3: NR Cell specific test parameters for TCI state switch

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Test config | Unit | Cell 1 |
| Frequency Range | | 1,2,3 |  | FR2-2 |
| Duplex mode | | 1,2,3 |  | TDD |
| TDD configuration | | 1,2,3 |  | TDDConf.3.1 |
| BWchannel | | 1 |  | 100 MHz: NRB,c = 66 |
|  | | 2 |  | 400 MHz: NRB,c = 66 |
|  | | 3 |  | 400 MHz: NRB,c = 33 |
| Data RBs allocated | | 1-2 |  | 66 |
|  | | 3 |  | 33 |
| Initial DL BWP Configuration | | 1,2,3 |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration | | 1,2,3 |  | DLBWP.1.1 |
| Initial UL BWP Configuration | | 1,2,3 |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration | | 1,2,3 |  | ULBWP.1.1 |
| PDSCH Reference measurement channel | | 1 |  | SR.3. 2 TDD |
|  | | 2 |  | TBD |
|  | | 3 |  | TBD |
| 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. 5 |
| SSB Configuration | | 1 |  | SSB.1 FR2 |
|  | | 2 |  | TBD |
|  | | 3 |  | TBD |
| SMTC Configuration | | 1,2,3 |  | SMTC.1 |
| TCI State 0 | | 1,2,3 |  | TCI.State.0 |
| TCI State 1 | | 1,2,3 |  | TCI.State.1 |
| TRS Configuration | | 1 |  | TRS.2.1 TDD |
|  | | 2 |  | TBD |
|  | | 3 |  | TBD |
| Correlation Matrix and Antenna Configuration | | 1,2,3 |  | 1x2 Low |
| EPRE ratio of PSS to SSS | | 1,2,3 | 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.X1.1.1-4: OTA related test parameters for TCI state switch

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Test | Unit | Cell 1 | | | | |
|  | | Config |  | SSB0 | | SSB1 | | |
|  | |  |  | T1 | T2 | T1 | | T2 |
| Angle of arrival configuration | | 1,2,3 |  | Setup 3 according to clause A.3.15.3 | | | | |
|  | |  |  | AoA1 | | | AoA2 | |
| Assumption for UE beams Note 6 | | 1,2,3 |  | Rough | | | | |
| Ês | | 1 | dBm/SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
|  | | 2 |  | -74.6 | -74.6 | -Infinity | | -74.6 |
|  | | 3 |  | -71.6 | -71.6 | -Infinity | | -71.6 |
| SS B\_RP Note 2 | | 1 | dBm/ SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
|  | | 2 |  | -74.6 | -74.6 | -Infinity | | -74.6 |
|  | | 3 |  | -71.6 | -71.6 | -Infinity | | -71.6 |
| BB Note 7 | | 1,2,3 | dB | 8.3 | 8.3 | -Infinity | | 8.3 |
| IoNote2 | | 1 | dBm/95.04 MHz Note4 | -56.0 | -56.0 | - Infinity | | -56.0 |
|  | | 2,3 | dBm/380.16 MHz | -49,98 | -49,98 | - Infinity | | -49,98 |
|  | 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.X1.1.1-1: Time multiplexed downlink transmissions during T1



Figure A.7.5.8.X1.1.1-2: Time multiplexed downlink transmissions during T2

A.7.5.8.X1.1.2 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.X2 RRC based active TCI state switch in FR-2

A.7.5.8.X2.1 NR PCell FR2-2 active TCI state switch for a known TCI state

A.7.5.8.X2.1.1 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.X2.1.1-1.

The test scenario comprises of one NR PCell as given in Table A.7.5.8.X2.1.1-2. Cell-specific parameters of NR PCell is specified in Table A.7.5.8.X2.1.1-3 below. The OTA related test parameters for FR2-2 is shown in Table A.7.5.8.X2.1.1-4.

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.X2.1.1-1 and Figure A.7.5.8.X2.1.1-2 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.X2.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | NR 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR2-2 | |

Table A.7.5.8.X2.1.1-2: 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.X2.1.1-3: NR Cell specific test parameters for TCI state switch

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Test Config | Unit | Cell 1 |
| Frequency Range | | 1,2,3 |  | FR2-2 |
| Duplex mode | | 1,2,3 |  | TDD |
| TDD configuration | | 1,2,3 |  | TDDConf.3.1 |
| BWchannel | | 1 |  | 100 MHz: NRB,c = 66 |
|  | | 2 |  | 400 MHz: NRB,c = 66 |
|  | | 3 |  | 400 MHz: NRB,c = 33 |
| Data RBs allocated | | 1,2 |  | 66 |
|  | | 3 |  | 33 |
| Initial DL BWP Configuration | | 1,2,3 |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration | | 1,2,3 |  | DLBWP.1.1 |
| Initial UL BWP Configuration | | 1,2,3 |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration | | 1,2,3 |  | ULBWP.1.1 |
| PDSCH Reference measurement channel | | 1 |  | SR.3. 2 TDD |
|  | | 2 |  | TBD |
|  | | 3 |  | TBD |
| 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. 5 |
| SSB Configuration | | 1 |  | SSB.1 FR2 |
|  | | 2 |  | TBD |
|  | | 3 |  | TBD |
| SMTC Configuration | | 1,2,3 |  | SMTC.1 |
| TCI State 0 | | 1,2,3 |  | TC. State.0 |
| TCI State 1 | | 1,2,3 |  | TCI.State.1 |
| reportConfigType | | 1,2,3 |  | ssb-Index-RSRP |
| reportConfigType | | 1,2,3 |  | periodic |
| Number of reported RS | | 1,2,3 |  | 2 |
| L1-RSRP reporting period | | 1,2,3 | slot | TBD |
| timeRestrictionForChannelMeasurements | | 1,2,3 |  | configured |
| TRS Configuration | | 1 |  | TRS.2.1 TDD |
|  | | 2 |  | TBD |
|  | | 3 |  | TBD |
| Correlation Matrix and Antenna Configuration | | 1,2,3 |  | 1x2 Low |
| EPRE ratio of PSS to SSS | | 1,2,3 | 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 | | 1,2,3 |  | 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.X2.1.1-4: OTA related test parameters for TCI state switch

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Test Config | Unit | Cell 1 | | | | |
|  |  |  | SSB0 | | SSB1 | | |
|  |  |  | T1 | T2 | T1 | | T2 |
| Angle of arrival configuration | 1,2,3 |  | Setup 3 according to clause A.3.15.3 | | | | |
|  |  |  | AoA1 | | | AoA2 | |
| Assumption for UE beams Note 6 | 1,2,3 |  | Rough | | | | |
| Ês | 1 | dBm/SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
|  | 2 |  | -74.6 | -74.6 | -Infinity | | -74.6 |
|  | 3 |  | -71.6 | -71.6 | -Infinity | | -71.6 |
| SS B\_RP Note 2 | 1 | dBm/ SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
|  | 3 |  | -74.6 | -74.6 | -Infinity | | -74.6 |
|  | 3 |  | -71.6 | -71.6 | -Infinity | | -71.6 |
| BB Note 7 | 1,2,3 | dB | 8.3 | 8.3 | -Infinity | | 8.3 |
| IoNote2 | 1 | dBm/95.04 MHz Note4 | -6.0 | -56.0 | - Infinity | | -56.0 |
|  | 2,3 | dBm/380.16 MHz | -49,98 | -49,98 | - Infinity | | -49,98 |
|  | 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.X2.1.1-1: Time multiplexed downlink transmissions during T1



Figure A.7.5.8.X2.1.1-2: Time multiplexed downlink transmissions during T2

A.7.5.8.X2.1.2 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.

### < End of change 7, R4-2217200>

### < Start of change 8, R4-2217201>

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.X3.2-2, and A.7.3.1.X3.2-3.

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 | |

### < End of change 8, R4-2217201>

### < Start of change 9, R4-2217202>

#### A.7.5.1.X1 Radio Link Monitoring Out-of-sync Test for FR2-2 PCell configured with SSB-based RLM RS in non-DRX mode

##### A.7.5.1.X1.1 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 FR2-2 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.X1.1-1. The test parameters are given in Tables A.7.5.1.X1.1-2, A.7.5.1.X1.1-3, and A.7.5.1.X1.1-4 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.X1.1-1 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.X1.1-2 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.X1.1-1: Supported test configurations for FR2-2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz 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.7.5.1.X1.1-2: General test parameters for FR2-2 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, 2, 3 |  | TDD |
| BWchannel | | Config 1, 2, 3 |  | Config 1: NRB,c = 66  Config 2: NRB,c = 66  Config 3: NRB,c = 33 |
| Data RBs allocated | | Config 1, 2, 3 |  | 24 |
| DL initial BWP configuration | | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2, 3 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1, 2, 3 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1, 2, 3 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1, 2, 3 |  | CCR.3.4 TDD |
| SSB Configuration | | Config 1, 2, 3 |  | [SSB.1 FR2-2]-2 |
| SMTC Configuration | | Config 1, 2, 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2, 3 |  | 120 KHz |
| PRACH Configuration | | Config 1, 2, 3 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1, 2, 3 |  | 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 | 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.X1.1-3: OTA related cell specific test parameters for FR2-2 (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, 2, 3 | dB | 2Note 6 | -6Note 6 | -15 |  | | |
| ssb-Index 1 SNR | Config 1, 2, 3 |  | Not sent | | | 2Note 6 | -15 | -15 |
|  | Config 1, 2, 3 | dBm/ 15kHz | -92.1 | | | -92.1 | | |
| Time multiplexing of the downlink transmissions from each AoA | |  | Defined in Figure A.7.5.1.X1.1-2 | | | | | |
| 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.X1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

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

Chart, box and whisker chart

Description automatically generated

Figure A.7.5.1.X.1.1-1: SNR variation for out-of-sync testing



Figure A.7.5.1.X1.1-2: Time multiplexed downlink transmissions

##### A.7.5.1.X1.2 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.X2 Radio Link Monitoring In-sync Test for FR2-2 PCell configured with SSB-based RLM RS in non-DRX mode

