3GPP TSG-RAN WG4 Meeting #100-e R4-2115460 Electronic Meeting, August 16-27, 2021

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** |  | **rev** | **-** | **Current version:** | **16.8.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Big CR to TS 38.133: NR\_newRAT-Perf maintenance Part 3 (Rel-16) | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | MCC, Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_newRAT-Perf | | | | |  | ***Date:*** | | | 2021-8-31 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | **R4-2112476 Correction on configurations in SA FR2 tests in R16**  In some SA FR2 tests, LTE Cell is configured while it should not be the serving cell. Some configuration numbers are incorrect.  **R4-2112537 Correction on configurations in SCell activation tests in R16**  In some SCell activation tests, some configuration numbers are incorrect and the T1 is missing.  **R4-2112614 Draft-CR to TS 38.133: Missing CORESET RMCs in several test cases (Rel 16)**  Rel-16 mirror CR for Rel-15 CR agreed in R4-2112613  Many NSA-FR1 and NSA-FR2 TCs are missing the RMSI and/or Dedicated CORESET reference channel.  **R4-2112617 Draft-CR to TS 38.133: Corrections to PRACH test cases (Rel 16)**  Rel-16 mirror CR for Rel-15 CR agreed in R4-2112616  Agreed R4-1915897 stated that “Requirement 6.2.2.2.1.5 is not applicable for EN-DC as CCCH does not exists in NR cell in EN-DC scenario. According to TS 38.321, in EN-DC scenario where C-RNTI is already provided to the UE, UE shall send Msg3 including MAC CE addressing the C-RNTI and SS will send PDCCH addressing the C-RNTI, then the contetion resolution and random access procedure is successfully completed.”  However, the concerned sub-tests were only removed from the EN-DC FR1 TC A.4.3.2.2.1, but not from the similar EN-DC FR2 TC in A.5.3.2.2.1.  **R4-2112620 Draft-CR to TS 38.133: Corrections to re-establishment test cases (Rel 16)**  Rel-16 mirror CR for Rel-15 CR agreed in R4-2112619  In TCs A.6.3.2.1.1, A.6.3.2.1.2, A.6.3.2.1.3:   * Cell 2 RMCs for PDSCH and TRS are N/A. However, as part of the test procedure the UE will re-establish the connection with Cell 2 (though the evaluation is at PRACH transmission point of time), therefore PDSCH RMC is required (similarly as done for re-selection, HO). * The comment T310 is disabled is misleading, since T310 has a value of 0ms, which is not the same as being disabled.   **R4-2112623 Draft-CR to TS 38.133: Corrections to radio link monitoring test cases (Rel 16)**  Rel-16 mirror CR for Rel-15 CR agreed in R4-2112622  RLM In-Sync test cases are using a 4dB EPRE ratio of PDCCH DMRS to SSS (e.g. Table A.4.5.1.2.1-3), which equals the hypothetical Out-of-Sync value (e.g. Table A.5.5.1.2.1-2) and the one used in Out-of-Sync tests. In fact the hypothetical value for In-Sync is 0dB and this was also used in LTE In-Sync tests. Thus we believe the 4dB is a copy-paste error and should be corrected to 0dB.  **R4-2112626 Draft-CR to TS 38.133: Corrections to periodic measurement test cases (Rel 16)**  Rel-16 mirror CR for Rel-15 CR agreed in R4-2112625  Several editorial inconsistencies and missing configurations (BWP, TRS, TCI etc.) in periodical reporting TCs.  Agreed R4-2110239, changed the OCNG pattern in Table A.6.3.2.2.2.1-2 incorrectly from OCNG Pattern 1 to OP.11 (should have been OP.1).  **R4-2115245 Draft CR on general modification in clauses A.3.7A and A.3.7.2.2**  During Rel.15 NR OTA SI​, it was agreed that FR1 link is just used for signaling because it is not calibrated​. And the agreements have been partially reflected into TR38.810 and TS38.133. However, in the current RRM specification, the testability issue has not been clearly stated, hence, leading to a misunderstanding among working groups and TE vendors.  **R4-2115261 Draft CR: Interruptions during measurements on deactivated NR SCC in FR1**  The test is to verify UE DL interruption requirement upon measurement on deactivated NR SCell, hence, no UL configuration is necessary for the deactivated SCell. UL BWP configuration may unnecessarily limit the test applicability to those UEs supporting UL CA. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | **R4-2112476 Correction on configurations in SA FR2 tests in R16**  Change #1   * On Table A.7.6.3.1.2-1: Correct the config number.   Change #2   * On Table A.7.7.1.3.1-1: remove LTE cells in the SA test configuration. * On Table A.7.7.1.3.2-2: Correct the config number   Change #3  On Table A.7.7.4.1.1-1: remove LTE cells in the SA test configuration.  **R4-2112537 Correction on configurations in SCell activation tests in R16**   * Correct configuration numbers for Table A.6.5.3.1.1-3, Table A.7.5.3.1.1-3, Table A.7.5.3.1.1-4, Table A.7.5.3.2.1-2, Table A.7.5.3.2.1-3, Table A.7.5.3.3.1-4, Table A.7.5.3.4.1-4, Table A.7.5.3.5.1-3 and Table A.7.5.3.5.1-4. * Add the missing T1 for Table A.6.5.3.5.1-2.   **R4-2112614 Draft-CR to TS 38.133: Missing CORESET RMCs in several test cases (Rel 16)**  For A.4.3.2.2.1, A.4.3.2.2.2, A.4.3.2.2.3, A.4.3.2.2.4, A.4.4.1.1, A.4.4.3.1, A.4.6.2.1, A.4.6.2.2, A.4.6.2.5, A.4.6.2.6, A.5.4.3.1, A.5.6.2.1, A.5.6.2.2, A.5.6.2.3, A.5.6.2.4, A.5.6.2.5, A.5.6.2.6, A.5.6.2.7, A.5.6.2.8 added RMSI and/or Dedicated CORESET reference channel. (Similarly to CR agreed in R4-2108025).  **R4-2112617 Draft-CR to TS 38.133: Corrections to PRACH test cases (Rel 16)**  A.5.3.2.2.1.2.5 and A.5.3.2.2.1.2.6 are voided since the requirements are only applicable to SA test cases.  **R4-2112620 Draft-CR to TS 38.133: Corrections to re-establishment test cases (Rel 16)**  In TCs A.6.3.2.1.1, A.6.3.2.1.2, A.6.3.2.1.3:   * Added RMCs for Cell 2 * Removed the misleading comment about T310   **R4-2112623 Draft-CR to TS 38.133: Corrections to radio link monitoring test cases (Rel 16)**  In all RLM In-Sync tests, the EPRE ratio of PDCCH DMRS to SSS corrected from 4 to 0dB.  **R4-2112626 Draft-CR to TS 38.133: Corrections to periodic measurement test cases (Rel 16)**  Editorial corrections and addition of missing configuratoins (as per other similar defined TCs)  In Table A.6.3.2.2.2.1-2 OCNG pattern corrected from OP.11 to OP.1  **R4-2115245 Draft CR on general modification in clauses A.3.7A and A.3.7.2.2**  Clarified the wording in A.3.7.2.2 and A.3.7A.  Added a new clause of “A.3.7B LTE-FR2 and LTE-FR1/FR2 test setup” to clearly state that the testability issue is also applied to “LTE-FR2” and “LTE-FR1/FR2” test cases which are currently missing in the specification.  **R4-2115261 Draft CR: Interruptions during measurements on deactivated NR SCC in FR1**  Removed UL BWP configuration from the configuration of Cell 2. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | **R4-2112476 Correction on configurations in SA FR2 tests in R16**  Incorrect test cell configuration.  **R4-2112537 Correction on configurations in SCell activation tests in R16**  Incorrect test configuration.  **R4-2112614 Draft-CR to TS 38.133: Missing CORESET RMCs in several test cases (Rel 16)**  Inconsisteny in the specification.  TC finalization / implementation not possible.  **R4-2112617 Draft-CR to TS 38.133: Corrections to PRACH test cases (Rel 16)**  A.5.3.2.2.1 will contain requirements not applicable for EN-DC.  **R4-2112620 Draft-CR to TS 38.133: Corrections to re-establishment test cases (Rel 16)**  Required RMCs will be missing from the test not allowing a fluent test procedure.  **R4-2112623 Draft-CR to TS 38.133: Corrections to radio link monitoring test cases (Rel 16)**  In-Sync TCs are executed with PDCCH power settings of Out-of-Sync TCs.  **R4-2112626 Draft-CR to TS 38.133: Corrections to periodic measurement test cases (Rel 16)**  Test case implementaion will remain unclear.  **R4-2115245 Draft CR on general modification in clauses A.3.7A and A.3.7.2.2**  UEs might not be able to pass conformance tests due to the testability issue.  **R4-2115261 Draft CR: Interruptions during measurements on deactivated NR SCC in FR1**  UEs incapable of UL CA might not be tested due to the test configuration conflicting with UE capability. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | **R4-2112476 Correction on configurations in SA FR2 tests in R16**  A.7.6.3.1.2, A.7.7.1.3, A.7.7.4.1.1  **R4-2112537 Correction on configurations in SCell activation tests in R16**  A.6.5.3.1, A.6.5.3.5, A.7.5.3.1, A.7.5.3.2, A.7.5.3.3, A.7.5.3.4 and A.7.5.3.5  **R4-2112614 Draft-CR to TS 38.133: Missing CORESET RMCs in several test cases (Rel 16)**  A.4.3.2.2.1, A.4.3.2.2.2, A.4.3.2.2.3, A.4.3.2.2.4, A.4.4.1.1, A.4.4.3.1, A.4.6.2.1, A.4.6.2.2, A.4.6.2.5, A.4.6.2.6  A.5.4.3.1, A.5.6.2.1, A.5.6.2.2, A.5.6.2.3, A.5.6.2.4, A.5.6.2.5, A.5.6.2.6, A.5.6.2.7, A.5.6.2.8  **R4-2112617 Draft-CR to TS 38.133: Corrections to PRACH test cases (Rel 16)**  A.5.3.2.2.1.2  **R4-2112620 Draft-CR to TS 38.133: Corrections to re-establishment test cases (Rel 16)**  A.6.3.2.1.1, A.6.3.2.1.2, A.6.3.2.1.3  **R4-2112623 Draft-CR to TS 38.133: Corrections to radio link monitoring test cases (Rel 16)**  A.4.5.1.2/4/6/8, A.5.5.1.2/4/6/8, A.6.5.1.2/4/6/8, A.7.5.1.2/4/6/8  **R4-2112626 Draft-CR to TS 38.133: Corrections to periodic measurement test cases (Rel 16)**  A.5.7.1.1, A.5.7.2.1, A.5.7.2.2, A.5.7.3.1, A.5.7.3.2, A.7.7.2.1, A.7.7.2.2, A.7.7.3.2  **R4-2115245 Draft CR on general modification in clauses A.3.7A and A.3.7.2.2**  A.3.7.2.2, A.3.7A, A.3.7C  **R4-2115261 Draft CR: Interruptions during measurements on deactivated NR SCC in FR1**  A.6.5.2.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS38.533 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

<Start of Change 1>

A.3.7.2.2 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR2

Table A.3.7.2.2-1 defines cell specific test parameters for E-UTRAN cell which can be used in EN-DC test cases or in any test case comprising at least one E-UTRA serving cell with one or more NR cells in FR2.

**Table A.3.7.2.2-1: E-UTRAN cell specific test parameters for tests with one or more NR cells in FR2**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **E-UTRAN Cell** |
| Duplex mode |  | FDD or TDD |
| TDD special subframe configurationNote1 |  | 6 |
| TDD uplink-downlink configurationNote1 |  | 1 |
| BWchannel | MHz | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD  5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD  5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD |
| OCNG PatternsNote2 |  | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD  5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD |
| PBCH\_RA | dB | 0 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote3 | dB |
| OCNG\_RBNote3 | dB |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.  Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 respectively.  Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 4: The E-UTRA signal is required only to ensure the E-UTRA link to the DUT in the EN-DC operation. The Test System shall provide a stable and noise-free E-UTRA signal without need of precise propagation modelling, path loss and polarization control. Further details of the E-UTRA signal configuration are not defined as part of the cell specific test parameters, since the E-UTRA link is not under performance verification and shall not affect the test result unless otherwise specifically stated in the test case. | | |

<End of Change 1>

<Start of Change 2>

A.3.7A NR FR1-FR2 test setup

Some Test cases in clause A.7 have NR cells in both FR1 and FR2. Unless otherwise stated within the test, the NR FR1 Cell signal is required only to provide a link to the UE under test. The Test System shall provide a stable and noise-free NR FR1 signal without need of precise propagation modelling, path loss and polarization control. Further details of the NR FR1 signal configuration are not defined as part of the cell specific test parameters, since the NR FR1 link is not under performance verification and shall not affect the test result unless otherwise specifically stated in the test case.

<End of Change 2>

<Start of Change 3>

A.3.7C LTE-FR1/FR2 test setup

Some Test cases in clause A.5 have LTE and FR2 NR cells. Unless otherwise stated within the test, the LTE Cell signal is required only to provide a link to the UE under test. The Test System shall provide a stable and noise-free LTE signal without need of precise propagation modelling, path loss and polarization control. Further details of the LTE signal configuration are not defined as part of the cell specific test parameters, since the LTE link is not under performance verification and shall not affect the test result unless otherwise specifically stated in the test case.

<End of Change 3>

<unchanged sections omitted>

<Start of Change 4>

##### A.4.3.2.2.1 4-step RA type contention based random access test in FR1 for PSCell in EN-DC

A.4.3.2.2.1.1 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 two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell in FR1. Supported test parameters are shown in Table A.4.3.2.2.1.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.4.3.2.2.1.1-2.

Table A.4.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR1 for PSCell in EN-DC

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

Table A.4.3.2.2.1.1-2: General test parameters for contention based random access test in FR1 for PSCell in EN-DC

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test-1 | Comments |
| SSB Configuration | | Config 1,2 |  | SSB pattern 3 in FR1 | As defined in A.3.10 |
|  | | Config 3,4 |  | SSB pattern 4 in FR1 |  |
|  | | |  |  |  |
|  | | |  |  |  |
| Duplex Mode for Cell 2 | | Config 1,2 |  | FDD |  |
|  | | Config 3,4 |  | TDD |
| TDD Configuration | | Config 3,4 |  | TDDConf.2.1 |  |
| OCNG Pattern Note 1 | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters | | Config 1,2 |  | SR.1.1 FDD | As defined in A.3.1.1. |
| Note 4 | | Config 3,4 |  | SR.2.1 TDD |  |
| RMSI CORESET Reference Channel | | Config 1,2 |  | CR.1.1 FDD |  |
| Config 3,4 |  | CR.2.1 TDD |  |
| Dedicated CORESET Reference Channel | | Config 1,2 |  | CCR.1.1 FDD |  |
| Config 3,4 |  | CCR.2.1 TDD |  |
| NR RF Channel Number | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | dB |  |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | dB | 0 |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | dB |  |  |
| SSB with index 0 |  | | dB | 3 | Power of SSB with index 0 is setto be above configured *rsrp-ThresholdSSB* |
|  |  | Config 1,2 | dBm/15kHz | -98 |  |
|  |  | Config 3,4 |  | -101 |  |
|  |  | | dB | 3 |  |
|  | SS-RSRP Note 3 | | dBm/ SCS | -95 |  |
| SSB with index 1 |  | | dB | -17 | Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB* |
|  |  | Config 1,2 | dBm/15kHz | -98 |  |
|  |  | Config 3,4 |  | -101 |  |
|  |  | | dB | -17 |  |
|  | SS-RSRP Note 3 | | dBm/ SCS | -115 |  |
| Io Note 2 | | Config 1,2 | dBm | -65.3/9.36MHz | For symbols without SSB |
|  | | Config 3,4 |  | -62.2/38.16MHz | index 1 |
| ss-PBCH-BlockPower | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| PRACH Configuration | | |  | FR1 PRACH configuration 1 | As defined in A.3.8.2. |
| Propagation Condition | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: Void  Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required. | | | | | |

A.4.3.2.2.1.2 Test Requirements

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

A.4.3.2.2.1.2.1 Random Access Preamble Transmission

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.4.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

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

The UE shall 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 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 -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.4.3.2.2.1.2.3 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 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

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 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 -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.4.3.2.2.1.2.4 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.4.3.2.2.1.2.5 Void

ClauseA.4.3.2.2.1.2.6 Void

ClauseA.4.3.2.2.1.2.7 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 TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

##### A.4.3.2.2.2 4-step RA type non-contention based random access test in FR1 for PSCell in EN-DC

A.4.3.2.2.2.1 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 two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell in FR1. Supported test parameters are shown in Table A.4.3.2.2.2.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.4.3.2.2.2.1-2 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.4.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR1 for PSCell in EN-DC

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

Table A.4.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR1 for PSCell in EN-DC

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test-1 | Test-2 | Comments |
| SSB Configuration | | Config 1,2 |  | SSB pattern 3 in FR1 | SSB pattern 3 in FR1 | As defined in A.3.10 |
|  | | Config 3,4 |  | SSB pattern 4 in FR1 | SSB pattern 4 in FR1 |  |
| CSI-RS Configuration | | Config 1,2 |  | N/A | CSI-RS.1.1 FDD | As defined in A.3.1.4 |
| Config 3,4 | CSI-RS.2.1 TDD |
| Duplex Mode for Cell | | Config 1,2 |  | FDD | FDD |  |
| 2 | | Config 3,4 |  | TDD | TDD |  |
| TDD Configuration | | Config 3,4 |  | TDDConf.2.1 | TDDConf.2.1 |  |
| OCNG Pattern Note 1 | | |  | OCNG pattern 1 | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters | | Config 1,2 |  | SR.1.1 FDD | SR.1.1 FDD | As defined in |
| Note 4 | | Config 3,4 |  | SR.2.1 TDD | SR.2.1 TDD | A.3.1.1. |
| RMSI CORESET Reference Channel | | Config 1,2 |  | CR.1.1 TDD | CR.1.1 TDD |  |
| Config 3,4 |  | CR.2.1 TDD | CR.2.1 TDD |  |
| Dedicated CORESET Reference Channel | | Config 1,2 |  | CCR.1.1 TDD | CCR.1.1 TDD |  |
| Config 3,4 |  | CCR.2.1 TDD | CCR.2.1 TDD |  |
| NR RF Channel Number | | |  | 1 | 1 |  |
| EPRE ratio of PSS to SSS | | | dB |  |  |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | dB |  |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | dB |  |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | dB | 0 | 0 |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | dB |  |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | dB |  |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | dB |  |  |  |
| SSB with index 0 |  | | dB | 3 | 3 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
|  |  | Config 1,2 | dBm/15kHz | -98 | -98 |  |
|  |  | Config 3,4 |  | -101 | -101 |  |
|  |  | | dB | 3 | 3 |  |
|  | SS-RSRP Note 3 | | dBm/ SCS | -95 | -95 |  |
| SSB with index 1 |  | | dB | -17 | -17 | Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB* |
|  |  | Config 1,2 | dBm/15kHz | -98 | -98 |  |
|  |  | Config 3,4 |  | -101 | -101 |  |
|  |  | | dB | -17 | -17 |  |
|  | SS-RSRP Note 3 | | dBm/ SCS | -115 | -115 |  |
| Io Note 2 | | Config 1,2 | dBm | -65.3/9.36MHz | -65.3/9.36MHz | For symbols |
|  | | Config 3,4 |  | -62.2/38.16MHz | -62.2/38.16MHz | without SSB index 1 |
| ss-PBCH-BlockPower | | | dBm/ SCS | -5 | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | dBm | 23 | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| PRACH Configuration | | |  | FR1 PRACH configuration 2 | FR1 PRACH configuration 3 | As defined in A.3.8.2. |
| Propagation Condition | | | - | AWGN | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: Void  Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required. | | | | | | |

A.4.3.2.2.2.2 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.4.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

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

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2.. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.4.3.2.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-2, 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 -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.4.3.2.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

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

The UE shall 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 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 -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.4.3.2.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

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 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 -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

##### A.4.3.2.2.3 2-step RA type contention based random access test in FR1 for PSCell in EN-DC

A.4.3.2.2.3.1 Test Purpose and Environment

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

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell in FR1. Supported test parameters are shown in Table A.4.3.2.2.3.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.4.3.2.2.3.1-2.

Table A.4.3.2.2.3.1-1: Supported test configurations for 2-step RA type contention based random access test in FR1 for PSCell in EN-DC

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

Table A.4.3.2.2.3.1-2: General test parameters for 2-step RA type contention based random access test in FR1 for PSCell in EN-DC

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test-1 | Comments |
| SSB Configuration | | Config 1,2 |  | SSB pattern 3 in FR1 | As defined in A.3.10 |
|  | | Config 3,4 |  | SSB pattern 4 in FR1 |  |
| Duplex Mode for Cell 2 | | Config 1,2 |  | FDD |  |
|  | | Config 3,4 |  | TDD |
| TDD Configuration | | Config 3,4 |  | TDDConf.2.1 |  |
| OCNG Pattern Note 1 | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 ­ | | Config 1,2 |  | SR.1.1 FDD | As defined in A.3.1.1. |
| Config 3,4 |  | SR.2.1 TDD |  |
| RMSI CORESET Reference Channel | | Config 1,2 |  | CR.1.1 FDD |  |
| Config 3,4 |  | CR.2.1 TDD |  |
| Dedicated CORESET Reference Channel | | Config 1,2 |  | CCR.1.1 FDD |  |
| Config 3,4 |  | CCR.2.1 TDD |  |
| NR RF Channel Number | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | dB |  |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | dB | 0 |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | dB |  |  |
| SSB with index 0 |  | | dB | 3 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  |  | Config 1,2 | dBm/15kHz | -98 |  |
|  |  | Config 3,4 |  | -101 |  |
|  |  | | dB | 3 |  |
|  | SS-RSRP Note 2 | | dBm/ SCS | -95 |  |
| SSB with index 1 |  | | dB | -17 | Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB* |
|  |  | Config 1,2 | dBm/15kHz | -98 |  |
|  |  | Config 3,4 |  | -101 |  |
|  |  | | dB | -17 |  |
|  | SS-RSRP Note 2 | | dBm/ SCS | -115 |  |
| Io | | Config 1,2 | dBm | -65.3/9.36MHz | For symbols without SSB |
|  | | Config 3,4 |  | -62.2/38.16MHz | index 1 |
| ss-PBCH-BlockPower | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | |  | FR1 MsgA configuration 1 | As defined in A.3.20.2.1. |
| *msgA-RSRP-ThresholdSSB* | | | dBm | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
| Propagation Condition | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required. | | | | | |

A.4.3.2.2.3.2 Test Requirements

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

A.4.3.2.2.3.2.1 MsgA Transmission

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

In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first MsgA preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.4.3.2.2.3.2.2 MsgB Reception

To test the UE behaviour specified in Clause 6.2.2.3.1.2 the System Simulator shall transmit a MsgB with fallbackRAR containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble.

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

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

In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first MsgA preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.4.3.2.2.3.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.1.3 the System Simulator shall transmit a MsgB with fallbackRAR containing a successRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

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

In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first MsgA preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

##### A.4.3.2.2.4 2-step RA type non-contention based random access test in FR1 for PSCell in EN-DC

A.4.3.2.2.4.1 Test Purpose and Environment

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

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell in FR1. Supported test parameters are shown in Table A.4.3.2.2.4.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.4.3.2.2.4.1-2.

Table A.4.3.2.2.4.1-1: Supported test configurations for non-contention based random access test for 2-step RA type in FR1 for PSCell in EN-DC

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

Table A.4.3.2.2.4.1-2: General test parameters for non-contention based random access test for 2-step RA type in FR1 for PSCell in EN-DC

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test-1 | Comments |
| SSB Configuration | | Config 1,2 |  | SSB pattern 3 in FR1 | As defined in A.3.10 |
|  | | Config 3,4 |  | SSB pattern 4 in FR1 |  |
| Duplex Mode for Cell | | Config 1,2 |  | FDD |  |
| 2 | | Config 3,4 |  | TDD |  |
| TDD Configuration | | Config 3,4 |  | TDDConf.2.1 |  |
| OCNG Pattern Note 1 | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters | | Config 1,2 |  | SR.1.1 FDD | As defined in |
| Note 3 | | Config 3,4 |  | SR.2.1 TDD | A.3.1.1. |
| RMSI CORESET Reference Channel | | Config 1,2 |  | CR.1.1 TDD |  |
| Config 3,4 |  | CR.2.1 TDD |  |
| Dedicated CORESET Reference Channel | | Config 1,2 |  | CCR.1.1 TDD |  |
| Config 3,4 |  | CCR.2.1 TDD |  |
| NR RF Channel Number | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | dB |  |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | dB | 0 |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | dB |  |  |
| SSB with index 0 |  | | dB | 3 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  |  | Config 1,2 | dBm/15kHz | -98 |  |
|  |  | Config 3,4 |  | -101 |  |
|  |  | | dB | 3 |  |
|  | SS-RSRP | | dBm/ SCS | -95 |  |
| SSB with index 1 |  | | dB | -17 | Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB* |
|  |  | Config 1,2 | dBm/15kHz | -98 |  |
|  |  | Config 3,4 |  | -101 |  |
|  |  | | dB | -17 |  |
|  | SS-RSRP | | dBm/ SCS | -115 |  |
| Io Note 2 | | Config 1,2 | dBm | -65.3/9.36MHz | For symbols |
|  | | Config 3,4 |  | -62.2/38.16MHz | without SSB index 1 |
| ss-PBCH-BlockPower | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power (PCMAX,f,c) | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | |  | FR1 MsgA configuration 2 | As defined in A.3.20.2. |
| *msgA-RSRP-ThresholdSSB* | | | dBm | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
| Propagation Condition | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required. | | | | | |

A.4.3.2.2.4.2 Test Requirements

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

A.4.3.2.2.4.2.1 MsgA Transmission

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

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

In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] , where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.4.3.2.2.4.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2.3.2.2 the System Simulator shall transmit a MsgB containing a successRAR MAC subPDU corresponding to the transmitted Random Access Preamble after 5 MsgA transmissions have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble.

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

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated MsgA transmission power if Random Access Responses Reception has not been considered as successful.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] , where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.4.3.2.2.4.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.2.3 the System Simulator shall transmit a MsgB corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated MsgA transmission power when the backoff time expires if no MsgB is received within the MsgB Response window configured in *RACH-ConfigGenericTwoStepRA*.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] , where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

<End of Change 4>

<unchanged sections omitted>

<Start of Change 5>

A.4.4.1.1 NR UE Transmit Timing Test for FR1

A.4.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2. Supported test configurations are shown in Table 4.4.1.1.1-1.

**Table A.4.4.1.1.1-1: Supported test configurations for FR1 PSCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | LTE FDD, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 2 | LTE FDD, NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 3 | LTE FDD, NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 4 | LTE TDD, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 5 | LTE TDD, NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 6 | LTE TDD, NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

The test consists of E-UTRA PCell and NR PSCell. The configuration for E-UTRA is given in A.3.7.2.1. Table A.4.4.1.1.1-2 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.4.4.1.1.1-3.

**Table A.4.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Test1** | | | **Test2** | | **Band Group** |
| SSB ARFCN |  | 1,2,3,4,5,6 | Freq1 | | | Freq1 | |  |
| Duplex Mode |  | 1,4 | FDD | | | | |  |
|  |  | 2,3,5,6 | TDD | | | | |  |
| TDD configuration |  | 1,4 | Not Applicable | | | | |  |
|  |  | 2,5 | TDDConf.1.1 | | | | |  |
|  |  | 3,6 | TDDConf.2.1 | | | | |  |
| BWchannel | MHz | 1,4 | 10: NRB,c = 52 | | | | |  |
|  |  | 2,5 | 10: NRB,c = 52 | | | | |  |
|  |  | 3,6 | 40: NRB,c = 106 | | | | |  |
| Initial BWP Configuration |  | 1,2,3,4,5,6 | DLBWP.0.1  ULBWP.0.1 | | | | |  |
| Dedicated BWP Configuration |  | 1,2,3,4,5,6 | DLBWP.1.1  ULBWP.1.1 | | | | |  |
| DRx Cycle | ms | 1,2,3,4,5,6 | N/A | | | DRX.8Note5 |  | |
| PDSCH Reference |  | 1,4 | SR.1.1 FDD | | | |  | |
| measurement channel |  | 2,5 | SR.1.1 TDD | | | |  | |
|  |  | 3,6 | SR.2.1 TDD | | | |  | |
| RMSI CORESET Reference |  | 1,4 | CR.1.1 FDD | | | |  | |
| Channel |  | 2,5 | CR.1.1 TDD | | | |  | |
|  |  | 3,6 | CR.2.1 TDD | | | |  | |
| Dedicated CORESET Reference Channel |  | 1,4 | CCR.1.1 FDD | | | |  | |
|  | 2,5 | CCR.1.1 TDD | | | |  | |
|  | 3,6 | CCR.2.1 TDD | | | |  | |
| OCNG Patterns |  | 1,2,3,4,5,6 | OP.1 | | | |  | |
| SSB configuration |  | 1,4 | SSB.1 FR1 | | | |  | |
|  |  | 2,5 | SSB.1 FR1 | | | |  | |
|  |  | 3,6 | SSB.2 FR1 | | | |  | |
| SMTC configuration |  | 1,2,3,4,5,6 | SMTC.2 | | | |  | |
| TRS configuration |  | 1,4 | TRS.1.1 FDD | | | |  | |
|  |  | 2,5 | TRS.1.1 TDD | | | |  | |
|  |  | 3,6 | TRS.1.2 TDD | | | |  | |
| PDSCH/PDCCH | kHz | 1,2,4,5 | 15 | | | |  | |
| subcarrier spacing |  | 3,6 | 30 | | | |  | |
| EPRE ratio of PSS to SSS |  |  |  | |  | |  | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | dB | 1,2,3,4,5,6 | 0 | | 0 | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |  | |
| Note2 | dBm/15 kHz | 1,2,3,4,5,6 | -98 | | -98 | |  | |
| Note2 | dBm/SCS | 1,2,4,5 | -98 | | -98 | |  | |
|  | 3,6 | -95 | | -95 | |  | |
|  |  | 1,2,3,4,5,6 | 3 | | 3 | |  | |
|  |  | 1,2,3,4,5,6 | 3 | | 3 | |  | |
| SS-RSRPNote3 | dBm/SCS | 1,2,4,5 | -95 | | -95 | |  | |
|  |  | 3,6 | -92 | | -92 | |  | |
| IoNote3 | dBm/9.36MHz | 1,2,4,5 | -65.2 | | -65.2 | |  | |
|  | dBm/38.1MHz | 3,6 | -59.2 | | -59.2 | |  | |
| Propagation condition |  | 1,2,3,4,5,6 | AWGN | | | |  | |
| SRS Config |  | 1,2,4,5 | SRSConf.1Note6 | SRSConf.3Note6 | | |  | |
|  |  | 3, 6 | SRSConf.1Note6 | SRSConf.2Note6 | | |  | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: DRx related parameters are given in Table A.3.3.8-1  Note 6: SRS configs are given in Table A.4.4.1.1.1-3 | | | | | | | | |