##### A.7.5.1.X2.1 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 FR2-2 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.X2.1-1.The test parameters are given in Tables A.7.5.1.X2.1-2, and A.7.5.1.X2.1-3 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.X2.1-1 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.X2.1-2 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.X2.1-1: Supported test configurations for FR2-2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz 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.7.5.1.X2.1-2: General test parameters for FR2-2 in-sync testing in non-DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1, 2, 3 |  | TDD |
| BWchannel | | Config 1, 2, 3 |  | Config 1: NRB,c = 66  Config 2: NRB,c = 66  Config 3: NRB,c = 33 |
| Data RBs allocated | | Config 1, 2, 3 |  | 24 |
| DL initial BWP configuration | | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2, 3 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1, 2, 3 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1, 2, 3 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1, 2, 3 |  | CCR.3.1 TDD |
| SSB Configuration | | Config 1, 2, 3 |  | [SSB.1 FR2-2] |
| SMTC Configuration | | Config 1, 2, 3 |  | SMTC.3 |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2, 3 |  | 120 KHz |
| PRACH Configuration | | Config 1, 2, 3 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1, 2, 3 |  | 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 | 5000 |
| 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 | 2.80 |
| T4 | | | s | 0.2 |
| T5 | | | s | 4.84 |
| D1 | | | s | 4.8 |
| 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.X2.1-3: OTA related cell specific test parameters for FR2-2 (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, 2, 3 | dB | 2Note 6 | -6Note 6 | -15 | -4.5 | 2Note 6 |  | | | | |
| ssb-Index 1 SNR | Config 1, 2, 3 |  | Not sent | | | | | 2Note 6 | -15 | -15 | -15 | -15 |
|  | Config 1, 2, 3 | dBm/ 15kHz | -92.1 | | | | | -92.1 | | | | |
| Time multiplexing of the downlink transmissions from each AoA | |  | Defined in Figure A.7.5.1.X2.1-2 | | | | | | | | | |
| 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.X2.1-4: Void

Chart, box and whisker chart

Description automatically generated

Figure A.7.5.1.X2.1-1: SNR variation for in-sync testing



Figure A.7.5.1.X2.1-2: Time multiplexed downlink transmissions

##### A.7.5.1.X2.2 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.X3 Radio Link Monitoring Out-of-sync Test for FR2-2 PCell configured with SSB-based RLM RS in DRX mode

##### A.7.5.1.X3.1 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 FR2-2 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.X3.1-1. The test parameters are given in Tables A.7.5.1.X3.1-2, and A.7.5.1.X3.1-3. 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.X3.1-1 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.X3.1-1: Supported test configurations for FR2-2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz 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.7.5.1.X3.1-2: General test parameters for FR2-2 out-of-sync testing in DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1, 2, 3 |  | TDD |
| BWchannel | | Config 1, 2, 3 |  | Config 1: NRB,c = 66  Config 2: NRB,c = 66  Config 3: NRB,c = 33 |
| Data RBs allocated | | Config 1, 2, 3 |  | 66 |
| DL initial BWP configuration | | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2, 3 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1, 2, 3 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1, 2, 3 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1, 2, 3 |  | CCR.3.4 TDD |
| SSB Configuration | | Config 1, 2, 3 |  | [SSB.1 FR2-2] |
| SMTC Configuration | | Config 1, 2, 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2, 3 |  | 120 KHz |
| PRACH Configuration | | Config 1, 2, 3 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1, 2, 3 |  | 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, 2, 3 |  | 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, 2, 3 |  | 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.X3.1-3: OTA related cell specific test parameters for FR2-2 (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, 2, 3 | dB | 2Note 6 | -6Note 6 | -15 |
| ssb-Index 1 SNR | Config 1, 2, 3 | 2Note 6 | -15 | -15 |
|  | Config 1, 2, 3 | 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.X3.1-4: Void

Table A.7.5.1.X3.1-5: Void

Chart, box and whisker chart

Description automatically generated

Figure A.7.5.1.X3.1-1: SNR variation for out-of-sync testing

##### A.7.5.1.X.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.X4 Radio Link Monitoring In-sync Test for FR2-2 PCell configured with SSB-based RLM RS in DRX mode

##### A.7.5.1.X4.1 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 FR2-2 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.X4.1-1. The test parameters are given in Tables A.7.5.1.X4.1-2, and A.7.5.1.X4.1-3. 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.X4.1-1 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.X4.1-1: Supported test configurations for FR2-2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz 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.7.5.1.X4.1-2: General test parameters for FR2-2 in-sync testing in DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1, 2, 3 |  | TDD |
| BWchannel | | Config 1, 2, 3 |  | Config 1: NRB,c = 66  Config 2: NRB,c = 66  Config 3: NRB,c = 33 |
| Data RBs allocated | | Config 1, 2, 3 |  | 66 |
| DL initial BWP configuration | | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2, 3 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1, 2, 3 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1, 2, 3 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1, 2, 3 |  | CCR.3.1 TDD |
| SSB Configuration | | Config 1, 2, 3 |  | [SSB.1 FR2-2] |
| SMTC Configuration | | Config 1, 2, 3 |  | SMTC.3 |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2, 3 |  | 120 KHz |
| PRACH Configuration | | Config 1, 2, 3 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1, 2, 3 |  | 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 | 7000 |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1, 2, 3 |  | 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, 2, 3 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.2 |
| T3 | | | s | 4.2 |
| T4 | | | s | 0.2 |
| T5 | | | s | 6.84 |
| D1 | | | s | 6.8 |
| 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.X4.1-3: OTA related cell specific test parameters for FR2-2 (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, 2, 3 | dB | 2Note 6 | -6Note 6 | -15 | -4.5 | 2Note 6 |
| ssb-Index 1 SNR | Config 1, 2, 3 | 2Note 6 | -15 | -15 | -15 | -15 |
|  | Config 1, 2, 3 | 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.X4.1-4: Void

Table A.7.5.1.X4.1-5: Void

Chart, box and whisker chart

Description automatically generated

Figure A.7.5.1.X4.1-1: SNR variation for in-sync testing

##### A.7.5.1.X4.2 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.X5 Radio Link Monitoring Out-of-sync Test for FR2-2 PCell configured with CSI-RS-based RLM in non-DRX mode

##### A.7.5.1.X5.1 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 FR2-2 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.X5.1-1, A.7.5.1.X5.1-2, A.7.5.1.X5.1-3 and A.7.5.1.X5.1-4 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.X5.1-1 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.X5.1-1: Supported test configurations for FR2-2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz 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.7.5.1.X5.1-2: General test parameters for FR2-2 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, 2, 3 |  | TDD |
| BWchannel | Config 1, 2, 3 |  | Config 1: NRB,c = 66  Config 2: NRB,c = 66  Config 3: NRB,c = 33 |
| Data RBs allocated | Config 1, 2, 3 |  | 24 |
| BWoccupied | Config 1, 2, 3 |  | 24 |
| TDD Configuration | Config 1, 2, 3 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1, 2, 3 |  | DLBWP.1.4 |
| UL initial BWP configuration | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1, 2, 3 |  | ULBWP.1.4 |
| RMSI CORESET Reference Channel | Config 1, 2, 3 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | Config 1, 2, 3 |  | CCR.3.4 TDD  CCR.3.6 TDD |
| SSB Configuration | Config 1, 2, 3 |  | [SSB.1 FR2-2] |
| SMTC Configuration | Config 1, 2, 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1, 2, 3 |  | 120 KHz |
| CSI-RS for RLM | Config 1, 2, 3 |  | 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, 2, 3 |  | 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 | Config 1:4.88  Config 2:1.28  Config 3:0.68 |
| T3 | | s | Config 1:4.88  Config 2:1.28  Config 3:0.68 |
| D1 | | s | Config 1: 4.84  Config 2:1.24  Config 3:0.64 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

Table A.7.5.1.X5.1-3: Cell specific test parameters for FR2-2 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, 2, 3 | dB | 2Note 11 | -6Note 11 | -15 |  | | |
| SNR on RLM-RS2 | Config 1, 2, 3 |  | Not sent | | | 2Note 11 | -14 | -15 |
|  | Config 1, 2, 3 | 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.X5.1-1.  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.X5.1-4: Measurement gap configuration for FR2-2 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 | |

**A picture containing chart

Description automatically generated**

Figure A.7.5.1.X5.1-1: SNR variation for CSI-RS out-of-sync testing

##### A.7.5.1.X5.2 Test Requirements

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

During time durations T1, T2 and T3, 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 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.X6 Radio Link Monitoring In-sync Test for FR2-2 PCell configured with CSI-RS-based RLM in non-DRX mode

##### A.7.5.1.X6.1 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 FR2-2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.X6.1-1, A.7.5.1.X6.1-2 and A.7.5.1.X6.1-3 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.X6.1-1 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.X6.1-1: Supported test configurations for FR2-2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz 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.7.5.1.X6.1-2: General test parameters for FR2-2 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, 2, 3 |  | TDD |
| BWchannel | Config 1, 2, 3 |  | Config 1: NRB,c = 66  Config 2: NRB,c = 66  Config 3: NRB,c = 33 |
| Data RBs allocated | Config 1, 2, 3 |  | 24 |
| BWoccupied | Config 1, 2, 3 |  | 24 |
| TDD Configuration | Config 1, 2, 3 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1, 2, 3 |  | DLBWP.1.4 |
| UL initial BWP configuration | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1, 2, 3 |  | ULBWP.1.4 |
| RMSI CORESET Reference Channel | Config 1, 2, 3 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | Config 1, 2, 3 |  | CCR.3.1 TDD  CCR.3.3 TDD |
| SSB Configuration | Config 1, 2, 3 |  | [SSB.1 FR2-2] |
| SMTC Configuration | Config 1, 2, 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1, 2, 3 |  | 120 KHz |
| CSI-RS for RLM | Config 1, 2, 3 |  | 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 | 5000 |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for CSI reporting | Config 1, 2, 3 |  | 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 | Config 1:3.24  Config 2:0.84  Config 3:0.44 |
| T4 | | s | 0.2 |
| T5 | | s | Config 1:3.24  Config 2:0.84  Config 3:0.44 |
| D1 | | s | Config 1: 4.8  Config 2: 4.8  Config 3: 4.8 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

Table A.7.5.1.X6.1-3: Cell specific test parameters for FR2-2 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, 2, 3 | dB | 2Note 11 | -6Note 11 | -15 | -4.5 | 2Note 11 |  | | | | |
| SNR on RLM-RS2 | Config 1, 2, 3 |  | Not sent | | | | | 2Note 11 | -14 | -15 | -15 | -14 |
|  | Config 1, 2, 3 | 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.X6.1-1.  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. | | | | | | | | | | | | |

**Diagram

Description automatically generated with medium confidence**

Figure A.7.5.1.X6.1-1: SNR variation for CSI-RS in-sync testing

##### A.7.5.1.X6.2 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.X7 Radio Link Monitoring Out-of-sync Test for FR2-2 PCell configured with CSI-RS-based RLM in DRX mode

##### A.7.5.1.X7.1 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 FR2-2 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.X7.1-1, A.7.5.1.X7.1-2, and A.7.5.1.X7.1-3 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.X7.1-1 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.X7.1-1: Supported test configurations for FR2-2 PCell

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR 120 kHz SSB SCS, 100MHz 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.7.5.1.X7.1-2: General test parameters for FR2-2 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, 2, 3 |  | TDD |
| TDD Configuration | Config 1, 2, 3 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1, 2, 3 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | Config 1, 2, 3 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | Config 1, 2, 3 |  | CCR.3.4 TDD  CCR.3.6 TDD |
| SSB Configuration | Config 1, 2, 3 |  | [SSB.1 FR2-2] |
| SMTC Configuration | Config 1, 2, 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1, 2, 3 |  | 120 KHz |
| CSI-RS for RLM | Config 1, 2, 3 |  | 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, 2, 3 |  | 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 | Config 1: 28.88  Config 2: 19.28  Config 3:19.28 |
| T3 | | s | Config 1: 28.88  Config 2: 19.28  Config 3:19.28 |
| D1 | | s | Config 1:28.84  Config 2:19.24  Config 3:19.24 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

**Table A.7.5.1.X7.1-3: Cell specific test parameters for FR2-2 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, 2, 3 | dB | 2Note 11 | -6Note 11 | -15 |
| SNR on RLM-RS2 | Config 1, 2, 3 | dB | 2Note 11 | -14 | -15 |
|  | Config 1, 2, 3 | 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.X7.1-1.  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. | | | | | |

**A picture containing shape

Description automatically generated**

Figure A.7.5.1.X7.1-1: SNR variation for CSI-RS out-of-sync testing

##### A.7.5.1.X7.2 Test Requirements

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

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on PCell.

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.X8 Radio Link Monitoring In-sync Test for FR2-2 PCell configured with CSI-RS-based RLM in DRX mode

##### A.7.5.1.X8.1 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 FR2-2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.X8.1-1, A.7.5.1.X8.1-2, A.7.5.1.X8.1-3 and A.7.5.1.X8.1-4 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.X8.1-1 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.X8.1-1: Supported test configurations for FR2-2 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz 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.7.5.1.X8.1-2: General test parameters for FR2-2 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, 2, 3 |  | TDD |
| TDD Configuration | Config 1, 2, 3 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1, 2, 3 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | Config 1, 2, 3 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | Config 1, 2, 3 |  | CCR.3.1 TDD  CCR.3.3 TDD |
| SSB Configuration | Config 1, 2, 3 |  | [SSB.1 FR2-2] |
| SMTC Configuration | Config 1, 2, 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1, 2, 3 |  | 120 KHz |
| CSI-RS for RLM | Config 1, 2, 3 |  | 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 | *10000* |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for CSI reporting | Config 1, 2, 3 |  | 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 | Config 1:6.44  Config 2: 6.44  Config 3: 6.44 |
| T4 | | s | 0.2 |
| T5 | | s | Config 1:9.84  Config 2: 9.84  Config 3: 9.84 |
| D1 | | s | Config 1:9.8  Config 2: 9.8  Config 3: 9.8 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

Table A.7.5.1.X8.1-3: Cell specific test parameters for FR2-2 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, 2, 3 | dB | 2Note 11 | -6Note 11 | -15 | -4.5 | 2Note 11 |
| SNR on RLM-RS2 | Config 1, 2, 3 | dB | 2Note 11 | -14 | -15 | -15 | -14 |
|  | Config 1, 2, 3 | 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.X8.1-1.  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.X8.1-4: Measurement gap configuration for FR2-2 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 | |

**Diagram

Description automatically generated**

Figure A.7.5.1.X8.1-1: SNR variation for CSI-RS in-sync testing

##### A.7.5.1.X8.2 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.X9 UE Radio Link Monitoring Scheduling Restrictions on FR2-2

##### A.7.5.1.X9.1 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.X9.1-1, table A.7.5.1.X9.1-2 and table A.7.5.1.X9.1-3 below. The UE is required during time period T1 to transmit ACK/NACK correctly upon scheduling of PDSCH.

Table A.7.5.1.X9.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz 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.7.5.1.X9.1-2: General test parameters for NR RLM scheduling restriction test case in FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| RF Channel Number |  | 1, 2, 3 | 1 |  |
| SSB configuration |  | 1, 2, 3 | [SSB.1 FR2-2] |  |
| SMTC configuration |  | 1, 2, 3 | SMTC pattern 1 |  |
| DRX cycle length | s | 1, 2, 3 | OFF |  |
| T1 | s | 1, 2, 3 | 5 | During T1 the UE is required to correctly transmit ACK/NACK |

Table A.7.5.1.X9.1-3: Cell specific test parameters for NR RLM scheduling restriction test case in FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | |
| AoA setup |  | 1, 2, 3 | Setup 3 defined in A.3.15.3 | |
|  |  |  | AoA1 | AoA2 |
| Assumption for UE beams Note 1 |  |  | Rough | Rough |
| TDD configuration |  | 1, 2, 3 | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2, 3 | Config 1: NRB,c = 66  Config 2: NRB,c = 66  Config 3: NRB,c = 33 | |
| Data RBs allocated |  | 1, 2, 3 | 24 | |
| PDSCH Reference measurement channel |  | 1, 2, 3 | SR.3.2 TDD | Not sent |
| RMSI CORESET RMC configuration |  | 1, 2, 3 | CR.3.1 TDD | Not sent |
| Dedicated CORESET RMC configuration |  | 1, 2, 3 | CCR.3.2 TDD | Not sent |
| TRS configuration |  | 1, 2, 3 | TRS.2.1 TDD | TRS.2.2 TDD |
| PDCCH/PDSCH TCI state |  | 1, 2, 3 | TCI.State.2 | N/A |
| OCNG Pattern |  | 1, 2, 3 | OP.5 defined in A.3.2.1 | Not sent |
| Initial DL BWP configuration |  | 1, 2, 3 | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2, 3 | ULBWP.0.1 | |
| RLM-RS |  | 1, 2, 3 | SSB with index 0 | SSB with index 1 |
|  | dBm/15kHz | 1, 2, 3 | -92.1 | -92.1 |
| Note2 | dBm/SCS | 1 | -83.1 | -83.1 |
|  |  | 2 | -77.1 | -77.1 |
|  |  | 3 | -74.1 | -74.1 |
|  | dB | 1, 2, 3 | 2 | 2 |
| BB Note 4 | dB | 1, 2, 3 | 1 | 1 |
| SSB\_RP Note3 | dBm/SCS | 1 | -81.1 | -81.1 |
|  |  | 2 | -75.1 | -75.1 |
|  |  | 3 | -72.1 | -72.1 |
| Io | dBm/95.04 MHz | 1 | -50 | -50 |
|  |  | 2 | -44 | -44 |
|  |  | 3 | -44 | -44 |
| Time multiplexing of the downlink transmissions from each AoA | | 1, 2, 3 | Defined in Figure A.7.5.1.X9.1-1 | |
| Propagation Condition |  | 1, 2, 3 | 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.X9.1-1: Time multiplexed downlink transmissions

##### A.7.5.1.X9.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.1.7.3.

### < End of change 9, R4-2217202>

### < Start of change 10, R4-2220043>

### A.7.5.7 PSCell addition and release delay

#### A.7.5.7.X1 Addition and Release Delay of known NR PSCell in FR2-2

##### A.7.5.7.X1.1 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.X1.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2-2, respectively. Test parameters are given in Tables A.7.5.7.X1.1-2, A.7.5.7.X1.1-3 and A.7.5.7.X1.1-4 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 UE shall identify Cell 2 and send an event-triggered report. When the tests system receives the report, it shall send updated measurement control information where the measurement gap pattern is released. Before the start of T3, 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 T3.

During T3, the UE shall carry out random access towards the PSCell. Reception by the test system of the PRACH preamble defines the start of T4.

During T4, 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 T5.

During T5, the UE shall release the PSCell.

Table A.7.5.7.X1.1-1: Supported test configurations for FR2-2 PSCell

|  |  |
| --- | --- |
| Config | Description |
| 1 | FR1 FDD SSB SCS 15kHz BW 10MHz – FR2-2 TDD SSB SCS 120kHz BW 100MHz |
| 2 | FR1 TDD SSB SCS 15kHz BW 10MHz – FR2-2 TDD SSB SCS 120kHz BW 100MHz |
| 3 | FR1 TDD SSB SCS 30kHz BW 40MHz – FR2-2 TDD SSB SCS 120kHz BW 100MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.5.7.X1.1-2: 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 FR2-2 |
| 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 | 1 | During this time the UE adds the PSCell. |
| T4 | | s | 1 | During this time the UE sends CSI reports for PSCell. |
| T5 | | s | 1 | During this time the UE releases the PSCell. |

Table A.7.5.7.X1.1-3: 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 | FR2-2 | | | | |
| 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.X1.1-4: 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.X1.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest TBD 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.X2 Addition and Release Delay of unknown NR PSCell in FR2-2

##### A.7.5.7.X2.1 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.X2.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2-2, respectively. Test parameters are given in Tables A.7.5.7.X2.1-2, A.7.5.7.X2.1-3 and A.7.5.7.X2.1-4 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.X2.1-1: Supported test configurations for FR2-2 PSCell

|  |  |
| --- | --- |
| Config | Description |
| 1 | FR1 FDD SSB SCS 15kHz BW 10MHz – FR2-2 TDD SSB SCS 120kHz BW 100MHz |
| 2 | FR1 TDD SSB SCS 15kHz BW 10MHz – FR2-2 TDD SSB SCS 120kHz BW 100MHz |
| 3 | FR1 TDD SSB SCS 30kHz BW 40MHz – FR2-2 TDD SSB SCS 120kHz BW 100MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.5.7.X2.1-2: 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 FR2-2 |
| 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.X2.1-3: 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 | FR2-2 | | | |
| 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.X2.1-4: 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.X2.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest TBD 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%.