**Table A.4.4.1.1.1-3: SRS Configuration for Timing Accuracy Test**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Field** | **SRSConf.1** | **SRSConf.2** | **SRSConf.3** | **Comments** |
| SRS- | srs-ResourceSetId | 0 | 0 | 0 |  |
| ResourceSet | srs-ResourceIdList | 0 | 0 | 0 |  |
|  | resourceType | Periodic | Periodic | Periodic |  |
|  | Usage | Codebook | Codebook | Codebook |  |
| SRS-Resource | SRS-ResourceId | 0 | 0 | 0 |  |
|  | nrofSRS-Ports | Port1 | Port1 | Port1 |  |
|  | transmissionComb | n2 | n2 | n2 |  |
|  | combOffset-n2 | 0 | 0 | 0 |  |
|  | cyclicShift-n2 | 0 | 0 | 0 |  |
|  | resourceMapping  startPosition | 0 | 0 | 0 |  |
|  | resourceMapping  nrofSymbols | n1 | n1 | n1 |  |
|  | resourceMapping  repetitionFactor | n1 | n1 | n1 |  |
|  | freqDomainPosition | 0 | 0 | 0 |  |
|  | freqDomainShift | 0 | 0 | 0 |  |
|  | freqHopping  c-SRS | 14 for test configuration 1,2,4,5  25 for test configuration 3,6 | 25 | 14 | Matches NRB,c |
|  | freqHopping  b-SRS | 0 | 0 | 0 |  |
|  | freqHopping  b-hop | 0 | 0 | 0 |  |
|  | groupOrSequenceHopping | Neither | Neither | Neither |  |
|  | resourceType | Periodic | Periodic | Periodic |  |
|  | periodicityAndOffset-p | sl1, 0 | sl640, 5 | sl320, 3 | Offset to align with DRx periodicity |
|  | sequenceId | 0 | 0 | 0 | Any 10 bit number |

A.4.4.1.1.2 Test requirements

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

Following will be the test sequence for this test

1) Set up E-UTRA PCell according to parameters given in Table A.3.7.2.1-1 and setup NR PSCell according to parameters given in Table A.4.4.1.1.1-1.

2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within (NTA + NTA\_offset)×Tc ± Te of the first detected path of DL SSB.

a. The NTA offset value (in Tc units) is 25600

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.4.4.1.1.2-1

**Table A.4.4.1.1.2-1: Adjustment Value for DL Timing**

|  |  |  |
| --- | --- | --- |
| **SCS of SSB signals (kHz)** | **Adjustment Value** | |
|  | Test1 | Test2 |
| 15 | +64\*64Tc | +32\*64Tc |
| 30 | +32\*64Tc | +16\*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.

<unchanged sections omitted>

A.4.4.3.1 EN-DC FR1 timing advance adjustment accuracy

A.4.4.3.1.1 Test Purpose and Environment

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

A.4.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.4.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.4.4.3.1.2-2, A.4.4.3.1.2-3 and A.4.4.3.1.2-4. The configuration of Cell 1 (LTE PCell) is specified in clause A.3.7.2.1.

In all test cases, two cells are used. Cell 1 is the PCell in the primary Timing Advance Group (pTAG) and cell 2 is the PSCell is in the secondary Timing Advance Group (sTAG). Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands for sTAG are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.4.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured for PSCell in sTAG.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element for sTAG, as specified in clause 6.1.3.4 in TS 38.321 [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 for sTAG 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 for sTAG, with Timing Advance Command value specified in table A.4.4.3.1.2-2. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

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, shall be configured so that it does not expire in the duration of the test.

**Table A.4.4.3.1.2-1: Timing advance supported test configurations**

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

**Table A.4.4.3.1.2-2: General test parameters for timing advance**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF channel number |  | Cell 1: 1  Cell 2: 2 | 1 for E-UTRAN PCell  2 for NR PSCell |
| Initial DL BWP |  | DLBWP.0.1 | As specified in Table A.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 15 kHz SCS NTA\_new = NTA\_old + 8192\*Tc*  *For 30 kHz SCS NTA\_new = NTA\_old + 4096\*Tc*  (based on equation in clause 4.2 of TS 38.213 [3]) |
| T1 | s | 5 |  |
| T2 | s | 5 |  |

**Table A.4.4.3.1.2-3: Cell specific test parameters for timing advance**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test1** | |
|  | | |  | **T1** | **T2** |
| Duplex mode | | Config 1,4 |  | FDD | |
|  | | Config 2,3,5,6 |  | TDD | |
| TDD configuration | | Config 1,4 |  | Not Applicable | |
|  | | Config 2,5 |  | TDDConf.1.1 | |
|  | | Config 3,6 |  | TDDConf.2.1 | |
| BWchannel | | Config 1,4 | MHz | 10: NRB,c = 52 | |
|  | | Config 2,5 |  | 10: NRB,c = 52 | |
|  | | Config 3,6 |  | 40: NRB,c = 106 | |
| BWP BW | | Config 1,4 | MHz | 10: NRB,c = 52 | |
|  | | Config 2,5 |  | 10: NRB,c = 52 | |
|  | | Config 3,6 |  | 40: NRB,c = 106 | |
| DRx Cycle | | | ms | Not Applicable | |
| PDSCH Reference | | Config 1,4 |  | SR.1.1 FDD | |
| measurement | | Config 2,5 |  | SR.1.1 TDD | |
| channel | | Config 3,6 |  | SR2.1 TDD | |
| RMSI CORESET Reference | | Config 1,4 |  | CR.1.1 FDD | |
| Channel | | Config 2,5 |  | CR.1.1 TDD | |
|  | | Config 3,6 |  | CR.2.1 TDD | |
| Dedicated CORESET Reference Channel | | Config 1,4 |  | CCR.1.1 FDD | |
| Config 2,5 |  | CCR.1.1 TDD | |
| Config 3,6 |  | CCR.2.1 TDD | |
| TRS configuration | | Config 1,4 |  | TRS.1.1 FDD | |
|  | | Config 2,5 |  | TRS.1.1 TDD | |
|  | | Config 3,6 |  | TRS.1.2 TDD | |
| OCNG Patterns | | |  | OCNG pattern 1 | |
| SSB Configuration | | Config 1,2,4,5 |  | SSB.1 FR1 | |
|  | | Config 3,6 |  | SSB.2 FR1 | |
| SMTC configuration | | Config 1,2,4,5 |  | SMTC.1 FR1 | |
|  | | Config 3,6 |  | SMTC.2 FR1 | |
| PDSCH/PDCCH | | Config 1,2,4,5 | kHz | 15 kHz | |
| subcarrier spacing | | Config 3,6 |  | 30 kHz | |
| PUCCH/PUSCH | | Config 1,2,4,5 | kHz | 15 kHz | |
| subcarrier spacing | | Config 3,6 |  | 30 kHz | |
| EPRE ratio of PSS to SSS | | |  |  | |
| EPRE ratio of PBCH DMRS to SSS | | |  |  | |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  | |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  | |
| EPRE ratio of PDSCH to PDSCH | | |  |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  | |
| Note2 | | | dBm/15kHz | -98 | |
| Note2 | Config 1,2,4,5 | | dBm/SCS | -98 | |
|  | Config 3,6 | |  | -95 | |
|  | | | dB | 3 | |
|  | | | dB | 3 | |
| IoNote3 | Config 1,2,4,5 | | dBm/9.36MHz | -67.57 | |
|  | Config 3,6 | | dBm/38.16MHz | -62.58 | |
| 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. | | | | | |

**Table A.4.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | | **Value** | **Comment** |
| c-SRS | Config 1,2,4,5 | 12 | Frequency hopping is disabled |
|  | Config 3,6 | 24 |  |
| 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=2 for SCS 15kHz sl5=4 for SCS 30kHz | Once every 5 slots |
| pathlossReferenceRS | | ssb-Index=0 | SSB #0 is used for SRS path loss estimation |
| usage | | Codebook | Codebook based UL transmission |
| startPosition | | 0 | resourceMapping setting. SRS on last |
| nrofSymbols | | n1 | symbol of slot, and 1symbols for SRS |
| repetitionFactor | | n1 | without repetition. |
| 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.4.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value for PSCell in sTAG to the transmission timing at the designated activation time i.e. *k+1* slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy for PSCell in sTAG 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 5>

<unchanged sections omitted>

<Start of Change 6>

#### A.4.5.1.2 Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in non-DRX mode

<unchanged text omitted>

**Table A.4.5.1.2.1-3: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in non-DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
|  | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| 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 |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB | 0 | | | | |
| 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 | Config 1, 4 | dB | 1 | -7 | -15 | -4.5 | 1 |
| RLM-RS | Config 2, 5 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3, 6 |  | 1 | -7 | -15 | -4.5 | 1 |
| SNR on other channels and signals | Config 1, 2, 3, 4, 5, 6 | dB | 1 | | | | |
|  | Config 1, 4 | dBm/15 kHz | -98 | | | | |
|  | Config 2, 5 |  | -98 | | | | |
|  | Config 3, 6 |  | -98 | | | | |
|  | Config 1, 4 | dBm/SCS | -98 | | | | |
|  | Config 2, 5 |  | -98 | | | | |
|  | Config 3, 6 |  | -95 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 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 in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.4.5.1.2.1-1.  Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6. | | | | | | | |

<End of Change 6>

<unchanged sections omitted>

<Start of Change 7>

#### A.4.5.1.4 Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in DRX mode

<unchanged text omitted>

**Table A.4.5.1.4.1-3: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
|  | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| 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 |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB | 0 | | | | |
| 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 | Config 1, 4 | dB | 1 | -7 | -15 | -4.5 | 1 |
| RLM-RS | Config 2, 5 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3, 6 |  | 1 | -7 | -15 | -4.5 | 1 |
| SNR on other channels and signals | Config 1, 2, 3, 4, 5, 6 | dB | 1 | | | | |
|  | Config 1, 4 | dBm/15 kHz | -98 | | | | |
|  | Config 2, 5 |  | -98 | | | | |
|  | Config 3, 6 |  | -98 | | | | |
|  | Config 1, 4 | dBm/SCS | -98 | | | | |
|  | Config 2, 5 |  | -98 | | | | |
|  | Config 3, 6 |  | -95 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 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 in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.4.5.1.4.1-1.  Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6. | | | | | | | |

<End of Change 7>

<unchanged sections omitted>

<Start of Change 8>

#### A.4.5.1.6 EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based RLM in non-DRX mode

<unchanged text omitted>

Table A.4.5.1.6.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| 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 |
| EPRE ratio of PSS to SSS | | dB |
| EPRE ratio of PBCH to PBCH DMRS | | dB |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |
| EPRE ratio of PDSCH DMRS to SSS | | dB |
| EPRE ratio of OCNG DMRS to SSS | | dB |
| EPRE ratio of OCNG to OCNG DMRS | | dB |
| SNR on | Config 1, 4 | dB | 1 | -7 | -15 | -4.5 | 1 |
| RLM-RS | Config 2, 5 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3, 6 |  | 1 | -7 | -15 | -4.5 | 1 |
| SNR on other | Config 1, 4 | dB | 1 | | | | |
| channels and | Config 2, 5 |  | 1 | | | | |
| signals | Config 3, 6 |  | 1 | | | | |
|  | Config 1, 4 | dBm/15KHz | -98 | | | | |
|  | Config 2, 5 |  | -98 | | | | |
|  | Config 3, 6 |  | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 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.4.5.1.6.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in clause A.3.6.1.1. | | | | | | | |

<End of Change 8>

<unchanged sections omitted>

<Start of Change 9>

#### A.4.5.1.8 EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based RLM in DRX mode

<unchanged text omitted>

**Table A.4.5.1.8.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** |
| 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 | 0 | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |
| EPRE ratio of PSS to SSS | | dB |
| EPRE ratio of PDSCH DMRS to SSS | | dB |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |
| EPRE ratio of OCNG DMRS to SSS | | dB |
| EPRE ratio of OCNG to OCNG DMRS | | dB |
| SNR on RLM-RS | Config 1, 4 | dB | 1 | -7 | -15 | -4.5 | 1 |
| Config 2, 5 | 1 | -7 | -15 | -4.5 | 1 |
| Config 3, 6 | 1 | -7 | -15 | -4.5 | 1 |
| SNR on other channels and signals | Config 1, 4 | dB | 1 | | | | |
| Config 2, 5 | 1 | | | | |
| Config 3, 6 | 1 | | | | |
|  | Config 1, 4 | dBm/15KHz | -98 | | | | |
| Config 2, 5 | -98 | | | | |
| Config 3, 6 | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 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.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1. | | | | | | | |

<End of Change 9>

<unchanged sections omitted>

<Start of Change 10>

#### A.4.6.2.1 EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is not used

##### A.4.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.1.1-1, A.4.6.2.1.1-2, and A.4.6.2.1.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.1.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.4.6.2.1.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.1.1-1.