### < End of change 10, R4-2220043>

### < Start of change 11, Moderator>

### A.15.2.1 Void











































































### < End of change 11, Moderator>

### < Start of change 12, R4-2220450>

### A.15.2.2 Radio link Monitoring for FR2-2 under CCA

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.15.2.2.1 Radio Link Monitoring Out-of-sync Test for FR2-2 PCell configured with SSB-based RLM RS in non-DRX mode

##### A.15.2.2.1.1 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 FR2-2 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.15.2.2.1.1-1. The test parameters are given in Tables A.15.2.2.1.1-2, A.15.2.2.1.1-3, and A.15.2.2.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.15.2.2.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.15.2.2.1.1-2 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.15.2.2.1.1-1: Supported test configurations for FR2-2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz 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.15.2.2.1.1-2: General test parameters for FR2-2 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, 2, 3 |  | TDD |
| BWchannel | | Config 1, 2, 3 |  | Config 1: NRB,c = 66  Config 2: NRB,c = 66  Config 3: NRB,c = 33 |
| Data RBs allocated | | Config 1, 2, 3 |  | 24 |
| DL initial BWP configuration | | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2, 3 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1, 2, 3 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1, 2, 3 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1, 2, 3 |  | CCR.3.4 TDD |
| SSB Configuration | | Config 1, 2, 3 |  | [SSB.1 FR2-2]-2 |
| SMTC Configuration | | Config 1, 2, 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2, 3 |  | 120 KHz |
| PRACH Configuration | | Config 1, 2, 3 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1, 2, 3 |  | 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 | 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.15.2.2.1.1-3: OTA related cell specific test parameters for FR2-2 (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, 2, 3 | dB | 2Note 6 | -6Note 6 | -15 |  | | |
| ssb-Index 1 SNR | Config 1, 2, 3 |  | Not sent | | | 2Note 6 | -15 | -15 |
|  | Config 1, 2, 3 | dBm/ 15kHz | -92.1 | | | -92.1 | | |
| Time multiplexing of the downlink transmissions from each AoA | |  | Defined in Figure A.15.2.2.1.1-2 | | | | | |
| 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.15.2.2.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

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

Chart, box and whisker chart

Description automatically generated

Figure A.15.2.2.1.1-1: SNR variation for out-of-sync testing



Figure A.15.2.2.1.1-2: Time multiplexed downlink transmissions

##### A.15.2.2.1.2 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.15.2.2.2 Radio Link Monitoring In-sync Test for FR2-2 PCell configured with SSB-based RLM RS in DRX mode

##### A.15.2.2.2.1 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 when DRX is used. This test will partly verify the FR2-2 radio link monitoring requirements in clause 8.1.

There is one cell (Cell 1), which is the active NR cell in FR2-2, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

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.15.2.2.2.1-1. The test parameters are given in Tables A.15.2.2.2.1-2, and A.15.2.2.2.1-3. 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.15.2.2.2.1-1 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.15.2.2.2.1-1: Supported test configurations for FR2-2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz 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.15.2.2.2.1-2: General test parameters for FR2-2 in-sync testing in DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1, 2, 3 |  | TDD |
| BWchannel | | Config 1, 2, 3 |  | Config 1: NRB,c = 66  Config 2: NRB,c = 66  Config 3: NRB,c = 33 |
| Data RBs allocated | | Config 1, 2, 3 |  | 66 |
| DL initial BWP configuration | | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2, 3 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1, 2, 3 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1, 2, 3 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1, 2, 3 |  | CCR.3.1 TDD |
| SSB Configuration | | Config 1, 2, 3 |  | [SSB.1 FR2-2] |
| SMTC Configuration | | Config 1, 2, 3 |  | SMTC.3 |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2, 3 |  | 120 KHz |
| PRACH Configuration | | Config 1, 2, 3 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1, 2, 3 |  | 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 | 7000 |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1, 2, 3 |  | 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, 2, 3 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.2 |
| T3 | | | s | 4.2 |
| T4 | | | s | 0.2 |
| T5 | | | s | 6.84 |
| D1 | | | s | 6.8 |
| 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.15.2.2.2.1-3: OTA related cell specific test parameters for FR2-2 (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, 2, 3 | dB | 2Note 6 | -6Note 6 | -15 | -4.5 | 2Note 6 |
| ssb-Index 1 SNR | Config 1, 2, 3 | 2Note 6 | -15 | -15 | -15 | -15 |
|  | Config 1, 2, 3 | 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.15.2.2.2.1-4: Void

Table A.15.2.2.2.1-5: Void

Chart, box and whisker chart

Description automatically generated

Figure A.15.2.2.2.1-1: SNR variation for in-sync testing

##### A.15.2.2.2.2 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%.

### < End of change 12, R4-2220450>

### < Start of change 13, R4-2220446>

### A.15.2.3 SCell Activation and Deactivation Delay

#### A.15.2.3.X SCell Activation and deactivation for SCell in FR2-2 intra-band in non-DRX with CCA

##### A.15.2.3.X.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 FR2-2 intra-band.

The supported test configurations are shown in table A.15.2.3.X.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.15.2.3.X.1-2, and cell specific test parameters are described in Tables A.15.2.3.X.1-3. OTA related test parameters are shown in table A.15.2.3.X.1-4 below.

Table A.15.2.3.X.1-1: Supported test configurations for FR2-2 SCell activation case

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz 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.15.2.3.X.1-2: General test parameters for FR2-2 SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2,3 | Two NR radio channels are used for this test, cell 1 and cell2 use RF channel 1 and 2, respectively. |

Table A.15.2.3.X.1-3: Cell specific test parameters for FR2-2 SCell activation case

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| SSB ARFCN |  |  | freq1 | | | freq2 | | |
| Duplex mode | Config 1, 2, 3 |  | TDD | | | | | |
| TDD configuration | Config 1, 2, 3 |  | TDDConf.3.1 | | | | | |
| 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 |  | TRS.2.1 TDD | | | | | |
| TCI state | Config 1, 2, 3 |  | TCI.State.0 | | | | | |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 | | | | | |
| Config 2 | 400: NRB,c = 66 | | | | | |
| Config 3 | 400: NRB,c = 33 | | | | | |
| Data RBs allocated | Config 1, 2 |  | 66 | | 66 | | 66 | |
| Config 3 |  | 33 | | 33 | | 33 | |
| PDSCH Reference measurement channel | Config 1, 2, 3 |  | SR.3.1 TDD | | | - | | |
| RMSI CORESET Parameters | Config 1, 2, 3 |  | CR.3.1 TDD | | | - | | |
| Dedicated CORESET Parameters | Config 1, 2, 3 |  | CCR.3.1 TDD | | | - | | |
| OCNG Patterns | Config 1, 2, 3 |  | OP.1 | | | | | |
| SSB Configuration | Config 1, 2, 3 |  | SSB.1 FR2-2 | | | | | |
| SMTC Configuration | Config 1, 2, 3 |  | SMTC.1 | | | | | |
| CSI-RS configuration for CSI reporting | Config 1, 2, 3 |  | CSI-RS.3.1 TDD | | | | | |
| reportConfigType | Config 1, 2, 3 |  | periodic | | | N/A | | |
| reportQuantity | Config 1, 2, 3 |  | cri-RI-PMI-CQI | | | N/A | | |
| CSI reporting periodicity | Config 1, 2, 3 | slot | 40 | | | N/A | | |
| CSI reporting offset | Config 1, 2, 3 | slot | 4 | | | N/A | | |
| EPRE ratio of PSS to SSS | Config 1, 2, 3 | 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 | 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: Void  Note 4: Void  Note 5: Void | | | | | | | | |

Table A.15.2.3.X.1-4: OTA related test parameters for FR2-2 SCell activation case

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | Cell 2 | | |
|  | |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Angle of arrival configuration | Config 1, 2 ,3 |  | Setup 1 according to table A.3.15.1 | | | Setup 1 according to table A.3.15.1 | | |
| Assumption for UE beams Note 4 | Config 1, 2 ,3 |  | Rough | | | Rough | | |
| Note1 |  | dBm/15kHzNote3 | -104.7 | | | -104.7 | | |
| Note1 | Config 1 | dBm/SCS | -95.7 | | | -95.7 | | |
|  | Config 2 |  | -95.7 | | | -95.7 | | |
|  | Config 3 |  | -92.7 | | | -92.7 | | |
|  |  | dB | 7 | | | 7 | | |
| SSB\_RPNote2 | Config 1 | dBm/SCS Note4 | -88.7 | | | -88.7 | | |
|  | Config 2 |  | -88.7 | | | -88.7 | | |
|  | Config 3 |  | -85.7 | | | -85.7 | | |
|  |  | dB | 7 | | | 7 | | |
| IoNote2 | Config 1 | dBm/95.04 MHz Note3 | -58.92 | | | -58.92 | | |
|  | Config 2 | dBm/380.16 MHz | -58.92 | | | -58.92 | | |
|  | Config 3 | dBm/380.16 MHz | -58.93 | | | -58.93 | | |
| 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: Equivalent power received by an antenna with 0dBi 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.15.2.3.X.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.

### < End of change 13, R4-2220446>

### < Start of change 14, R4-2220447>

#### A.15.2.3.Y SCell Activation and deactivation for FR1+FR2-2 inter-band with target SCell in FR2-2 with CCA

##### A.15.2.3.Y.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.15.5.3.1.1 except the PCell is in FR1 and SCell is in FR2-2.

The supported test configurations are defined in Table A.15.2.3.Y.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.15.2.3.Y.1-2. OTA related test parameters are defined in Table A.15.2.3.Y.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.15.2.3.Y.1-1: Supported test configurations for FR2-2 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 |
| 4 | PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  Target SCell: 480 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 5 | PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  Target SCell: 960 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.15.2.3.Y.1-2: Cell specific test parameters for FR2-2 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 2,3,4,5 |  | TDD | | | | | | |
| TDD configuration | Config 1 |  | Not Applicable | | | TDDConf.3.1 | | | |
| Config 2 | TDDConf.1.1 | | |
| Config 3,4,5 | TDDConf.2.1 | | |
| Downlink initial BWP Configuration | Config 1,2,3,4,5 |  | DLBWP.0.1 | | | | | | |
| Downlink dedicated BWP Configuration | Config 1,2,3,4,5 |  | DLBWP.1.1 | | | | | | |
| Uplink initial BWP configuration | Config 1,2,3,4,5 |  | ULBWP.0.1 | | | | | | |
| Uplink dedicated BWP configuration | Config 1,2,3,4,5 |  | ULBWP.1.1 | | | | | | |
| TRS configuration | Config 1,2,3,4,5 |  | N/A | | | | TRS.2.1 TDD | | |
| TCI state | Config 1,2,3,4,5 |  | TCI.State.0 | | | | | | |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | | 100: NRB,c = 66 | | |
| Config 3,4,5 | 40: NRB,c = 106 | | | |
| Data RBs allocated | Config 1,2 |  | 52 | 66 | 52 | | 66 | 52 | 66 |
| Config 3,4,5 | 106 | 106 | | 106 |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | | - | | |
| Config 2 |  | SR.1.1 TDD | | | |
| Config 3,4,5 |  | SR.2.1 TDD | | | |
| RMSI CORESET Parameters | Config 1 |  | CR.1.1 FDD | | | | - | | |
| Config 2 |  | CR.1.1 TDD | | | |
| Config 3,4,5 |  | CR.2.1 TDD | | | |
| Dedicated CORESET Parameters | Config 1 |  | CCR.1.1 FDD | | | | - | | |
| Config 2 | CCR.1.1 TDD | | | |
| Config 3,4,5 | CCR.2.1 TDD | | | |
| OCNG Patterns | |  | OP.1 | | | | | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 | | | | [SSB.x FR2-2] | | |
| Config 3 |  | SSB.2 FR1 | | | | [SSB.x FR2-2] | | |
|  | Config 4 |  |  | | | | [SSB.x FR2-2] | | |
|  | Config 5 |  |  | | | | [SSB.x FR2-2] | | |
| CSI-RS configuration for CSI reporting | Config 1,2,3,4,5 |  | 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 3,4,5 | 10 | | | |
| L1-RSRP reporting periodicity Note 7 | Config 1,2 | slot | 5 | | | | N/A | | |
| Config 3,4,5 | 10 | | | |
| CSI reporting offset | Config 1,2 | slot | 2 | | | | N/A | | |
| Config 3,4,5 | 4 | | | |
| L1-RSRP reporting offset | Config 1,2 | slot | 2 | | | | N/A | | |
| Config 3,4,5 | 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.15.2.3.Y.1-3: OTA related test parameters for FR1 PCell activation case with FR2-2 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 4 |  | -95.7 | | | | |
|  | Config 5 |  | -92.7 | | | | |
|  | Config 1,2,3,4,5 | dB | -∞ | | 7 | | 7 |
|  | Config 1,2,3,4,5 | dB | -∞ | | 7 | | 7 |
| SSB\_RPNote 2, Note 4 | Config 1,2,3 | dBm/SCS | -∞ | | -88.7 | | -88.7 |
|  | Config 4 |  | -∞ | | -88.7 | | -88.7 |
|  | Config 5 |  | -∞ | | -85.7 | | -85.7 |
| IoNote 2, Note 4 | Config 1,2,3 | dBm/95.04 MHz | -66.71 | | -58.92 | | -58.92 |
|  |  | dBm/380.16 MHz |  | | | -66.71 | | -58.92 | | -58.92 |
|  |  | dBm/380.16 MHz |  | | | -66.72 | | -58.93 | | -58.93 |
| 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.15.2.3.Y.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.

### < End of change 14, R4-2220447>

### < Start of change 15, R4-2220445>

### A.15.2.4 Beam Failure Detection and Link recovery procedures

#### A.15.2.4.X1 Beam Failure Detection and Link Recovery Test for FR2-2 PCell configured with SSB-based BFD and LR in non-DRX mode with CCA

##### A.15.2.4.X1.1 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 FR2-2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.15.2.4.X1.1-1, A.15.2.4.X1.1-2, A.15.2.4.X1.1-3 and A.15.2.4.X1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.15.2.4.X1.1-1 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.15.2.4.X1.1-1 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.15.2.4.X1.1-1: 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.15.2.4.X1.1-2: 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 | | 1-3 |  | Cell 1 |  |
| RF Channel Number | | 1-3 |  | 1 |  |
| Duplex mode | | 1-3 |  | TDD |  |
| TDD Configuration | | 1-3 |  | TDDConf.3.1 |  |
| BWchannel | | 1 |  | 100: NRB,c = 66 |  |
| 2 |  | 400: NRB,c = 66 |  |
| 3 |  | 400: NRB,c = 33 |  |
| Data RBs allocated | | 1-2 |  | 66 |  |
| 3 |  | 33 |  |
| PDSCH/PDCCH subcarrier spacing | | 1 | kHz | 120 |  |
| 2 | 480 |  |
| 3 | 960 |  |
| DL initial BWP configuration | | 1-3 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1-3 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1-3 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1-2 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1 |  | SR.3.2 TDD |  |
| 2, 3 | SR.3.3 TDD |  |
| RMSI CORESET Reference Channel | | 1 |  | CR.3.1 TDD |  |
| 2, 3 | CR.3.2 TDD |  |
| Dedicated CORESET Reference Channel | | 1 |  | CCR.3.1 TDD |  |
| 2, 3 | CCR.3.7 TDD |  |
| OCNG parameters | | 1-3 |  | OP.1 |  |
| CP length | | 1-3 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1-3 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1-3 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1 |  | SSB.1 FR2-2 |  |
| 2, 3 | SSB.2 FR2-2 |  |
| SMTC Configuration | | 1-3 |  | SMTC.3 |  |
| PRACH Configuration | | 1-3 |  | FR2-2 PRACH configuration 2 | A.3.8.3.2 |
| DRX configuration | | 1-3 |  | OFF |  |
| SSB index assigned as BFD RS (q0) | | 1-3 |  | 0 |  |
| SSB index assigned as CBD RS (q1) | | 1-3 |  | 1 |  |
| SSB index assigned as RLM RS | | 1-3 |  | 0,1 |  |
| Beam failure detection transmission parameters | DCI format | 1-3 |  | 1-0 |  |
| Number of Control OFDM symbols | 1-3 |  | 2 |  |
| Aggregation level | 1-3 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1-3 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1-3 | dB | 0 |  |
| DMRS precoder granularity | 1-3 |  | REG bundle size |  |
| REG bundle size | 1-3 |  | 6 |  |
| Gap pattern ID | | 1-3 |  | gp0 |  |
| gapOffset | | 1-3 | ms | 0 |  |
| rlmInSyncOutOfSyncThreshold | | 1-3 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| 2, 3 | -92 |
| powerControlOffsetSS | | 1-3 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1-3 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1-3 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1-3 |  | CSI-RS.3.1 TDD |  |
| reportConfigType | | 1-3 |  | periodic |  |
| reportQuantity | | 1-3 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1-3 | slot | 40 |  |
| CSI reporting offset | | 1-3 | slot | 4 |  |
| T310 | | 1-3 | ms | 1000 |  |
| N310 | | 1-3 |  | 2 |  |
| T1 | | 1-3 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1-3 | s | 2.61 |  |
| T3 | | 1-3 | s | 1.64 |  |
| T4 | | 1-3 | s | 0 |  |
| T5 | | 1-3 | s | 1.01 |  |
| D1 | | 1-3 | 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.15.2.4.X1.1-3: 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 | |  | 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 1-3 | dB | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1-3 | 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 2,3 | SCS | -101.5 | -101.5 | -81.5 | -81.5 | -81.5 |
|  | 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: 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.15.2.4.X1.1-1.  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.15.2.4.X1.1-4: Void**

****

**Figure A.15.2.4.X1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode**

##### A.15.2.4.X1.2 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.15.2.4.X2 Beam Failure Detection and Link Recovery Test for FR2-2 PCell configured with CSI-RS-based BFD and LR in DRX mode with CCA

##### A.15.2.4.X2.1 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.

There is one cell (Cell 1), which is the active NR cell in FR2-2, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

The test parameters are given in Tables A.15.2.4.X2.1-1, A.15.2.4.X2.1-2, A.15.2.4.X2.1-3, and A.15.2.4.X2.1-4 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.15.2.4.X2.1-1 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.15.2.4.X2.1-1 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.15.2.4.X2.1-1: 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.15.2.4.X2.1-2: 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 | | 1-3 |  | Cell 1 |  |
| RF Channel Number | | 1-3 |  | 1 |  |
| Duplex mode | | 1-3 |  | TDD |  |
| TDD Configuration | | 1-3 |  | TDDConf.3.1 |  |
| BWchannel | | 1 |  | 100: NRB,c = 66 |  |
| 2 |  | 400: NRB,c = 66 |  |
| 3 |  | 400: NRB,c = 33 |  |
| Data RBs allocated | | 1 |  | 66 |  |
| 3 |  | 33 |  |
| PDSCH/PDCCH subcarrier spacing | | 1 | kHz | 120 |  |
| 2 | 480 |  |
| 3 | 960 |  |
| DL initial BWP configuration | | 1-3 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1-3 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1-3 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1-3 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1-3 |  | SR.3.2 TDD |  |
| RMSI CORESET Reference Channel | | 1-3 |  | CR.3.1 TDD |  |
| Dedicated CORESET Reference Channel | | 1-3 |  | CCR.3.1 TDD |  |
| OCNG parameters | | 1-3 |  | OP.1 |  |
| CP length | | 1-3 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1-3 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1-3 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1-3 |  | SSB.1 FR2-2 |  |
| SMTC Configuration | | 1-3 |  | SMTC.3 |  |
| PRACH Configuration | | 1-3 |  | FR2-2 PRACH configuration 4 | A.3.8.3.4 |
| DRX configuration | | 1-3 |  | DRX.3 | A.3.3.3 |
| CSI-RS configuration for BFD/CBD/RLM | | 1-3 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS index assigned as BFD RS (q0) | | 1-3 |  | 0 |  |
| CSI-RS index assigned as CBD RS (q1) | | 1-3 |  | 1 |  |
| CSI-RS index assigned as RLM RS | | 1-3 |  | 0,1 |  |
| Beam failure detection transmission parameters | DCI format | 1-3 |  | 1-0 |  |
| Number of Control OFDM symbols | 1-3 |  | 2 |  |
| Aggregation level | 1-3 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1-3 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1-3 | dB | 0 |  |
| DMRS precoder granularity | 1-3 |  | REG bundle size |  |
| REG bundle size | 1-3 |  | 6 |  |
| Gap pattern ID | | 1-3 |  | N/A |  |
| rlmInSyncOutOfSyncThreshold | | 1-3 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1-3 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | 1-3 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1-3 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1-3 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1-3 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| reportConfigType | | 1-3 |  | periodic |  |
| reportQuantity | | 1-3 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1-3 | slot | 40 |  |
| CSI reporting offset | | 1-3 | slot | 4 |  |
| T310 | | 1-3 | ms | 1000 |  |
| N310 | | 1-3 |  | 2 |  |
| T1 | | 1-3 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1-3 | s | 5.43 |  |
| T3 | | 1-3 | s | 5.16 |  |
| T4 | | 1-3 | s | 0 |  |
| T5 | | 1-3 | s | 0.31 |  |
| D1 | | 1-3 | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.15.2.4.X2.1-3: 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 1-3 | dB | 5 Note 11 | -3 Note 11 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1-3 | 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 2 | TBD | TBD | TBD | TBD | TBD |
| Config 3 | TBD | TBD | TBD | TBD | TBD |
|  | Config 1-3 | 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.15.2.4.X2.1-1.  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.15.2.4.X2.1-4: Void

Table A.15.2.4.X2.1-5: Void

Table A.15.2.4.X2.1-6: Void



**Figure A.15.2.4.X2.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode**

##### A.15.2.4.X2.2 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%.

### < End of change 15, R4-2220445>

### < Start of change 16, R4-2220451>

### A.15.2.5 PSCell addition and release delay

A.15.2.5.1 Addition and Release Delay of unknown NR PSCell in FR2-2 with CCA

A.15.2.5.1.1 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 unknown to the UE at the time of addition.