Table A.4.6.2.1.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, 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: target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2 | |

Table A.4.6.2.1.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | Comment |
|  |  | configuration | Test 1 | Test 2 |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | One E-UTRAN carrier frequencies is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | Two FR1 NR carrier frequencies is used. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2,3,4,5,6 | -6 | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6 | OFF | | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,4 | 3 ms | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 2,3,5,6 | 3 μs | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | |  |
| T2 | s | Config 1,2,3,4,5,6 | 1 | 1 |  |

Table A.4.6.2.1.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Cell 2 | | Cell 3 | |
|  |  | configuration | T1 | T2 | T1 | T2 |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode |  | Config 1,4 | FDD | | | |
|  |  | Config 2,3,5,6 | TDD | | | |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 | | | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | | |
| BWP BW | MHz | Config 1,4 | 10: NRB,c = 52 | | | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | | |
| TDD configuration |  | Config 2,5 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | Config 3,6 | TDDConf.2.1 | | TDDConf.2.1 | |
| Initial DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | NA | |
| Initial UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | NA | |
| TRS configuration |  | Config 1,4 | TRS.1.1 FDD | | NA | |
|  |  | Config 2,5 | TRS.1.1 TDD | | NA | |
|  |  | Config 3,6 | TRS.1.2 TDD | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | Config 1,2,3,4,5,6 | OP.1 | | OP.1 | |
| PDSCH Reference |  | Config 1,4 | SR.1.1 FDD | | - | |
| measurement channel |  | Config 2,5 | SR.1.1 TDD | |  | |
|  |  | Config 3,6 | SR2.1 TDD | |  | |
| RMSI CORESET Reference |  | Config 1,4 | CR.1.1 FDD | | - | |
| Channel |  | Config 2,5 | CR.1.1 TDD | |  | |
|  |  | Config 3,6 | CR.2.1 TDD | |  | |
| Dedicated CORESET Reference  Channel |  | Config 1,4 | CCR.1.1 FDD | | - | |
|  | Config 2,5 | CCR.1.1 TDD | |  | |
|  | Config 3,6 | CCR.2.1 TDD | |  | |
| SSB parameters |  | Config 1,4 | SSB.1 FR1 | | SSB.5 FR1 | |
|  |  | Config 2,5 | SSB.1 FR1 | | SSB.5 FR1 | |
|  |  | Config 3,6 | SSB.2 FR1 | | SSB.6 FR1 | |
| SMTC configuration |  | Config 1,4 | SMTC.2 | | SMTC.5 | |
| defined in A.3.11 |  | Config 2,3,5,6 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH | kHz | Config 1,2,4,5 | 15 | | | |
| subcarrier spacing |  | Config 3,6 | 30 | | | |
| EPRE ratio of PSS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  | Config 1,2,3,4,5,6 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |
| Note2 | dBm/15kHz |  | -98 | | -98 | |
| Note2 | dBm/SCS | Config 1,2,4,5 | -98 | | -98 | |
|  | Config 3,6 | -95 | | -95 | |
| SS-RSRP Note 3 | dBm/SCS | Config 1,2,4,5 | -94 | -94 | -Infinity | -91 |
|  | Config 3,6 | -91 | -91 | -Infinity | -88 |
|  | dB | Config 1,2,3,4,5,6 | 4 | 4 | -Infinity | 7 |
|  | dB | Config 1,2,3,4,5,6 | 4 | 4 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | Config 1,2,4,5 | -64.59 | -64.59 | -70.05 | -62.26 |
|  | dBm/38.16MHz | Config 3,6 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition |  | Config 1,2,3,4,5,6 | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | |

##### A.4.6.2.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 760 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

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

#### A.4.6.2.2 EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is used

##### A.4.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.2.1-1, A.4.6.2.2.1-2, and A.4.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.2.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.4.6.2.2.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.2.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.2.2.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, 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: target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2 | |

Table A.4.6.2.2.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | | | Comment |
|  |  | configuration | Test 1 | Test 2 | Test 3 | Test 4 |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | | | One E-UTRAN carrier frequencies is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | | | Two FR1 NR carrier frequencies is used. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2,3,4,5,6 | -6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | | | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | | | L3 filtering is not used |
| DRX | ms | Config 1,2,3,4,5,6 | DRX.1 | DRX.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,4 | 3ms | | | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 2,3,5,6 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | | | |  |
| T2 | s | Config 1,2,3,4,5,6 | 1.1 | 11 | 1.1 | 11 |  |

Table A.4.6.2.2.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Cell 2 | | Cell 3 | |
|  |  | configuration | T1 | T2 | T1 | T2 |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode |  | Config 1,4 | FDD | | | |
|  |  | Config 2,3,5,6 | TDD | | | |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 | | | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | | |
| BWP BW | MHz | Config 1,4 | 10: NRB,c = 52 | | | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | | |
| TDD configuration |  | Config 2,5 | TDDConf.1.1 | | | |
|  |  | Config 3,6 | TDDConf.2.1 | | | |
| Initial DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | NA | |
| Initial UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | NA | |
| TRS configuration |  | Config 1,4 | TRS.1.1 FDD | | NA | |
|  |  | Config 2,5 | TRS.1.1 TDD | | NA | |
|  |  | Config 3,6 | TRS.1.2 TDD | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | Config 1,2,3,4,5,6 | OP.1 | | OP.1 | |
| PDSCH Reference |  | Config 1,4 | SR.1.1 FDD | | - | |
| measurement channel |  | Config 2,5 | SR.1.1 TDD | |  | |
|  |  | Config 3,6 | SR2.1 TDD | |  | |
| RMSI CORESET Reference |  | Config 1,4 | CR.1.1 FDD | | - | |
| Channel |  | Config 2,5 | CR.1.1 TDD | |  | |
|  |  | Config 3,6 | CR.2.1 TDD | |  | |
| Dedicated CORESET Reference  Channel |  | Config 1,4 | CCR.1.1 FDD | | - | |
|  | Config 2,5 | CCR.1.1 TDD | |  | |
|  | Config 3,6 | CCR.2.1 TDD | |  | |
| SSB parameters |  | Config 1,4 | SSB.1 FR1 | | SSB.5 FR1 | |
|  |  | Config 2,5 | SSB.1 FR1 | | SSB.5 FR1 | |
|  |  | Config 3,6 | SSB.2 FR1 | | SSB.6 FR1 | |
| SMTC configuration defined |  | Config 1,4 | SMTC.2 | | SMTC.5 | |
| in A.3.11 |  | Config 2,3,5,6 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2,4,5 | 15 | | | |
|  |  | Config 3,6 | 30 | | | |
| EPRE ratio of PSS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  | Config 1,2,3,4,5,6 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |
| Note2 | dBm/15kHz |  | -98 | | -98 | |
| Note2 | dBm/SCS | Config 1,2,4,5 | -98 | | -98 | |
|  |  | Config 3,6 | -95 | | -95 | |
| SS-RSRP Note 3 | dBm/SCS | Config 1,2,4,5 | -94 | -94 | -Infinity | -91 |
|  |  | Config 3,6 | -91 | -91 | -Infinity | -88 |
|  | dB | Config 1,2,3,4,5,6 | 4 | 4 | -Infinity | 7 |
|  | dB | Config 1,2,3,4,5,6 | 4 | 4 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | Config 1,2,4,5 | -64.59 | -64.59 | -70.05 | -62.26 |
|  | dBm/38.16MHz | Config 3,6 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition |  | Config 1,2,3,4,5,6 | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | |

##### A.4.6.2.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

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

#### A.4.6.2.3 Void

#### A.4.6.2.4 Void

#### A.4.6.2.5 EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is not used

##### A.4.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.5.1-1, A.4.6.2.5.1-2, and A.4.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.4.6.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.5.1-1.

Table A.4.6.2.5.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, 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: target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2 | |

Table A.4.6.2.5.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | Comment |
|  |  | configuration | Test 1 | Test 2 |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | One E-UTRAN carrier frequencies is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | Two FR1 NR carrier frequencies is used. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2,3,4,5,6 | -6 | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6 | OFF | | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,4 | 3ms | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 2,3,5,6 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | |  |
| T2 | s | Config 1,2,3,4,5,6 | 1.1 | 1 |  |

Table A.4.6.2.5.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Cell 2 | | Cell 3 | |
|  |  | configuration | T1 | T2 | T1 | T2 |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode |  | Config 1,4 | FDD | | | |
|  |  | Config 2,3,5,6 | TDD | | | |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 | | | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | | |
| BWP BW | MHz | Config 1,4 | 10: NRB,c = 52 | | | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | | |
| TDD configuration |  | Config 2,5 | TDDConf.1.1 | | | |
|  |  | Config 3,6 | TDDConf.2.1 | | | |
| Initial DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | NA | |
| Initial UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | NA | |
| TRS configuration |  | Config 1,4 | TRS.1.1 FDD | | NA | |
|  |  | Config 2,5 | TRS.1.1 TDD | | NA | |
|  |  | Config 3,6 | TRS.1.2 TDD | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | Config 1,2,3,4,5,6 | OP.1 | | OP.1 | |
| PDSCH Reference |  | Config 1,4 | SR.1.1 FDD | |  | |
| measurement channel |  | Config 2,5 | SR.1.1 TDD | |  | |
|  |  | Config 3,6 | SR2.1 TDD | |  | |
| RMSI CORESET Reference |  | Config 1,4 | CR.1.1 FDD | | - | |
| Channel |  | Config 2,5 | CR.1.1 TDD | |  | |
|  |  | Config 3,6 | CR.2.1 TDD | |  | |
| Dedicated CORESET Reference Channel |  | Config 1,4 | CCR.1.1 FDD | | - | |
|  | Config 2,5 | CCR.1.1 TDD | |  | |
|  | Config 3,6 | CCR.2.1 TDD | |  | |
| SSB parameters |  | Config 1,4 | SSB.1 FR1 | | SSB.5 FR1 | |
|  |  | Config 2,5 | SSB.1 FR1 | | SSB.5 FR1 | |
|  |  | Config 3,6 | SSB.2 FR1 | | SSB.6 FR1 | |
| SMTC configuration defined |  | Config 1,4 | SMTC.2 | | SMTC.5 | |
| in A.3.11 |  | Config 2,3,5,6 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2,4,5 | 15 | | | |
|  |  | Config 3,6 | 30 | | | |
| EPRE ratio of PSS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  | Config 1,2,3,4,5,6 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |
| Note2 | dBm/15kHz |  | -98 | | -98 | |
| Note2 | dBm/SCS | Config 1,2,4,5 | -98 | | -98 | |
|  |  | Config 3,6 | -95 | | -95 | |
| SS-RSRP Note 3 | dBm/SCS | Config 1,2,4,5 | -94 | -94 | -Infinity | -91 |
|  |  | Config 3,6 | -91 | -91 | -Infinity | -88 |
|  | dB | Config 1,2,3,4,5,6 | 4 | 4 | -Infinity | 7 |
|  | dB | Config 1,2,3,4,5,6 | 4 | 4 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | Config 1,2,4,5 | -64.59 | -64.59 | -70.05 | -62.26 |
|  | dBm/38.16MHz | Config 3,6 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition |  | Config 1,2,3,4,5,6 | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | |

##### A.4.6.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 880 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

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

#### A.4.6.2.6 EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is used

##### A.4.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.6.1-1, A.4.6.2.6.1-2, and A.4.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.4.6.2.6.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.6.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.2.6.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, 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: target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2 | |

Table A.4.6.2.6.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | | | Comment |
|  |  | configuration | Test 1 | Test 2 | Test 3 | Test 4 |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | | | One E-UTRAN carrier frequencies is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | | | Two FR1 NR carrier frequencies is used. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2,3,4,5,6 | -6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | | | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | | | L3 filtering is not used |
| DRX | ms | Config 1,2,3,4,5,6 | DRX.1 | DRX.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,4 | 3ms | | | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 2,3,5,6 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | | | |  |
| T2 | s | Config 1,2,3,4,5,6 | 1.3 | 13.5 | 1.3 | 13.5 |  |

Table A.4.6.2.6.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Cell 2 | | Cell 3 | |
|  |  | configuration | T1 | T2 | T1 | T2 |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode |  | Config 1,4 | FDD | | | |
|  |  | Config 2,3,5,6 | TDD | | | |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 | | | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | | |
| BWP BW | MHz | Config 1,4 | 10: NRB,c = 52 | | | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | Config 1,2,3,4,5,6 | OP.1 | | OP.1 | |
| PDSCH Reference |  | Config 1,4 | SR.1.1 FDD | | - | |
| measurement channel |  | Config 2,5 | SR.1.1 TDD | |  | |
|  |  | Config 3,6 | SR2.1 TDD | |  | |
| RMSI CORESET Reference |  | Config 1,4 | CR.1.1 FDD | | - | |
| Channel |  | Config 2,5 | CR.1.1 TDD | |  | |
|  |  | Config 3,6 | CR.2.1 TDD | |  | |
| Dedicated CORESET Reference  Channel |  | Config 1,4 | CCR.1.1 FDD | | - | |
|  | Config 2,5 | CCR.1.1 TDD | |  | |
|  | Config 3,6 | CCR.2.1 TDD | |  | |
| TDD configuration |  | Config 2,5 | TDDConf.1.1 | | | |
|  |  | Config 3,6 | TDDConf.2.1 | | | |
| Initial DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | | |
| TRS configuration |  | Config 1,4 | TRS.1.1 FDD | | N/A | |
|  |  | Config 2,5 | TRS.1.1 TDD | | N/A | |
|  |  | Config 3,6 | TRS.1.2 TDD | | N/A | |
| Initial UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | | |
| Dedicated DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | | |
| Dedicated UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | | |
| SSB parameters |  | Config 1,4 | SSB.1 FR1 | | | |
|  |  | Config 2,5 | SSB.1 FR1 | | | |
|  |  | Config 3,6 | SSB.2 FR1 | | | |
| SMTC configuration defined |  | Config 1,4 | SMTC.2 | | | |
| in A.3.11 |  | Config 2,3,5,6 | SMTC.1 | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2,4,5 | 15 | | | |
|  |  | Config 3,6 | 30 | | | |
| EPRE ratio of PSS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  | Config 1,2,3,4,5,6 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |
| Note2 | dBm/15kHz |  | -98 | | -98 | |
| Note2 | dBm/SCS | Config 1,2,4,5 | -98 | | -98 | |
|  |  | Config 3,6 | -95 | | -95 | |
| SS-RSRP Note 3 | dBm/SCS | Config 1,2,4,5 | -94 | -94 | -Infinity | -91 |
|  |  | Config 3,6 | -91 | -91 | -Infinity | -88 |
|  | dB | Config 1,2,3,4,5,6 | 4 | 4 | -Infinity | 7 |
|  | dB | Config 1,2,3,4,5,6 | 4 | 4 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | Config 1,2,4,5 | -64.59 | -64.59 | -70.05 | -62.26 |
|  | dBm/38.16MHz | Config 3,6 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition |  | Config 1,2,3,4,5,6 | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | |

##### A.4.6.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

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

<End of Change 10>

<unchanged sections omitted>

<Start of Change 11>

##### A.5.3.2.2.1 4-step RA type contention based random access test in FR2 for PSCell/SCell in EN-DC

A.5.3.2.2.1.1 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 two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell or SCell in FR2. Supported test parameters are shown in Table A.5.3.2.2.1.1-1. UE capable of EN-DC with PSCell or SCell in FR2 needs to be tested by using the parameters in Table A.5.3.2.2.1.1-2 and Table A.5.3.2.2.1.1-3.