The supported test configurations are given in Table A.15.2.5.1.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2-2 with CCA, respectively. Test parameters are given in Tables A.15.2.5.1.1-2, A.15.2.5.1.1-3 and A.15.2.5.1.1-4 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.15.2.5.1.1-1: Supported test configurations for FR2-2 PSCell with CCA**

|  |  |  |
| --- | --- | --- |
| **Configuration** | **Description** | |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz | 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.15.2.5.1.1-2: 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 FR2-2 with CCA |
| DRX |  | OFF | For both PCell and PSCell once activated |
| DL CCA model |  | TBD |  |
| UL CCA model |  | TBD |  |
| 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.15.2.5.1.1-3: 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 | – | TBD | | | |
|  |  | 2 | TDDConf.1.1 |  | | | |
|  |  | 3 | TDDConf.2.1 |  | | | |
| 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  66 | | | |
| 2 | 52 |
| 3 | 106 | 33 | | | |
| PCCA\_DL |  | 1,2,3 | – | TBD | | | |
| PCCA\_UL |  | 1,2,3 | – | TBD | | | |
| 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 | TBD | | | |
|  |  | 3 | SR.2.1 TDD | 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.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 | TBD | | | |
|  |  | 3 | CCR.2.1 TDD | TBD | | | |
| OCNG PatternsNote1 |  | 1,2,3 | OP.1 | OP.3 | | | |
| SSB configuration |  | 1 | SSB.1 FR1 | SSB.2 FR2 | | | |
| 2 | SSB.1 FR1 | TBD | | | |
| 3 | SSB.2 FR1 | TBD | | | |
| SMTC configuration |  | 1,2,3 | SMTC.2 | SMTC.1 | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1 | 15 | 120 | | | |
| 2 | 15 | 480 | | | |
| 3 | 30 | 960 | | | |
| 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. | | | | | | | |

**Table A.15.2.5.1.1-4: 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 | | | |
| SSB\_RP Note1, Note 2 | dBm/SCS | 1 | -∞ | -95.7 | | |
| 2 | -∞ | -89.7 | | |
| 3 | -∞ | -86.7 | | |
| BB Note1, Note 4 | dB | 1,2,3 | -∞ | 7 | | |
| Io Note 1, Note 2 | dBm/95.04 MHz | 1 | N/A | -58.9 | | |
| dBm/380.16 MHz | 2,3 | N/A | -52.9 | | |
| 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.15.2.5.1.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at Tconfig\_PSCell\_CCA 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.

Tconfig\_PSCell\_CCA is defined in clause 8.9B.2.

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%.

### < End of change 16, R4-2220451>

### < Start of change 17, R4-2220451>

### A.15.2.6 Active TCI state switch delay

#### A.15.2.6.1 MAC-CE based active TCI state switch in FR2-2 with CCA

A.15.2.6.1.1 NR PCell FR2-2 active TCI state switch for a known TCI state

A.15.2.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10A.3. Supported test configuration is shown in Table A.15.2.6.1.1.1-1.

The test scenario comprises of one NR PCell (Cell 1) as given in Table A.15.2.6.1.1.1-2. Cell-specific parameters of NR PCell are specified in Table A.15.2.6.1.1.1-3 below. The OTA related test parameters for FR2-2 are shown in Table A.15.2.6.1.1.1-4.

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.15.2.6.1.1.1-1 and Figure A.15.2.6.1.1.1-2 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 + TSSB\*LMAC,known).

Table A.15.2.6.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | NR 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR2-2 | |

Table A.15.2.6.1.1.1-2: 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 |  |
| DL CCA model |  | TBD |  |
| UL CCA model |  | TBD |  |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |

Table A.15.2.6.1.1.1-3: NR Cell specific test parameters for TCI state switch

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Test config | Unit | Cell 1 |
| Frequency Range | | 1,2,3 |  | FR2-2 |
| Duplex mode | | 1,2,3 |  | TDD |
| TDD configuration | | 1,2,3 |  | TDDConf.3.1 |
| BWchannel | | 1 |  | 100 MHz: NRB,c = 66 |
| 2 |  | 400 MHz: NRB,c = 66 |
| 3 |  | 400 MHz: NRB,c = 33 |
| Data RBs allocated | | 1-2 |  | 66 |
| 3 |  | 33 |
| PCCA\_DL | | 1,2,3 |  | TDD |
| PCCA\_UL | | 1,2,3 |  | TDD |
| Initial DL BWP Configuration | | 1,2,3 |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration | | 1,2,3 |  | DLBWP.1.1 |
| Initial UL BWP Configuration | | 1,2,3 |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration | | 1,2,3 |  | ULBWP.1.1 |
| PDSCH Reference measurement channel | | 1 |  | SR.3. 2 TDD |
|  | | 2 |  | TBD |
|  | | 3 |  | TBD |
| 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. 5 |
| SSB Configuration | | 1 |  | SSB.1 FR2 |
| 2 |  | TBD |
| 3 |  | TBD |
| SMTC Configuration | | 1,2,3 |  | SMTC.1 |
| TCI State 0 | | 1,2,3 |  | TCI.State.0 |
| TCI State 1 | | 1,2,3 |  | TCI.State.1 |
| TRS Configuration | | 1 |  | TRS.2.1 TDD |
| 2 |  | TBD |
| 3 |  | TBD |
| Correlation Matrix and Antenna Configuration | | 1,2,3 |  | 1x2 Low |
| EPRE ratio of PSS to SSS | | 1,2,3 | 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.15.2.6.1.1.1-4: OTA related test parameters for TCI state switch

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Test | Unit | Cell 1 | | | | |
|  | | Config |  | SSB0 | | SSB1 | | |
|  | |  |  | T1 | T2 | T1 | | T2 |
| Angle of arrival configuration | | 1,2,3 |  | Setup 3 according to clause A.3.15.3 | | | | |
|  | |  |  | AoA1 | | | AoA2 | |
| Assumption for UE beams Note 6 | | 1,2,3 |  | Rough | | | | |
| Ês | | 1 | dBm/SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| 2 |  | -74.6 | -74.6 | -Infinity | | -74.6 |
| 3 |  | -71.6 | -71.6 | -Infinity | | -71.6 |
| SS B\_RP Note 2 | | 1 | dBm/ SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| 2 |  | -74.6 | -74.6 | -Infinity | | -74.6 |
| 3 |  | -71.6 | -71.6 | -Infinity | | -71.6 |
| BB Note 7 | | 1,2,3 | dB | 8.3 | 8.3 | -Infinity | | 8.3 |
| IoNote2 | | 1 | dBm/95.04 MHz Note4 | -56.0 | -56.0 | - Infinity | | -56.0 |
| 2,3 | dBm/380.16 MHz | -49,98 | -49,98 | - Infinity | | -49,98 |
|  | 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.15.2.6.1.1.1-1: Time multiplexed downlink transmissions during T1



Figure A.15.2.6.1.1.1-2: Time multiplexed downlink transmissions during T2

A.15.2.6.1.1.2 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+ TSSB\*LMAC,known which is defined in clause 8.10A.3

### < End of change 17, R4-2220451>

### < Start of change 18, R4-2219266>

## A.15.3 RRC\_CONNECTED state mobility

### A.15.3.1 Handover

A.15.3.1.1 Intra-frequency handover from FR2-2 carrier with CCA to FR2-2 carrier with CCA; unknown target cell

A.15.3.1.1.1 Test Purpose and Environment

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

A.15.3.1.1.2 Test Parameters

Supported test configurations are shown in table A.15.3.1.1.2-1. Both handover delay and interruption length are tested by using the parameters in table A.15.3.1.1.2-2, and A.15.3.1.1.2-3.

The test scenario comprises of 1 carrier and two cell on the 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.15.3.1.1.2-1: Intra-frequency handover from FR2-2** **carrier with CCA to FR2-2** **carrier with CCA 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.15.3.1.1.2-2: General test parameters for Intra-frequency handover from FR2-2 carrier with CCA to FR2-2** **carrier with CCA**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 | On the carrier under CCA |
|  | Neighbouring cell |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell |  | Cell 2 | On the carrier under CCA |
| A4-Offset | | dBm | -120 |  |
| DL CCA model | |  | TBD |  |
| UL CCA model | |  | TBD |  |
| 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.15.3.1.1.2-3: Cell specific test parameters for Intra-frequency handover from FR2-2 carrier with CCA to FR2-2** **carrier with CCA**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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** | | |
| PCCA\_DL | |  | 1,2,3 | TDD | | | | TDD | | |
| PCCA\_UL | |  | 1,2,3 | TDD | | | | TDD | | |
| 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.15.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than RRC procedure delay + Tinterrupt 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 is defined in clause 6.1B.1.3.2.

### < End of change 18, R4-2219266>

### < Start of change 19, R4-2219266>

A.15.3.1.2 Inter-frequency handover from FR1 to FR2-2 carrier with CCA; unknown target cell

A.15.3.1.2.1 Test Purpose and Environment

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

A.15.3.1.2.2 Test Parameters

Supported test configurations are shown in table A.15.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.15.3.1.2.2-2, and A.15.3.1.2.2-3.

The test scenario comprises of 2 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.15.3.1.2.2-1: Inter-frequency handover from FR1 to FR2-2** **carrier with CCA test configurations**

|  |  |  |
| --- | --- | --- |
| **Configuration** | **Description** | |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz | 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.15.3.1.2.2-2: General test parameters Inter-frequency handover from FR1 to FR2-2** **carrier with CCA**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 | On carrier with CCA |
| Final condition | Active cell |  | Cell 2 | On carrier with CCA |
| A4-Offset | | dBm | -120 |  |
| DL CCA model | |  | TBD |  |
| UL CCA model | |  | TBD |  |
| 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.15.3.1.2.2-3: Cell specific test parameters for NR FR1-FR2-2 carrier with CCA 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** | | |
| PCCA\_DL | |  | 1,2,3 | TDD | | TDD | | |
| PCCA\_UL | |  | 1,2,3 | TDD | | TDD | | |
| 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.15.3.1.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than RRC procedure delay + Tinterrupt 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 is defined in clause 6.1B.1.4.2.

### < End of change 19, R4-2219266>

### < Start of change 20, R4-2218933>

A.15.3.2 RRC Connection Mobility Control

A.15.3.2.1 SA: RRC Re-establishment

A.15.3.2.1.1 Inter-frequency RRC Re-establishment with CCA in FR2-2

A.15.3.2.1.1.1 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 6.2.1A.

The test parameters are given in table A.15.3.2.1.1.1-1, table A.15.3.2.1.1.1-2 and table A.15.3.2.1.1.1-3 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 with CCA, 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.15.3.2.1.1.1-1: Supported test configurations**

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

**Table A.15.3.2.1.1.1-2: 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 |  |
| DL CCA Model | |  | 1,2,3 | TBD |  |
| UL CCA Model | |  | 1,2,3 | TBD |  |
| 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 | TBD |  |
|  | |  | 2 | TBD |  |
|  | |  | 3 | TBD |  |
| SMTC configuration | |  | 1 | SMTC pattern 1 |  |
|  | |  | 2 |  |  |
|  | |  | 3 |  |  |
| DRX cycle length | | s | 1,2,3 | OFF |  |
| PRACH configuration | |  | 1 | TBD | Table A.3.8.3.1-1 |
|  | |  | 2 | TBD |  |
|  | |  | 3 | TBD |  |
| 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 8.1A 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.15.3.2.1.1.1-3: 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 |  | 1,2,3 | Rough | | | Rough | | |
| AoA setup |  | 1,2,3 | Setup 3 as specified in clause A.3.15 | | | | | |
|  |  |  | AoA1 | | | AoA2 | | |
| TDD configuration |  | 1,2,3 | TBD | | | TBD | | |
| DL CCA probability PCCA\_DL |  | 1,2,3 | TBD | | | TBD | | |
| UL CCA probability PCCA\_UL |  | 1,2,3 | TBD | | | TBD | | |
| 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 |  | 1,2,3 | 24 | | | 24 | | |
| PDSCH RMC configuration |  | 1 | TBD | | | N/A | | |
|  |  | 2 | TBD | | | N/A | | |
|  |  | 3 | TBD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1 | TBD | | | TBD | | |
|  |  | 2 | TBD | | | TBD | | |
|  |  | 3 | TBD | | | TBD | | |
| Dedicated CORESET RMC configuration |  | 1 | TBD | | | TBD | | |
|  |  | 2 | TBD | | | TBD | | |
|  |  | 3 | TBD | | | TBD | | |
| TRS configuration |  | 1 | TBD | | | N/A | | |
|  |  | 2 | TBD | | | N/A | | |
|  |  | 3 | TBD | | | N/A | | |
| PDSCH/PDCCH TCI state |  | 1,2,3 | 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.15.3.2.1.1.2 Test Requirements

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

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than Tre-establish\_delay\_CCA 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\_CCA= TUL\_grant + TUE\_re-establish\_delay\_CCA.

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\_CCA = MAX (1000 ms, 12 x (10+ K3) x TSMTC,i) ms,

where:

K3 is the number of SMTC occasion groups not available at the UE during RRC re-establishment period on the “i"th carrier with CCA

TSMTC,I is the periodicity of the SMTC occasion configured for the inter-frequency carrier *i*

Tidentify\_inter\_NR\_CCA = TBD

TSI\_CCA = 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\_CCA = (1+ K4)\*TSSB,RO + 10 ms, where:

- TSSB,RO is the SSB to PRACH occasion association period as defined in Table 8.1-1 of TS 38.213 [3].

- K4 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. K4 = 0 for Type 3 UL channel access procedure as defined in TS 37.213 [33].

This gives a total of = 50 + MAX (1000 ms, 12 x ([10]+K3) x TSMTC, 1) + TBD + 1280 + (1+ K4)\*TSSB,RO + 10 ms..

A.15.3.2.1.2 Intra-frequency RRC Re-establishment with CCA in FR2-2 without serving cell timing

A.15.3.2.1.2.1 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.15.3.2.1.2.1-1, table A.15.3.2.1.2.1-2 and table A.15.3.2.1.2.1-3 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 with CCA, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.15.3.2.1.2.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | NR 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one configuration. | |

**Table A.15.3.2.1.2.1-2: 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 |  |
| DL CCA Model | |  | 1,2,3 | TBD |  |
| UL CCA Model | |  | 1,2,3 | TBD |  |
| 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 | TBD |  |
|  | |  | 2 | TBD |  |
|  | |  | 3 | TBD |  |
| DBT window configuration | |  | 1,2,3 | TBD |  |
| SMTC configuration | |  | 1 | TBD |  |
|  | |  | 2 | TBD |  |
|  | |  | 3 | TBD |  |
| DRX cycle length | | s | 1,2,3 | OFF |  |
| PRACH configuration | |  | 1 | TBD | Table A.3.8.3.1-1 |
|  | |  | 2 | TBD |  |
|  | |  | 3 | TBD |  |
| 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 8.1A 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.15.3.2.1.2.1-3: 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 | TBD | | | TBD | | |
| DL CCA probability PCCA\_DL |  | 1,2,3 | TBD | | | TBD | | |
| UL CCA probability PCCA\_UL |  | 1,2,3 | TBD | | | TBD | | |
| PDSCH RMC configuration |  | 1 | TBD | | | N/A | | |
|  |  | 2 | TBD | | | N/A | | |
|  |  | 3 | TBD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1 | TBD | | | TBD | | |
|  |  | 2 | TBD | | | TBD | | |
|  |  | 3 | TBD | | | TBD | | |
| Dedicated CORESET RMC configuration |  | 1 | TBD | | | TBD | | |
|  |  | 2 | TBD | | | TBD | | |
|  |  | 3 | TBD | | | TBD | | |
| TRS configuration |  | 1 | TBD | | | N/A | | |
|  |  | 2 | TBD | | | N/A | | |
|  |  | 3 | TBD | | | N/A | | |
| PDSCH/PDCCH TCI state |  | 1,2,3 | 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.15.3.2.1.2.2 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 intra frequency cell without serving cell timing shall be less than Tre-establish\_delay\_CCA 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\_CCA= TUL\_grant + TUE\_re-establish\_delay\_CCA.

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 = MAX (1000 ms, 12 x (10+ K3) x TSMTC,i) ms

where:

K3 is the number of SMTC occasion groups not available at the UE during RRC re-establishment period on the “i"th carrier with CCA

TSMTC,I is the periodicity of the SMTC occasion configured for the inter-frequency carrier *i*

Tidentify\_inter\_NR\_CCA = TBD

TSI\_CCA = 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\_CCA = (1+ K4)\*TSSB,RO + 10 ms, where:

- TSSB,RO is the SSB to PRACH occasion association period as defined in Table 8.1-1 of TS 38.213 [3].

- K4 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. K4 = 0 for Type 3 UL channel access procedure as defined in TS 37.213 [33].

This gives a total of = 50 + MAX (1000 ms, 12 x ([10]+K3) x TSMTC, 1) + TBD + 1280 + (1+ K4)\*TSSB,RO + 10 ms..

### < End of change 20, R4-2218933>

### < Start of change 21, R4-2218933>

#### A.15.3.2.2 Random Access

##### A.15.3.2.2.1 4-step RA type contention based random access test with CCA in FR2-2 for NR Standalone

A.15.3.2.2.1.1 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 FR2-2. Supported test parameters are shown in Table A.15.3.2.2.1.1-1. UE capable of SA with PCell or SCell in FR2-2 needs to be tested by using the parameters in Table A.15.3.2.2.1.1-2 and Table A.15.3.2.2.1.1-3.

Table A.15.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR2-2 with CCA for NR Standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR PCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR PCell/SCell 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | NR PCell/SCell 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one configuration. | |

Table A.15.3.2.2.1.1-2: General test parameters for contention based random access test in FR2-2 for NR Standalone

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Comments |
| SSB Configuration | Config 1 |  | TBD |  |
|  | Config 2 |  | TBD |  |
|  | Config 3 |  | TBD |  |
| DBT Window Configuration | Config 1 |  | TBD |  |
|  | Config 2 |  | TBD |  |
|  | Config 3 |  | TBD |  |
| DL CCA model | Config 1,2,3 |  | TBD |  |
| UL CCA model | Config 1,2,3 |  | As specified in A.3.26.2.2 |  |
| CSI-RS for tracking | Config 1 |  | TBD |  |
|  | Config 2 |  | TBD |  |
|  | Config 3 |  | TBD |  |
| Duplex Mode for Cell 1 | Config 1 |  | TDD |  |
| TDD Configuration | Config 1 |  | TBD |  |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |  |
|  | Config 2 |  | 400: NRB,c = 66 |  |
|  | Config 3 |  | 400: NRB,c = 33 |  |
| Data RBs allocated | Config 1,2,3 |  | 24 |  |
| OCNG Pattern Note 1 | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH Reference Channel Note 2 | Config 1 |  | TBD |  |
|  | Config 2 |  | TBD |  |
|  | Config 3 |  | TBD |  |
| RMSI CORESET Reference Channel | Config 1 |  | TBD |  |
|  | Config 2 |  | TBD |  |
|  | Config 3 |  | TBD |  |
| 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 | |  | TBD |  |
| DL CCA probability | |  | TBD |  |
| UL CCA probability | |  | TBD |  |
| 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.15.3.2.2.1.1-3: OTA-related test parameters for contention based random access test in FR2-2 for NR Standalone

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Comments |
| AoA setup | |  | Setup 1 | 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 *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: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

A.15.3.2.2.1.2 Test Requirements

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

A.15.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2A.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,* if the UL CCA is successful.

The three requirements below are relevant for all cases of PRACH transmissions described within the clause A.15.3.2.2.1.2.2:

The System Simulator shall implement the UL CCA model of A.3.26.2 for the RACH occasions where PRACH transmissions are expected. The System Simulator shall monitor the RACH occasions to detect if the UE is transmitting PRACH preambles. If a PRACH transmission is detected on a RACH occasion that is expected to have UL CCA failure, the test is considered as failed.

In case of CCA DL failure, the test equipment should verify that the UE does not transmit PRACH

In case of UL CCA failure The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.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.15.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2A.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. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

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.15.3.2.2.1.2.3 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. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

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.15.3.2.2.1.2.4 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.15.3.2.2.1.2.5 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.15.3.2.2.1.2.6 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.15.3.2.2.1.2.7 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.15.3.2.2.2 4-step RA type n on-contention based random access with CCA test in FR2-2 for NR Standalone

A.15.3.2.2.2.1 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 FR2-2. Supported test parameters are shown in Table A.15.3.2.2.2.1-1. UE capable of SA with PCell or SCell in FR2-2 needs to be tested by using the parameters in Table A.15.3.2.2.2.1-2 and Table A.15.3.2.2.2.1-3 for SSB-based non-contention based random access test (Test 1).