Table A.5.3.2.2.1.1-1: Supported test configurations for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

Table A.5.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for PSCell/SCell in EN-DC

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

Table A.5.3.2.2.1.1-3: OTA-related test parameters for contention based random access test in FR2 for PSCell/SCell in EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Comments |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Assumption for UE beamsNote 3 | |  | Rough |  |
| SSB with | Es Note1 | dBm/SCS | -80.6 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
| index 0 | 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 | Es Note1 | dBm/SCS | -95.0 | Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB* |
| index 1 | 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.5.3.2.2.1.2 Test Requirements

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

A.5.3.2.2.1.2.1 Random Access Preamble Transmission

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

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

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

A.5.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 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 TS38.321 [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.5.3.2.2.1.2.3 No Random Access Response Reception

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

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [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.5.3.2.2.1.2.4 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.5.3.2.2.1.2.5 Void

A.5.3.2.2.1.2.6 Void

A.5.3.2.2.1.2.7 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 TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

<End of Change 11>

<unchanged sections omitted>

<Start of Change 12>

A.5.4.3.1 EN-DC FR2 timing advance adjustment accuracy

A.5.4.3.1.1 Test Purpose and Environment

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

A.5.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.5.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.5.4.3.1.2-2, A.5.4.3.1.2-3, A.5.4.3.1.2-3A and A.5.4.3.1.2-4. The configuration of Cell 1 (LTE PCell) is specified in clause A.3.7.2.1.

In all test cases, two cells are used. Cell 1 is the PCell in the primary Timing Advance Group (pTAG) and cell 2 is the PSCell is in the secondary Timing Advance Group (sTAG). Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands for sTAG are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.5.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured for PSCell in sTAG.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element for sTAG, as specified in clause 6.1.3.4 in TS 38.321 [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 for sTAG 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 for sTAG, with Timing Advance Command value specified in table A.5.4.3.1.2-2. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

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, shall be configured so that it does not expire in the duration of the test.

**Table A.5.4.3.1.2-1: Timing advance supported test configurations**

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

**Table A.5.4.3.1.2-2: General test parameters for timing advance**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF channel number |  | Cell 1: 1  Cell 2: 2 | 1 for E-UTRAN PCell  2 for NR PSCell |
| Initial DL BWP |  | DLBWP.0.1 | As specified in Table A.3.9.2.1-1 |
| Dedicated DL BWP |  | DLBWP.1.1 | As specified in Table A.3.9.2.2-1 |
| Initial UL BWP |  | ULBWP.0.1 | As specified in Table A.3.9.3.1-1 |
| Dedicated UL BWP |  | ULBWP.1.1 | As specified in Table A.3.9.3.2-1 |
| Timing Advance Command (*TA*) value during T1 |  | 31 | *NTA\_new = NTA\_old* for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command (*TA*) value during T2 |  | 39 | *For 120 kHz SCS NTA\_new = NTA\_old + 1024\*Tc* (based on equation in clause 4.2 of TS 38.213 [3]) |
| T1 | s | 5 |  |
| T2 | s | 5 |  |

**Table A.5.4.3.1.2-3: Cell specific test parameters for timing advance**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test1** | |
|  |  | **T1** | **T2** |
| Duplex mode |  | TDD | |
| TDD configuration |  | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | |
| BWP BW | MHz | 100: NRB,c = 66 | |
| DRx Cycle | ms | Not Applicable | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | |
| Dedicated CORESET Reference Channel |  | CCR.3.1 TDD | |
| TRS configuration |  | TRS.2.1 TDD | |
| PDSCH/PDCCH TCI state |  | TCI.State.2 | |
| OCNG Patterns |  | OCNG pattern 1 | |
| SMTC configuration |  | SMTC.1 FR2 | |
| SSB configuration |  | SSB.3 FR2 | |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 kHz | |
| PUCCH/PUSCH subcarrier spacing | kHz | 120 kHz | |
| EPRE ratio of PSS to SSS | dB | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  | |
| EPRE ratio of PDSCH to PDSCH |  |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  | |
| Propagation condition | - | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |

**Table A.5.4.3.1.2-3A: OTA related test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | |
|  |  | **T1** | **T2** |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 6 |  | Fine | |
| Note1 | dBm/15kHzNote4 | -112 | |
| Note1 | dBm/SCSNote3 | -103 | |
|  | dB | 4 | |
| SS-RSRPNote2 | dBm/SCS Note4 | -99 | |
|  | dB | 4 | |
| IoNote2 | dBm/95.04 MHz Note4 | -68.5 | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | |

**Table A.5.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance**

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| c-SRS | 16 | Frequency hopping is disabled |
| b-SRS | 0 |  |
| b-hop | 0 |  |
| freqDomainPosition | 0 | Frequency domain position of SRS |
| freqDomainShift | 0 |  |
| groupOrSequenceHopping | neither | No group or sequence hopping |
| SRS-PeriodicityAndOffset | sl5=4 | Once every 5 slots |
| pathlossReferenceRS | ssb-Index=0 | SSB #0 is used for SRS path loss estimation |
| usage | Codebook | Codebook based UL transmission |
| startPosition | 0 | resourceMapping setting. SRS on last |
| nrofSymbols | n1 | symbol of slot, and 1symbols for SRS |
| repetitionFactor | n1 | without repetition. |
| 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.5.4.3.1.3 Test Requirements

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

The Timing Advance adjustment accuracy for PSCell in sTAG 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 12>

<unchanged sections omitted>

<Start of Change 13>

#### A.5.5.1.2 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in non-DRX mode

<unchanged text omitted>

**Table A.5.5.1.2.1-3: OTA related cell specific test parameters for FR2 (Cell 2) 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 beamsNote 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 | dB | 2Note 6 | -6Note 6 | -15 | -4.5 | 2Note 6 |
| ssb-Index 1 SNR | Config 1, 2 |  | Not sent | | | | | 2Note 6 | -15 | -15 | -15 | -15 |
| SNR on other channels and signals | Config 1, 2 | dB | 2Note 6 | | | | | N/A | | | | |
|  | Config 1, 2 | dBm/ 15kHz | -92.1 | | | | | -92.1 | | | | |
| Time multiplexing of the downlink transmissions from each AoA | |  | Defined in Figure A.5.5.1.2.1-2 | | | | | | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | | | | | |

<End of Change 13>

<unchanged sections omitted>

<Start of Change 14>

#### A.5.5.1.4 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in DRX mode

<unchanged text omitted>

**Table A.5.5.1.4.1-3: OTA related cell specific test parameters for FR2 (Cell 2) 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 beamsNote 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 | dB | 2Note 6 | -6Note 6 | -15 | -4.5 | 2Note 6 |
| ssb-Index 1 SNR | Config 1, 2 | 2Note 6 | -15 | -15 | -15 | -15 |
| SNR on other channels and signals | Config 1, 2 | dB | 2Note 6 | | | | |
|  | Config 1, 2 | dBm/15KHz | -104.7dBm | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 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 | | | | | | | |

<End of Change 14>

<unchanged sections omitted>

<Start of Change 15>

#### A.5.5.1.6 EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based RLM in non-DRX mode

<unchanged text omitted>

**Table A.5.5.1.6.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | | | | | | |
|  | |  | **T1** | **T2** | **T3** | **T4** | **T5** | **T1** | **T2** | **T3** | **T4** | **T5** |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | | | | | |
|  | |  | AoA1 | | | | | AoA2 | | | | |
| Assumption for UE beamsNote 10 | |  | Rough | | | | | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 0 | | | | | Not sent | | | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB |
| EPRE ratio of PBCH to PBCH DMRSPSS\_beta | | dB |
| EPRE ratio of PSS to SSSSSS\_beta | | dB |
| EPRE ratio of PDSCH DMRS to SSS PDSCH\_beta | | dB |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |
| EPRE ratio of OCNG DMRS to SSS | | dB |
| EPRE ratio of OCNG to OCNG DMRSOCNG\_beta | | dB |
| SNR on RLM-RS1 | Config 1, 2 | dB | 2Note 11 | -6Note 11 | -15 | -4.5 | 2Note 11 |
| SNR on RLM-RS2 | Config 1, 2 |  | Not sent | | | | | 2Note 11 | -14 | -15 | -15 | -14 |
| SNR on other channels and signals | Config 1, 2 | dB | 2 | | | | | N/A | | | | |
|  | Config 1, 2 | dBm/ 15KHz | -92.1 | | | | | -92.1 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 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.5.5.1.6.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | | | | | |

<End of Change 15>

<unchanged sections omitted>

<Start of Change 16>

#### A.5.5.1.8 EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based RLM in DRX mode

**Table A.5.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beamsNote 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 | 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 | dB | 2Note 11 | -6Note 11 | -15 | -4.5 | 2Note 11 |
| SNR on RLM-RS2 | Config 1, 2 | dB | 2Note 11 | -14 | -15 | -15 | -14 |
| SNR on other channels and signals | Config 1, 2 | dB | 2Note 11 | | | | |
|  | Config 1, 2 | dBm/15KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 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.5.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

<End of Change 16>

<unchanged sections omitted>

<Start of Change 17>

A.5.6.2.1 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is not used

A.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.1.1-1, A.5.6.2.1.1-2, and A.5.6.2.1.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.1.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.1.1-1.

**Table A.5.6.2.1.1-1 EN-DC event triggered reporting tests without SSB index reading for FR2-FR2**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell | |

**Table A.5.6.2.1.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test**  **configuration** | **Value** | | **Comment** |
|  |  |  | **Test 1** | **Test 2** |  |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 | | One E-UTRAN TDD carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | | Two FR2 NR carrier frequencies are used. |
| Active cell |  | Config 1,2 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell 3 | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2 | 0 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 39 | 39 |  |
| SMTC-SSB parameters |  | Config 1,2 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| offsetMO | dB | Config 1,2 | 16 | | Applied to NR Cell 3 measurement object |
| A3-Offset | dB | Config 1,2 | -11 | |  |
| Hysteresis | dB | Config 1,2 | 0 | |  |
| CP length |  | Config 1,2 | Normal | |  |
| TimeToTrigger | s | Config 1,2 | 0 | |  |
| Filter coefficient |  | Config 1,2 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2 | OFF | | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2 | 3 μs | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2 | 5 | |  |
| T2 | s | Config 1,2 | 5.2 for PC1; 3.5 for other PC | 5.2 for PC1; 3.5 for other PC |  |

**Table A.5.6.2.1.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Cell 2** | | **Cell 3** | |
|  |  | **configuration** | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | Config 1,2 | Setup 3 as specified in clause A.3.15 | | | |
|  |  |  | AoA1 | | AoA2 | |
| Assumption for UE beamsNote 7 |  | Config 1,2 | Rough | | Rough | |
| NR RF Channel Number |  | Config 1,2 | 1 | | 2 | |
| Duplex mode |  | Config 1,2 | TDD | | TDD | |
| BWchannel | MHz | Config 1,2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | Config 1,2 | 66 | | 66 | |
| BWP BW | MHz | Config 1,2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| TDD configuration |  | Config 1,2 | TDDConf.3.1 | | TDDConf.3.1 | |
| Initial DL BWP |  | Config 1,2 | DLBWP.0.1 | | NA | |
| Initial UL BWP |  | Config 1,2 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP |  | Config 1,2 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP |  | Config 1,2 | ULBWP.1.1 | | NA | |
| OCNG Patterns defined in A.3.2.1.1 |  | Config 1,2 | OP.1 | | OP.1 | |
| TRS configuration |  | Config 1,2 | TRS.2.1 TDD | | NA | |
| PDSCH/PDCCH TCI state |  | Config 1,2 | TCI.State.2 | | NA | |
| PDSCH Reference measurement channel |  | Config 1,2 | SR.3.1 TDD | | - | |
| RMSI CORESET Reference Channel |  | Config 1,2 | CR.3.1 TDD | | - | |
| Dedicated CORESET Reference Channel |  | Config 1,2 | CCR.3.1 TDD | | - | |
| SMTC configuration defined in A.3.11 |  | Config 1,2 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2 | 120 | | 120 | |
| EPRE ratio of PSS to SSS |  | Config 1,2 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |
| Ês | dBm/SCS | Config 1,2 | -87 | | -87 | |
| SSB-RP Note 3 | dBm/SCSNote5 | Config 1,2 | -87 | -87 | -Infinity | -87 |
| BB Note 8 | dB | Config 1,2 | 1.89 | 1.89 | -Infinity | 1.89 |
| Io Note3 | dBm/95.04 MHzNote5 | Config 1,2 | -58.01 | -58.01 | -Infinity | -58.01 |
| Propagation Condition |  | Config 1,2 | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: SSB-RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 6: As observed with 0dBi 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.5.6.2.1.2 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

5120 for UE supporting power class 1, or

3200 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.5.6.2.2 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is used

A.5.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.2.1-1, A.5.6.2.2.1-2, and A.5.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.2.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.2.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.2.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.5.6.2.2.1-1 EN-DC event triggered reporting tests without SSB index reading for FR2-FR2**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell | |

**Table A.5.6.2.2.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Value** | | | | **Comment** |
|  |  | **configuration** | **Test 1** | **Test 2** | **Test 3** | **Test 4** |  |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 | | | | One E-UTRAN TDD carrier frequenciy is used. |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | | | | Two FR2 NR carrier frequencies are used. |
| Active cell |  | Config 1,2 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2 | 0 | | 13 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 39 | | 39 | |  |
| SMTC-SSB parameters |  | Config 1,2 | SSB.3 FR2 | | | | As specified in clause A.3.10.2 |
| A3-Offset | dB | Config 1,2 | -6 | | | |  |
| Hysteresis | dB | Config 1,2 | 0 | | | |  |
| CP length |  | Config 1,2 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2 | 0 | | | |  |
| Filter coefficient |  | Config 1,2 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2 | DRX.1 | DRX.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between PCell and PSCell |  | Config 1,2 | 3 μs | | | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2 | 5 | | | |  |
| T2 | s | Config 1,2 | 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.5.6.2.2.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Cell 2** | | **Cell 3** | |
|  |  | **configuration** | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | Config 1,2 | Setup 1 as specified in clause A.3.15 | | | |
| Assumption for UE beamsNote 7 |  | Config 1,2 | Rough | | Rough | |
| NR RF Channel Number |  | Config 1,2 | 1 | | 2 | |
| Duplex mode |  | Config 1,2 | TDD | | TDD | |
| BWchannel | MHz | Config 1,2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | Config 1,2 | 66 | | 66 | |
| BWP BW | MHz | Config 1,2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| TDD configuration |  | Config 1,2 | TDDConf.3.1 | | TDDConf.3.1 | |
| Initial DL BWP |  | Config 1,2 | DLBWP.0.1 | | NA | |
| Initial UL BWP |  | Config 1,2 | ULBWP.0.1 | |  | |
| Dedicated DL BWP |  | Config 1,2 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP |  | Config 1,2 | ULBWP.1.1 | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | Config 1,2 | OP.1 | | OP.1 | |
| TRS configuration |  | Config 1,2 | TRS.2.1 TDD | | NA | |
| PDSCH/PDCCH TCI state |  | Config 1,2 | TCI.State.2 | | NA | |
| PDSCH Reference measurement channel |  | Config 1,2 | SR.3.1 TDD | | - | |
| RMSI CORESET Reference Channel |  | Config 1,2 | CR.3.1 TDD | | - | |
| Dedicated CORESET Reference Channel |  | Config 1,2 | CCR.3.1 TDD | | - | |
| SMTC configuration defined in A.3.11 |  | Config 1,2 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2 | 120 | | 120 | |
| EPRE ratio of PSS to SSS |  | Config 1,2 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |
| Note2 | dBm/15kHz Note5 |  | -104.7 | | -104.7 | |
| Note2 | dBm/SCS Note4 | Config 1,2 | -95.7 | | -95.7 | |
| SS-RSRP Note 3 | dBm/SCS Note5 | Config 1,2 | -89.7 | -89.7 | -Infinity | -86.7 |
|  | dB | Config 1,2 | 6 | 6 | -Infinity | 9 |
|  | dB | Config 1,2 | 6 | 6 | -Infinity | 9 |
| IoNote3 | dBm/95.04 MHz Note5 | Config 1,2 | -59.7 | -59.7 | -66.7 | -57.2 |
| Propagation Condition |  | Config 1,2 | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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.5.6.2.2.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 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.5.6.2.3 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is not used

A.5.6.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.3.1-1, A.5.6.2.3.1-2, and A.5.6.2.3.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.3.1-1 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.3.1-1 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.3.1-1.

**Table A.5.6.2.3.1-1 EN-DC event triggered reporting tests with SSB index reading for FR2-FR2**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell | |

**Table A.5.6.2.3.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Value** | | **Comment** |
|  |  | **configuration** | **Test 1** | **Test 2** |  |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 | | One E-UTRAN TDD carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | | Two FR2 NR carrier frequencies are used. |
| Active cell |  | Config 1,2 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell 3 | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2 | 0 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 39 | 39 |  |
| SMTC-SSB parameters |  | Config 1,2 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| offsetMO | dB | Config 1,2 | 16 | | Applied to NR Cell 3 measurement object |
| A3-Offset | dB | Config 1,2 | -11 | |  |
| Hysteresis | dB | Config 1,2 | 0 | |  |
| CP length |  | Config 1,2 | Normal | |  |
| TimeToTrigger | s | Config 1,2 | 0 | |  |
| Filter coefficient |  | Config 1,2 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2 | OFF | | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2 | 3 μs | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2 | 5 | |  |
| T2 | s | Config 1,2 | 7 for PC1; 4.5 for other PC | 7 for PC1; 4.5 for other PC |  |

**Table A.5.6.2.3.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Cell 2** | | **Cell 3** | |
|  |  | **configuration** | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | Config 1,2 | Setup 3 as specified in clause A.3.15 | | | |
|  |  |  | AoA1 | | AoA2 | |
| Assumption for UE beamsNote 7 |  | Config 1,2 | Rough | | Rough | |
| NR RF Channel Number |  | Config 1,2 | 1 | | 2 | |
| Duplex mode |  | Config 1,2 | TDD | | TDD | |
| BWchannel | MHz | Config 1,2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | Config 1,2 | 66 | | 66 | |
| BWP BW | MHz | Config 1,2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| TDD configuration |  | Config 1,2 | TDDConf.3.1 | | TDDConf.3.1 | |
| Initial DL BWP |  | Config 1,2 | DLBWP.0.1 | | NA | |
| Initial UL BWP |  | Config 1,2 | DLBWP.0.1 | | N/A | |
| Dedicated DL BWP |  | Config 1,2 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP |  | Config 1,2 | ULBWP.1.1 | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | Config 1,2 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel |  | Config 1,2 | SR.3.1 TDD | | - | |
| RMSI CORESET Reference Channel |  | Config 1,2 | CR.3.1 TDD | | - | |
| Dedicated CORESET Reference Channel |  | Config 1,2 | CCR.3.1 TDD | | - | |
| TRS configuration |  | Config 1,2 | TRS.2.1 TDD | | NA | |
| PDSCH/PDCCH TCI state |  | Config 1,2 | TCI.State.2 | | NA | |
| SMTC configuration defined in A.3.11 |  | Config 1,2 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2 | 120 | | 120 | |
| EPRE ratio of PSS to SSS |  | Config 1,2 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |
| Ês | dBm/SCS | Config 1 | -87 | | -87 | |
| SSB-RP Note 3 | dBm/SCS Note5 | Config 1,2 | -87 | -87 | -Infinity | -87 |
| BB Note 8 | dB | Config 1,2 | 1.89 | 1.89 | -Infinity | 1.89 |
| Io Note3 | dBm/95.04 MHz Note5 | Config 1,2 | -58.01 | -58.01 | -Infinity | -58.01 |
| Propagation Condition |  | Config 1,2 | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: SSB-RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 6: As observed with 0dBi 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.5.6.2.3.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

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.5.6.2.4 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is used

A.5.6.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.4.1-1, A.5.6.2.4.1-2, and A.5.6.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.4.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.4.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.4.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.5.6.2.4.1-1: EN-DC event triggered reporting tests with SSB index reading for FR2-FR2**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell | |

**Table A.5.6.2.4.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Value** | | | | **Comment** |
|  |  | **configuration** | **Test 1** | **Test 2** | **Test 3** | **Test 4** |  |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 | | | | One E-UTRAN TDD carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | | | | Two FR2 NR carrier frequencies are used. |
| Active cell |  | Config 1,2 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2 | 0 | | 13 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 39 | | 39 | |  |
| SMTC-SSB parameters |  | Config 1,2 | SSB.3 FR2 | | | | As specified in clause A.3.10.2 |
| A3-Offset | dB | Config 1,2 | -6 | | | |  |
| Hysteresis | dB | Config 1,2 | 0 | | | |  |
| CP length |  | Config 1,2 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2 | 0 | | | |  |
| Filter coefficient |  | Config 1,2 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2 | DRX.1 | DRX.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between PCell and PSCell |  | Config 1,2 | 3 μs | | | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2 | 5 | | | |  |
| T2 | s | Config 1,2 | 11 for PC1; 6.5 for other PC | 108 for PC1; 67 for other PC | 11 for PC1; 6.5 for other PC | 108 for PC1; 67 for other PC |  |

**Table A.5.6.2.4.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Cell 2** | | **Cell 3** | |
|  |  | **configuration** | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | Config 1,2 | Setup 1 as specified in clause A.3.15 | | | |
| Assumption for UE beamsNote 7 |  | Config 1,2 | Rough | | Rough | |
| NR RF Channel Number |  | Config 1,2 | 1 | | 2 | |
| Duplex mode |  | Config 1,2 | TDD | | TDD | |
| BWchannel | MHz | Config 1,2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | Config 1,2 | 66 | | 66 | |
| BWP BW | MHz | Config 1,2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| TDD configuration |  | Config 1,2 | TDDConf.3.1 | | TDDConf.3.1 | |
| Initial DL BWP |  | Config 1,2 | DLBWP.0.1 | | NA | |
| Initial UL BWP |  | Config 1,2 | ULBWP.0.1 | |  | |
| Dedicated DL BWP |  | Config 1,2 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP |  | Config 1,2 | ULBWP.1.1 | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | Config 1,2 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel |  | Config 1,2 | SR.3.1 TDD | | - | |
| RMSI CORESET Reference Channel |  | Config 1,2 | CR.3.1 TDD | | - | |
| Dedicated CORESET Reference Channel |  | Config 1,2 | CCR.3.1 TDD | | - | |
| TRS configuration |  | Config 1,2 | TRS.2.1 TDD | | NA | |
| PDSCH/PDCCH TCI state |  | Config 1,2 | TCI.State.2 | | NA | |
| SMTC configuration defined in A.3.11 |  | Config 1,2 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2 | 120 | | 120 | |
| EPRE ratio of PSS to SSS |  | Config 1,2 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |
| Note2 | dBm/15kHz Note5 |  | -104.7 | | -104.7 | |
| Note2 | dBm/SCS Note4 | Config 1,2 | -95.7 | | -95.7 | |
| SSB\_RP Note 3 | dBm/SCS Note5 | Config 1,2 | -89.7 | -89.7 | -Infinity | -86.7 |
|  | dB | Config 1,2 | 6 | 6 | -Infinity | 9 |
|  | dB | Config 1,2 | 6 | 6 | -Infinity | 9 |
| IoNote3 | dBm/95.04 MHz Note5 | Config 1,2 | -59.7 | -59.7 | -66.7 | -57.2 |
| Propagation Condition |  | Config 1,2 | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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 0dBi gain at the centre of the quiet zone  Note 6: As observed with 0dBi 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.5.6.2.4.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

A.5.6.2.5 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is not used

A.5.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.5.1-1, A.5.6.2.5.1-2, and A.5.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

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 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.5.1-1.

**Table A.5.6.2.5.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2**

|  |  |  |
| --- | --- | --- |
| **Config** | **Description of serving cell** | **Description of target cell** |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

**Table A.5.6.2.5.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Value** | | **Comment** |
|  |  | **configuration** | **Test 1** | **Test 2** |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | One E-UTRAN TDD carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | One FR1 and one FR2 NR carrier frequency is used. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 39 | 39 |  |
| SMTC-SSB |  | Config 1,4 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
| parameters on NR RF |  | Config 2,5 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
| Channel 1 |  | Config 3,6 | SSB.2 FR1 | | As specified in clause A.3.10.1 |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3,4,5,6 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| CSI-RS for tracking |  | Config 1,4 | TRS.1.1 FDD | |  |
|  | Config 2,5 | TRS.1.1 TDD | |  |
|  | Config 3,6 | TRS.1.2 TDD | |  |
| *offsetMO* | dB | Config 1,2,3,4,5,6 | 6 | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6 | -105 | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6 | OFF | | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,4 | 3ms | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 2,3,5,6 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | |  |
| T2 | s | Config 1,2,3,4,5,6 | 5.2 for PC1; 3.5 for other PC | 5.2 for PC1; 3.5 for other PC |  |

**Table A.5.6.2.5.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Cell 2** | | **Cell 3** | |
|  |  | **configuration** | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | Config 1,2,3,4,5,6 | NA | | Setup 1 as specified in clause A.3.15 | |
| Assumption for UE beamsNote 7 |  | Config 1,2,3,4,5,6 | N/A | | Rough | |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode |  | Config 1,4 | FDD | | TDD | |
|  |  | Config 2,3,5,6 | TDD | | TDD | |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP BW | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  | Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| TDD configuration |  | Config 2,5 | TDDConf.1.1 | | TDDConf.3.1 | |
|  |  | Config 3,6 | TDDConf.2.1 | | TDDConf.3.1 | |
| Initial DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | NA | |
| Initial UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | Config 1,2,3,4,5,6 | OP.1 | | OP.1 | |
| PDSCH Reference |  | Config 1,4 | SR.1.1 FDD | | - | |
| measurement channel |  | Config 2,5 | SR.1.1 TDD | |
|  |  | Config 3,6 | SR2.1 TDD | |
| RMSI CORESET Reference |  | Config 1,4 | CR.1.1 FDD | | - | |
| Channel |  | Config 2,5 | CR.1.1 TDD | |
|  |  | Config 3,6 | CR.2.1 TDD | |
| Dedicated CORESET Reference Channel |  | Config 1,4 | CCR.1.1 FDD | | - | |
|  |  | Config 2,5 | CCR.1.1 TDD | |  | |
|  |  | Config 3,6 | CCR.2.1 TDD | |  | |
| SMTC configuration defined |  | Config 1,4 | SMTC.2 | | SMTC.2 | |
| in A.3.11 |  | Config 2,3,5,6 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2,4,5 | 15 | | 120 | |
|  |  | Config 3,6 | 30 | | 120 | |
| EPRE ratio of PSS to SSS |  | Config | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  | 1,2,3,4,5,6 |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |
| Ês | dBm/SCS | Config 1,2,3,4,5,6 |  | | -Infinity | -87 |
| SSB\_RP Note 3 | dBm/SCS  Note5 | Config 1,2,3,4,5,6 |  | | -Infinity | -87 |
| BB Note 8 | dB | Config 1,2,3,4,5,6 | Link only, see clause A.3.7A | | -Infinity | 14.69 |
| IoNote3 | dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6 |  | | -Infinity | -58.01 |
| Propagation Condition |  | Config 1,2,3,4,5,6 |  | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: SSB\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void.  Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 6: As observed with 0dBi 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.5.6.2.5.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 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.5.6.2.6 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is used

A.5.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.6.1-1, A.5.6.2.6.1-2, and A.5.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.6.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

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 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.6.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.5.6.2.6.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2**

|  |  |  |
| --- | --- | --- |
| **Config** | **Description of serving cell** | **Description of target cell** |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