Table A.15.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR2-2 for NR Standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR PCell/SCell 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | NR PCell/SCell 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one configuration. | |

Table A.15.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR2-2 for NR Standalone

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Comments |
| SSB Configuration | Config 1 |  | TBD | As defined in A.3.10 |
|  | Config 2 |  | TBD |  |
|  | Config 3 |  | TBD |  |
| DBT Window Configuration | Config 1 |  | TBD |  |
|  | Config 2 |  | TBD |  |
|  | Config 3 |  | TBD |  |
| DL CCA model | Config 1,2,3 |  | TBD |  |
| UL CCA model | Config 1,2,3 |  | As specified in A.3.26.2.2 |  |
| CSI-RS for tracking | Config 1 |  | TBD |  |
|  | Config 2 |  | TBD |  |
|  | Config 3 |  | TBD |  |
| Duplex Mode for Cell 2 | Config 1, 2, 3 |  | TDD |  |
| TDD Configuration | Config 1, 2, 3 |  | TDDConf.3.1 |  |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |  |
|  | Config 2 |  | 400: NRB,c = 66 |  |
|  | Config 3 |  | 400: NRB,c = 33 |  |
| Data RBs allocated | Config 1, 2, 3 |  | 24 |  |
| OCNG Pattern Note 1 | |  | OP.3 | As defined in A.3.2.1. |
| PDSCH Reference Channel Note 2 | Config 1 |  | TBD |  |
|  | Config 2 |  | TBD |  |
|  | Config 3 |  | TBD |  |
| 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 | |  | TBD | 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.15.3.2.2.2.1-3: OTA-related test parameters for non-contention based random access test in FR2-2 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 |  |

A.15.3.2.2.2.2 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.15.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2A.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.

The three requirements below are relevant for all cases of PRACH transmissions described within the whole clause A.15.3.2.2.2.2:

The System Simulator shall implement the UL CCA model of A.3.26.2 for the RACH occasions where PRACH transmissions are expected. The System Simulator shall monitor the RACH occasions to detect if the UE is transmitting PRACH preambles. If a PRACH transmission is detected on a RACH occasion that is expected to have UL CCA failure, the test is considered as failed.

In case of CCA DL failure, the test equipment should verify that the UE does not transmit PRACH for semi-static channel access mode; for dynamic channel access mode it is assumed that RACH occasions are always scheduled within a UE-initiated COT.

In case of UL CCA failure, The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power.

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 6.2.2A.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.15.3.2.2.2.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2A.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. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

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 if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 is detected on a grant expected to have UL CCA failure, the test is considered as failed.

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.15.3.2.2.2.2.3 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. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

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.

### < End of change 21, R4-2218933>

### < Start of change 22, R4-2220448>

## A.15.4 Measurement procedure

### A.15.4.1 Intra-frequency Measurements

#### A.15.4.1.1 SA event triggered reporting test without gap under non-DRX for FR2-2 with CCA

##### A.15.4.1.1.1 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 9.2A.5.1 and 9.2A.5.2. Supported test configurations are shown in table A.15.4.1.1.1-1.

Table A.15.4.1.1.1-1: 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 with CCA transmitting SSBs according to DL CCA model. The test parameters for the Cell 1 and Cell 2 are given in Table A.15.4.1.1.1-2, A.15.4.1.1.1-3 and A.15.4.1.1.1-4 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.15.4.1.1.1-2: 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.15.4.1.1.1-3: 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 | |
| DL CCA model |  | 1,2,3 | As specified in clause TBD | | As specified in clause TBD | |
| DL CCA probability |  | 1,2,3 | TBD | | TBD | |
| 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.15.4.1.1.1-4: 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.15.4.1.1.1-1: Time multiplexed downlink transmissions (Config 1 example)

##### A.15.4.1.1.2 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

For Configuration 1，

- TBD for a UE supporting power class 1,

- TBD for a UE supporting power class 2 and 3

For Configuration 2，

- TBD for a UE supporting power class 1,

- TBD for a UE supporting power class 2 and 3

For Configuration 3，

- TBD for a UE supporting power class 1,

- TBD 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.15.4.1.2 SA event triggered reporting test with per-UE gaps under DRX for FR2-2 with CCA

##### A.15.4.1.2.1 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 9.2A.5.1 and 9.2A.5.2. Supported test configurations are shown in table A.15.4.1.2.1-1.

Table A.15.4.1.2.1-1: 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 with CCA transmitting SSBs according to DL CCA model. The test parameters for the Cell 1 and Cell 2 are given in Table A.15.4.1.2.1-2, A.15.4.1.2.1-3 and A.15.4.1.2.1-4 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.15.4.1.2.1-2: 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.7.6.1.7.1-5 |
| 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.15.4.1.2.1-3: 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 | |
| DL CCA model |  | 1,2,3 | As specified in clause TBD | | As specified in clause TBD | |
| DL CCA probability |  | 1,2,3 | TBD | | TBD | |
| 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.15.4.1.2.1-4: 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.15.4.1.2.2 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

For Configuration 1，

- TBD for a UE supporting power class 1,

- TBD for a UE supporting power class 2 and 3

For Configuration 2，

- TBD for a UE supporting power class 1,

- TBD for a UE supporting power class 2 and 3

For Configuration 3，

- TBD for a UE supporting power class 1,

- TBD 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，

- TBD for a UE supporting power class 1,

- TBD for a UE supporting power class 2 and 3

For Configuration 2，

- TBD for a UE supporting power class 1,

- TBD for a UE supporting power class 2 and 3

For Configuration 3，

- TBD for a UE supporting power class 1,

- TBD 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.15.4.2 Inter-frequency Measurements

#### A.15.4.2.1 SA event triggered reporting tests for FR2-2 with CCA without SSB time index detection when DRX is not used (PCell in FR2-2)

##### A.15.4.2.1.1 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 9.3A.4.

In this test, there are two cells: NR cell 1 as PCell in FR2-2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2-2 on NR RF channel 2 with CCA transmitting SSBs according to DL CCA model. The test parameters and configurations are given in Tables A.15.4.2.1.1-1, A.15.4.2.1.1-2, and A.15.4.2.1.1-3.

Measurement gap pattern configuration # 13 as defined in Table A.15.4.2.1.1-2 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.15.4.2.1.1-1.

Table A.15.4.2.1.1-1 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 |
| 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.15.4.2.1.1-2: 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 FR2-2 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.15.4.2.1.1-3: 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 | | |
| DL CCA model | |  | Config 1,2,3 | As specified in clause TBD | | As specified in clause TBD | | |
| DL CCA probability | |  | Config 1,2,3 | TBD | | TBD | | |
| 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.15.4.2.1.2 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

For Configuration 1,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 2,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 3,

TBD for UE supporting power class 1, or

TBD 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.15.4.2.2 SA event triggered reporting tests for FR2-2 with CCA with SSB time index detection when DRX is used (PCell in FR2-2)

##### A.15.4.2.2.1 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 9.3A.4.

In this test, there are two cells: NR cell 1 as PCell in FR2-2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2-2 on NR RF channel 2 with CCA transmitting SSBs according to DL CCA model. The test parameters and configurations are given in Tables A.15.4.2.2.1-1, A.15.4.2.2.1-2, and A.15.4.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.15.4.2.2.1-2 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.15.4.2.2.1-1.

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.15.4.2.2.1-1: 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.15.4.2.2.1-2: 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 FR2-2 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.15.4.2.2.1-3: 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 | |
| DL CCA model | |  | Config 1,2,3 | As specified in clause TBD | | As specified in clause TBD | |
| DL CCA probability | |  | Config 1,2,3 | TBD | | TBD | |
| 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.15.4.2.2.2 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

For Configuration 1,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 2,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 3,

TBD for UE supporting power class 1, or

TBD 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,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 2,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 3,

TBD for UE supporting power class 1, or

TBD 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.15.4.2.3 SA event triggered reporting tests for FR2-2 with CCA without SSB time index detection when DRX is used (PCell in FR1)

##### A.15.4.2.3.1 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 9.3A.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 with CCA transmitting SSBs according to DL CCA model. The test parameters and configurations are given in Tables A.15.4.2.3.1-1, A.15.4.2.3.1-2, and A.15.4.2.3.1-3.

In test 1&2 per-UE measurement gap pattern configuration # 0 as defined in Table A.15.4.2.3.1-2 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.15.4.2.3.1-2. 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.15.4.2.3.1-1.

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.15.4.2.3.1-1: 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.15.4.2.3.1-2: 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 FR2-2 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.15.4.2.3.1-3: 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 | |
| DL CCA model | |  | Config 1,2,3,4,5,6,7,8,9 | As specified in clause TBD | | As specified in clause TBD | |
| DL CCA probability | |  | Config 1,2,3,4,5,6,7,8,9 | TBD | | TBD | |
| 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.15.4.2.3.2 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

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 4,5,6

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 7,8,9

TBD for UE supporting power class 1, or

TBD 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

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 4,5,6

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 7,8,9

TBD for UE supporting power class 1, or

TBD 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.15.4.2.4 SA event triggered reporting tests for FR2-2 with CCA with SSB time index detection when DRX is not used (PCell in FR1)

##### A.15.4.2.4.1 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 9.3A.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 with CCA transmitting SSBs according to DL CCA model. The test parameters and configurations are given in Tables A.15.4.2.4.1-1, A.15.4.2.4.1-2, and A.15.4.2.4.1-3.

In test 1 per-UE measurement gap pattern configuration # 0 as defined in Table A.15.4.2.4.1-2 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.15.4.2.4.1-2. 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.15.4.2.4.1-1.

Table A.15.4.2.4.1-1: 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.15.4.2.4.1-2: 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 FR2-2 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.15.4.2.4.1-3: 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 | |
| DL CCA model | |  | Config 1,2,3,4,5,6,7,8,9 | As specified in clause TBD | | As specified in clause TBD | |
| DL CCA probability | |  | Config 1,2,3,4,5,6,7,8,9 | TBD | | TBD | |
| 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.15.4.2.4.2 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

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 4,5,6

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 7,8,9

TBD for UE supporting power class 1, or

TBD 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

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 4,5,6

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 7,8,9

TBD for UE supporting power class 1, or

TBD 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.

### < End of change 22, R4-2220448>

### < Start of change 23, R4-2220449>

#### 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%.

### < End of change 23, R4-2220449>

### < Start of change 24, R4-2220449>

#### 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%.

### < End of change 24, R4-2220449>