**Table A.5.6.2.6.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Value** | | | | **Comment** |
|  |  | **configuration** | **Test 1** | **Test 2** | **Test 3** | **Test 4** |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | | | One E-UTRAN TDD carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | | | One FR1 and one Fr2 NR carrier frequency is used. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | | 13 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 39 | | 39 | |  |
| SMTC-SSB |  | Config 1,4 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
| parameters on NR RF |  | Config 2,5 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
| Channel 1 |  | Config 3,6 | SSB.2 FR1 | | | | As specified in clause A.3.10.1 |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3,4,5,6 | SSB.3 FR2 | | | | As specified in clause A.3.10.2 |
| CSI-RS for tracking |  | Config 1,4 | TRS.1.1 FDD | | | |  |
|  | Config 2,5 | TRS.1.1 TDD | | | |  |
|  | Config 3,6 | TRS.1.2 TDD | | | |  |
| *offsetMO* | dB | Config 1,2,3,4,5,6 | 6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | | | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6 | -105 | | | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6 | DRX.1 | DRX.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,4 | 3ms | | | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 2,3,5,6 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | | | |  |
| T2 | s | Config 1,2,3,4,5,6 | 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.5.6.2.6.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Cell 2** | | **Cell 3** | |
|  |  | **configuration** | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | Config 1,2,3,4,5,6 | NA | | Setup 1 as specified in clause A.3.15 | |
| Assumption for UE beamsNote 7 |  | Config 1,2,3,4,5,6 | N/A | | Rough | |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode |  | Config 1,4 | FDD | | TDD | |
|  |  | Config 2,3,5,6 | TDD | | TDD | |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP BW | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| TDD configuration |  | Config 2,5 | TDDConf.1.1 | | TDDConf.3.1 | |
|  |  | Config 3,6 | TDDConf.2.1 | | TDDConf.3.1 | |
| Initial DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | NA | |
| Initial UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | Config 1,2,3,4,5,6 | OP.1 | | OP.1 | |
| PDSCH Reference |  | Config 1,4 | SR.1.1 FDD | | - | |
| measurement channel |  | Config 2,5 | SR.1.1 TDD | |  | |
|  |  | Config 3,6 | SR2.1 TDD | |  | |
| RMSI CORESET Reference |  | Config 1,4 | CR.1.1 FDD | | - | |
| Channel |  | Config 2,5 | CR.1.1 TDD | |  | |
|  |  | Config 3,6 | CR.2.1 TDD | |  | |
| Dedicated CORESET Reference Channel |  | Config 1,4 | CCR.1.1 FDD | | - | |
|  |  | Config 2,5 | CCR.1.1 TDD | |  | |
|  |  | Config 3,6 | CCR.2.1 TDD | |  | |
| SMTC configuration defined |  | Config 1,4 | SMTC.2 | | SMTC.2 | |
| in A.3.11 |  | Config 2,3,5,6 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2,4,5 | 15 | | 120 | |
|  |  | Config 3,6 | 30 | | 120 | |
| EPRE ratio of PSS to SSS |  | Config | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  | 1,2,3,4,5,6 |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |
| Note2 | dBm/15kHz Note5 |  |  | | -104.7 | |
| Note2 | dBm/SCS | Config 1,2,4,5 |  | | -95.7 | |
|  | Note4 | Config 3,6 |  | | -95.7 | |
| SSB\_RP Note 3 | dBm/SCS | Config 1,2,4,5 |  | | -Infinity | -86.7 |
|  | Note5 | Config 3,6 | NA | | -Infinity | -86.7 |
|  | dB | Config 1,2,3,4,5,6 | Link only, see clause A.3.7A | | -Infinity | 9 |
|  | dB | Config 1,2,3,4,5,6 |  | | -Infinity | 9 |
| IoNote3 | dBm/9.36MHz | Config 1,2,4,5 |  | | - | - |
|  | dBm/38.16MHz | Config 3,6 |  | | - | - |
|  | dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6 |  | | -66.7 | -57.2 |
| Propagation Condition |  | Config 1,2,3,4,5,6 |  | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SSB\_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | |

A.5.6.2.6.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

A.5.6.2.7 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is not used

A.5.6.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.7.1-1, A.5.6.2.7.1-2, and A.5.6.2.7.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.7.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

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 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.7.1-1.

**Table A.5.6.2.7.1-1: EN-DC event triggered reporting tests with SSB index reading for FR1-FR2**

|  |  |  |
| --- | --- | --- |
| **Config** | **Description of serving cell** | **Description of target cell** |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

**Table A.5.6.2.7.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Value** | | **Comment** |
|  |  | **configuration** | **Test 1** | **Test 2** |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | One E-UTRAN TDD carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | One FR1 and one FR2 NR carrier frequency is used. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 39 | 39 |  |
| SMTC-SSB |  | Config 1,4 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
| parameters on NR RF |  | Config 2,5 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
| Channel 1 |  | Config 3,6 | SSB.2 FR1 | | As specified in clause A.3.10.1 |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3,4,5,6 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| CSI-RS for tracking |  | Config 1,4 | TRS.1.1 FDD | |  |
|  | Config 2,5 | TRS.1.1 TDD | |  |
|  | Config 3,6 | TRS.1.2 TDD | |  |
| *offsetMO* | dB | Config 1,2,3,4,5,6 | 6 | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6 | -105 | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6 | OFF | | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,4 | 3ms | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 2,3,5,6 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | |  |
| T2 | s | Config 1,2,3,4,5,6 | 7 for PC1; 4.5 for other PC | 7 for PC1; 4.5 for other PC |  |

**Table A.5.6.2.7.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Cell 2** | | **Cell 3** | |
|  |  | **configuration** | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | Config 1,2,3,4,5,6 | NA | | Setup 1 as specified in clause A.3.15 | |
| Assumption for UE beamsNote 7 |  | Config 1,2,3,4,5,6 | N/A | | Rough | |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode |  | Config 1,4 | FDD | | TDD | |
|  |  | Config 2,3,5,6 | TDD | | TDD | |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP BW | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | Config 1,2,3,4,5,6 | OP.1 | | OP.1 | |
| PDSCH Reference |  | Config 1,4 | SR.1.1 FDD | | - | |
| measurement channel |  | Config 2,5 | SR.1.1 TDD | |  | |
|  |  | Config 3,6 | SR2.1 TDD | |  | |
| RMSI CORESET Reference |  | Config 1,4 | CR.1.1 FDD | | - | |
| Channel |  | Config 2,5 | CR.1.1 TDD | |  | |
|  |  | Config 3,6 | CR.2.1 TDD | |  | |
| Dedicated CORESET Reference Channel |  | Config 1,4 | CCR.1.1 FDD | | - | |
|  |  | Config 2,5 | CCR.1.1 TDD | |  | |
|  |  | Config 3,6 | CCR.2.1 TDD | |  | |
| TDD configuration |  | Config 2,5 | TDDConf.1.1 | | TDDConf.3.1 | |
|  |  | Config 3,6 | TDDConf.2.1 | | TDDConf.3.1 | |
| Initial DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | NA | |
| Initial UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | NA | |
| SMTC configuration defined in A.3.11 |  | Config 1,4 | SMTC.2 | | SMTC.2 | |
|  |  | Config 2,3,5,6 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2,4,5 | 15 | | 120 | |
|  |  | Config 3,6 | 30 | | 120 | |
| EPRE ratio of PSS to SSS |  | Config | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  | 1,2,3,4,5,6 |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |
| Ês | dBm/SCS | Config 1,2,3,4,5,6 |  | | -Infinity | -87 |
| SSB\_RP Note 3 | dBm/SCS  Note5 | Config 1,2,3,4,5,6 |  | | -Infinity | -87 |
| BB Note 8 | dB | Config 1,2,3,4,5,6 | Link only, see clause A.3.7A | | -Infinity | 14.69 |
| IoNote3 | dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6 |  | | -Infinity | -58.01 |
| Propagation Condition |  | Config 1,2,3,4,5,6 |  | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: SS-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 0dBi gain at the centre of the quiet zone  Note 6: As observed with 0dBi 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.5.6.2.7.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 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.5.6.2.8 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is used

A.5.6.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.8.1-1, A.5.6.2.8.1-2, and A.5.6.2.8.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.8.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

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 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.8.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.5.6.2.8.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2**

|  |  |  |
| --- | --- | --- |
| **Config** | **Description of serving cell** | **Description of target cell** |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

**Table A.5.6.2.8.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | | | | **Comment** |
|  |  |  | **Test 1** | **Test 2** | **Test 3** | **Test 4** |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | | | One E-UTRAN TDD carrier frequenciy is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | | | One FR1 and one FR2 NR carrier frequency is used. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | | 13 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 39 | | 39 | |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1,4 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 2,5 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 3,6 | SSB.2 FR1 | | | | As specified in clause A.3.10.1 |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3,4,5,6 | SSB.3 FR2 | | | | As specified in clause A.3.10.2 |
| CSI-RS for tracking |  | Config 1,4 | TRS.1.1 FDD | | | |  |
|  | Config 2,5 | TRS.1.1 TDD | | | |  |
|  | Config 3,6 | TRS.1.2 TDD | | | |  |
| *offsetMO* | dB | Config 1,2,3,4,5,6 | 6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | | | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6 | -105 | | | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6 | DRX.1 | DRX.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,4 | 3ms | | | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 2,3,5,6 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | | | |  |
| T2 | s | Config 1,2,3,4,5,6 | 11 for PC1; 6.5 for other PC | 108 for PC1; 67 for other PC | 11 for PC1; 6.5 for other PC | 108 for PC1; 67 for other PC |  |

**Table A.5.6.2.8.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 2** | | **Cell 3** | |
|  |  |  | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | Config 1,2,3,4,5,6 | NA | | Setup 1 as specified in clause A.3.15 | |
| Assumption for UE beamsNote 7 |  | Config 1,2,3,4,5,6 | N/A | | Rough | |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode |  | Config 1,4 | FDD | | TDD | |
|  |  | Config 2,3,5,6 | TDD | | TDD | |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP BW | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | Config 1,2,3,4,5,6 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel |  | Config 1,4 | SR.1.1 FDD | | - | |
|  |  | Config 2,5 | SR.1.1 TDD | |
|  |  | Config 3,6 | SR2.1 TDD | |
| RMSI CORESET Reference Channel |  | Config 1,4 | CR.1.1 FDD | | - | |
|  |  | Config 2,5 | CR.1.1 TDD | |
|  |  | Config 3,6 | CR.2.1 TDD | |
| Dedicated CORESET Reference Channel |  | Config 1,4 | CCR.1.1 FDD | | - | |
|  |  | Config 2,5 | CCR.1.1 TDD | |  | |
|  |  | Config 3,6 | CCR.2.1 TDD | |  | |
| TDD configuration |  | Config 2,5 | TDDConf.1.1 | | TDDConf.3.1 | |
|  |  | Config 3,6 | TDDConf.2.1 | | TDDConf.3.1 | |
| Initial DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | NA | |
| Initial UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | NA | |
| SMTC configuration defined in A.3.11 |  | Config 1,4 | SMTC.2 | | SMTC.2 | |
|  |  | Config 2,3,5,6 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2,4,5 | 15 | | 120 | |
|  |  | Config 3,6 | 30 | | 120 | |
| EPRE ratio of PSS to SSS |  | Config 1,2,3,4,5,6 | 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 1,2,4,5 |  | | -95.7 | |
|  |  | Config 3,6 |  | | -95.7 | |
| SSB\_RP Note 3 | dBm/SCS Note5 | Config 1,2,4,5 |  | | -Infinity | -86.7 |
|  |  | Config 3,6 |  | | -Infinity | -86.7 |
|  | dB | Config 1,2,3,4,5,6 |  | | -Infinity | 9 |
|  | dB | Config 1,2,3,4,5,6 |  | | -Infinity | 9 |
| IoNote3 | dBm/9.36MHz | Config 1,2,4,5 |  | | - | - |
|  | dBm/38.16MHz | Config 3,6 |  | | - | - |
|  | dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6 |  | | -66.7 | -57.2 |
| Propagation Condition |  | Config 1,2,3,4,5,6 |  | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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 0dBi gain at the centre of the quiet zone  Note 6: As observed with 0dBi 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.5.6.2.8.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

<End of Change 17>

<Unchanged sections omitted>

<Start of Change 18>

#### A.5.7.1.1 EN-DC intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

##### A.5.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.3.1.1 and 10.1.3.1.2 for intra-frequency measurements.

##### A.5.7.1.1.2 Test parameters

In this set of test cases, all NR cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table A.5.7.1.1.2-2 and A.5.7.1.1.2-3. The E-UTRA PCell is configured as specified in clause A.3.7.2.2. In all test cases, Cell 1 is the PCell, cell 2 is the PSCell and Cell 3 is the target cell. The test consists of two time phases T1 and T2.

Table A.5.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations | |

Table A.5.7.1.1.2-2: SS-RSRP Intra frequency general test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | | Unit | T1 | | T2 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| Physical cell ID | |  | 489 | 0 | 489 | 0 |
| SSB ARFCN | |  | freq1 | | freq1 | |
| Duplex mode | |  | TDD | | TDD | |
| TDD configuration | |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated | |  | 24 | | 24 | |
| BWP configuration | Initial DL BWP |  | DLBWP.0.1 | | | |
| Dedicated DL BWP |  | DLBWP.1.1 | | | |
| Initial UL BWP |  | ULBWP.0.1 | | | |
| Dedicated UL BWP |  | ULBWP.1.1 | | | |
| TRS configuration | |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state | |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel | |  | SR.3.2 TDD | - | SR.3.2 TDD | - |
| RMSI CORESET Reference Channel | |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Reference Channel | |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns | |  | OP.3 | OP.3 | OP.3 | OP.3 |
| SSB configuration | |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration | |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| Time offset with Cell 2 | | μs | - | 3 | - | 3 |
| PDSCH/PDCCH subcarrier spacing | | kHz | 120 | 120 | 120 | 120 |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS | |
| EPRE ratio of PBCH to PBCH\_DMRS | |
| EPRE ratio of PDCCH\_DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |
| EPRE ratio of PDSCH\_DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
| Propagation conditions | |  | AWGN | | AWGN | |
| Antenna configuration | |  | 1x2 | 1x2 | 1x2 | 1x2 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void  Note 5: All parameters apply for configuration 1 and 2  Note 6: Void | | | | | | |

Table A.5.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | T1 | | T2 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 8 |  | Rough | | | |
| Note1 | dBm/15kHzNote4 | -91.6 | | N/A | |
| Note1 | dBm/SCSNote4 | -82.6 | | N/A | |
|  | dB | 6.0 | 1.0 | N/A | N/A |
| Es | dBm/SCSNote4 |  |  | (Table B.2.2-2 Rx Beam Peak +2.1dB) | (Table B.2.2-2 Rx Beam Peak +2.1dB) |
| SSB\_RPNote2 | dBm/SCS | -76.6 | -81.6 | (Table B.2.2-2 Rx Beam Peak +2.1dB) | (Table B.2.2-2 Rx Beam Peak +2.1dB) |
| BB Note6 | dB | 2.44 | -5.98 | -5.98 | -5.98 |
| IoNote2 | dBm/95.04 MHz Note4 | -50.05 | | (Table B.2.2-2 Rx Beam Peak +29.70dB) | |
| Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SSB\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4.  Note 7: All parameters apply for configurations 1 and 2  Note 8: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.5.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.1.1 and relative accuracy requirements in clause 10.1.3.1.2. The following requirements are to be verified:

During T1:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.5.7.1.1.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T2:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.5.7.1.1.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T1 and T2:

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1

Relative accuracy of Cell 3 during T2 compared with Cell 3 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

Table A.5.7.1.1.3-1: SS-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 2 | SSB\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ SSB\_RP2 +δ +Gmax |
| Cell 3 | SSB\_RP3 -δ +Gmin ≤ Reported RSRP(dBm) ≤ SSB\_RP3 +δ +Gmax |
| Note 1: SSB\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.3.1.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class | |

<End of change 18>

<unchanged sections omitted>

<Start of change 19>

#### A.5.7.2.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.8.1.1.

A.5.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.5.7.2.1.2-2 and Table A.5.7.2.1.2-3. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

**Table A.5.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations | |

**Table A.5.7.2.1.2-2: SS-RSRQ Intra frequency test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** |
| SSB ARFCN | |  | **Freq1** | | **Freq1** | |
| Duplex mode | |  | TDD | | TDD | |
| TDD configuration | |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | DLBWP.0.1 | | | |
| Dedicated DL BWP | DLBWP.1.1 | | | |
| Initial UL BWP | ULBWP.0.1 | | | |
| Dedicated UL BWP | ULBWP.1.1 | | | |
| TRS configuration | |  | TRS.2.1 TDD |  | TRS.2.1 TDD |  |
| TCI state | |  | TCI.State.0 |  | TCI.State.0 |  |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD |  | SR.3.1 TDD |  |
| RMSI CORESET Reference Channel | |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC | |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns | |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration | |  | SMTC.1 | | | |
| SSB configuration | |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| PDSCH/PDCCH subcarrier spacing | | kHz | 120 | 120 | 120 | 120 |
| SS-RSSI-Measurement | |  | Not Applicable | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS | |
| EPRE ratio of PBCH to PBCH\_DMRS | |
| EPRE ratio of PDCCH\_DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |
| EPRE ratio of PDSCH\_DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
| Propagation condition | |  | AWGN | | AWGN | |
| Antenna Configuration | |  | 1x2 | 1x2 | 1x2 | 1x2 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void  Note 5: Void | | | | | | |

**Table A.5.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 9 |  | Rough | | | |
| Note1 | dBm/15kHzNote4 | -95 | | -95 | |
| Note1 | dBm/SCSNote3 | -86 | | -86 | |
|  | dB | 3 | 3 | -3 | -3 |
| SSB\_RPNote2 | dBm/SCS Note4 | -83 | -83 | -89 | -89 |
| SS-RSRQ Note2 | dB | -14.77 | -14.77 | -16.81 | -16.81 |
|  | dB | -1.76 | -1.76 | -4.76 | -4.76 |
| IoNote2 | dBm/95.04 MHz Note4 | -50 | | -54 | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRQ, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Void  Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.5.7.2.1.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ -2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ +3.5dB to Nominal SS-RSRQ -3.5dB according to the requirements in clause 10.1.8.1.1. Nominal SS-RSRQ is the value shown in table A.5.7.2.1.2-3.

A.5.7.2.2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter-frequency measurement.

A.5.7.2.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.5.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test setup in Table A.5.7.2.2.2-2 and Table A.5.7.2.2.2-3. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

**Table A.5.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

**Table A.5.7.2.2.2-2: SS-RSRQ Inter frequency general test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** |
| SSB ARFCN | |  | Freq1 | freq2 | freq1 | Freq2 |
| Duplex mode | |  | TDD | | TDD | |
| TDD configuration | |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | DLBWP.0.1 | | | |
| Dedicated DL BWP |  | DLBWP.1.1 | | | |
| Initial UL BWP |  | ULBWP.0.1 | | | |
| Dedicated UL BWP |  | ULBWP.1.1 | | | |
| TRS configuration | |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state | |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel | |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| OCNG Patterns | |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SSB configuration | |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration | |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| PDSCH/PDCCH subcarrier spacing | | kHz | 120 | 120 | 120 | 120 |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS | |
| EPRE ratio of PBCH to PBCH\_DMRS | |
| EPRE ratio of PDCCH\_DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |
| EPRE ratio of PDSCH\_DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
| Propagation conditions | |  | AWGN | AWGN | AWGN | AWGN |
| Antenna configuration | |  | 1x2 | 1x2 | 1x2 | 1x2 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void | | | | | | |

**Table A.5.7.2.2.2-3: SS-RSRQ Inter frequency OTA related test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** |
| AoA setup |  | Setup 1 in clause A.3.15 | | Setup 1 in clause A.3.15 | |
| Assumption for UE beamsNote 8 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -94.03 | -94.03 | -94.03 | -94.03 |
| Note1 | dBm/SCSNote3 | -85.0 | -85.0 | -85.0 | -85.0 |
|  | dB | -1.75 | -1.75 | -3 | -3 |
| SSB\_RPNote2 | dBm/SCS Note4 | -86.75 | -86.75 | -88 | -88 |
| SS-RSRQNote2 | dB | -14.75 | -14.75 | -15.56 | -15.56 |
|  | dB | -1.75 | -1.75 | -3 | -3 |
| IoNote2 | dBm/95.04 MHz Note4 | -53.8 | -53.8 | -54.25 | -54.25 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRQ, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.5.7.2.2.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SSRQ-2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ+3.5dB to Nominal SS-RSRQ-3.5dB according to the requirements in clause 10.1.10.1.1.

The SS-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.1.2.

<End of change 19>

<unchanged sections omitted>

<Start of change 20>

#### A.5.7.3.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

##### A.5.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.13.1.1.

##### A.5.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is test by using the parameters in Table A.5.7.3.1.2-2 and Table A.5.7.3.1.2-3. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.5.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations | |

Table A.5.7.3.1.2-2: SS-SINR Intra frequency test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| SSB ARFCN |  | Freq2 | | Freq2 | |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | | | |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | | | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | | |
| DRX cycle configuration | ms | Not applicable | | | |
| TRS configuration |  | TRS.2.1 TDD | | | |
| TCI state |  | TCI.State.0 | | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD |  | SR.3.1 TDD |  |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated RMSI CORESET Reference Channel |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 | | | |
| SSB configuration |  | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| SS-RSSI-Measurement |  | Not Applicable | | | |
| EPRE ratio of PSS to SSS | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | AWGN | | AWGN | |
| Antenna configuration |  | 1x2 | 1x2 | 1x2 | 1x2 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: VoidNote 4: Void | | | | | |

Table A.5.7.3.1.2-3: SS-SINR Intra frequency OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 9 |  | Rough | | Rough | |
| Note1 | dBm/15kHz Note4 | -105 | | -105 | |
| Note1 | dBm/SCS Note3 | -96 | | -96 | |
|  | dB | 4.54 | 2.66 | -3 | -3 |
| SS-RSRPNote2 | dBm/SCS Note4 | -91.46 | -93.34 | -99 | -99 |
| SS-SINR Note2 | dB | 0 | -3.2 | -4.76 | -4.76 |
|  | dB | 0 | -3.2 | -4.76 | -4.76 |
| IoNote2 | dBm/95.04 MHz Note4 | -59.43 | | -64 | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-SINR, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Void  Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.5.7.3.1.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3B to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.10.13.1. Nominal SS-SINR is the value shown in table A.5.7.3.1.2-3.

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.13.1.1.

#### A.5.7.3.2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

##### A.5.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.15.1.1 and 10.1.15.1.2 for inter-frequency measurement.

##### A.5.7.3.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.5.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test setup in Table A.5.7.3.2.2-2 and Table A.5.7.3.2.2-3. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.5.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.5.7.3.2.2-2: SS-SINR Inter frequency general test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| SSB ARFCN |  | Freq1 | freq2 | freq1 | Freq2 | freq1 | Freq2 |
| Duplex mode |  | TDD | | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | | | | | |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | | | | | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | | | | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | | | | |
| DRX cycle configuration | ms | Not applicable | | | | | |
| TRS configuration |  | TRS.2.1 TDD | | | | | |
| TCI state |  | TCI.State.0 | | | | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | AWGN | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna configuration |  | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void | | | | | | | |

Table A.5.7.3.2.2-3: SS-SINR Inter frequency OTA related test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| Angle of arrival configuration | degrees | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 10 |  | Rough | | Rough | | Rough | |
| Note1 | dBm/15kHz Note4 | -105 | -105 | -105 | -105 | -105 | -105 |
| Note1 | dBm/SCS Note3 | -96 | -96 | -96 | -96 | -96 | -96 |
|  | dB | -0.5 | -0.5 | 11 | 11. | -3.0 | -3.0 |
| SS-RSRPNote2 | dBm/SCS Note4 | -96.5 | -96.5 | -85 | -85 | -99 | -99 |
| SS-SINRNote2 | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
|  | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
| IoNote2 | dBm/95.04 MHz Note4 | -69.3 | -69.3 | -55.4 | -55.4 | -65.24 | -65.24 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-SINR, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Void  Note 9: Void  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.5.7.3.2.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3dB to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR+3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.15.1.1. Nominal SS-SINR is the value shown in table A.5.7.2.2.2-3

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.1.2.

<End of change 20>

<Unchanged sections omitted>

<Start of Change 21>

A.6.3.2.1 SA: RRC Re-establishment

A.6.3.2.1.1 Intra-frequency RRC Re-establishment in FR1

A.6.3.2.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR1 with 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.6.3.2.1.1.1-1, table A.6.3.2.1.1.1-2 and table A.6.3.2.1.1.1-3 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, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.6.3.2.1.1.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 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.6.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **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 | 3 ms | Asynchronous cells |
|  | | 2 | 3 μs | Synchronous cells |
|  | | 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; |
| T311 | | ms | 1, 2, 3 | 3000 | RRC re-establishment timer |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR1 |  |
|  | | 2 | SSB.1 FR1 |  |
|  | | 3 | SSB.2 FR1 |  |
| SMTC configuration | |  | 1 | SMTC.2 |  |
|  | | 2 | SMTC.1 |  |
|  | | 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3 | OFF |  |
| PRACH configuration | |  | 1, 2, 3 | FR1 PRACH configuration 1 | Table A.3.8.2.1-1 |
| T1 | | s | 1, 2, 3 | 5 |  |
| T2 | | ms | 1, 2, 3 | 200 | Time for the UE to detect RLF |
| T3 | | s | 1, 2, 3 | 2 |  |

**Table A.6.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | | | | **Cell 2** | | | | |
|  |  |  | **T1** | | **T2** | | **T3** | **T1** | **T2** | | | **T3** |
| TDD configuration |  | 1 | N/A | | | | | N/A | | | | |
|  |  | 2 | TDDConf.1.1 | | | | | TDDConf.1.1 | | | | |
|  |  | 3 | TDDConf.2.1 | | | | | TDDConf.2.1 | | | | |
|  |  |  |  | | | | |  | | | | |
|  |  |  |  | | | | |
|  |  |  |  | | | | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | | | | SR.1.1 FDD | | | | |
| 2 | SR.1.1 TDD | | | | | SR.1.1 TDD | | | | |
| 3 | SR.2.1 TDD | | | | | SR.2.1 TDD | | | | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | | | | CR.1.1 FDD | | | | |
|  |  | 2 | CR.1.1 TDD | | | | | CR.1.1 TDD | | | | |
|  |  | 3 | CR.2.1 TDD | | | | | CR.2.1 TDD | | | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | | | | CCR.1.1 FDD | | | | |
|  |  | 2 | CCR.1.1 TDD | | | | | CCR.1.1 TDD | | | | |
|  |  | 3 | CCR.2.1 TDD | | | | | CCR.2.1 TDD | | | | |
| OCNG Pattern |  | 1, 2, 3 | OP.1 defined in A.3.2.1 | | | | | OP.1 defined in A.3.2.1 | | | | |
|  |  |  |  | | | | |  | | | | |
|  |  |  |  | | | | |
|  |  |  |  | | | | |
| TRS configuration |  | 1 | TRS.1.1 FDD | | | | | TRS.1.1 FDD | | | | |
| 2 | TRS.1.1 TDD | | | | | TRS.1.1 TDD | | | | |
| 3 | TRS.1.2 TDD | | | | | TRS.1.2 TDD | | | | |
| 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 | | | | |
| Active DL BWP confgiuration |  | 1, 2, 3 | DLBWP.1.1 | N/A | | N/A | | N/A | | N/A | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | N/A | | N/A | | N/A | | N/A | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3 | SSB | | | | | SSB | | | | |
|  | dB | 1 | 1.54 | | -infinity | | -infinity | -3.79 | 4 | | | 4 |
|  |  | 2 |
|  |  | 3 |
| Note2 | dBm/SCS | 1 | -98 | | | | | | | | | |
|  |  | 2 | -98 | | | | | | | | | |
|  |  | 3 | -95 | | | | | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | | | | | |
|  |  | 2 |  | | | | | | | | | |
|  |  | 3 |  | | | | | | | | | |
|  | dB | 1 | 7 | | -infinity | | -infinity | 4 | 4 | | | 4 |
|  |  | 2 |
|  |  | 3 |
| SS-RSRP Note3 | dBm/SCS | 1 | -91 | | -infinity | | -infinity | -94 | -94 | | | -94 |
|  |  | 2 | -91 | | -infinity | | -infinity | -94 | -94 | | | -94 |
|  |  | 3 | -88 | | -infinity | | -infinity | -91 | -91 | | | -91 |
| Io | dBm/9.36 MHz | 1 | -60.74 | | -64.59 | | -64.59 | -60.74 | -64.59 | | | -64.59 |
|  | dBm/9.36 MHz | 2 | -60.74 | | -64.59 | | -64.59 | -60.74 | -64.59 | | | -64.59 |
|  | dBm/38.16 MHz | 3 | -54.65 | | -58.50 | | -58.50 | -54.65 | -58.50 | | | -58.50 |
| 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. | | | | | | | | | | | | |

A.6.3.2.1.1.2 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 a known NR intra frequency cell shall be less than 1.6 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 = 1

Tidentify\_intra\_NR = 200 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 1545 ms, allow 1.6 s in the test case.

A.6.3.2.1.2 Inter-frequency RRC Re-establishment in FR1

A.6.3.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR1 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.6.3.2.1.2.1-1, table A.6.3.2.1.2.1-2 and table A.6.3.2.1.2.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

**Table A.6.3.2.1.2.1-1: Supported test configurations**

|  |  |  |
| --- | --- | --- |
| **Configuration** | **Description of serving cell** | **Description of target cell** |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 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.6.3.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **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 | 3 ms | Asynchronous cells |
|  | | 2 | 3 μs | Synchronous cells |
|  | | 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; |
| 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 | SSB.1 FR1 |  |
|  | | 2 | SSB.1 FR1 |  |
|  | | 3 | SSB.2 FR1 |  |
| SMTC configuration | |  | 1 | SMTC.2 |  |
|  | | 2 | SMTC.1 |  |
|  | | 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3 | OFF |  |
| PRACH configuration | |  | 1, 2, 3 | FR1 PRACH configuration 1 | Table A.3.8.2.1-1 |
| T1 | | s | 1, 2, 3 | 5 |  |
| T2 | | ms | 1, 2, 3 | 200 | Time for the UE to detect RLF |
| T3 | | s | 1, 2, 3 | 5 |  |

**Table A.6.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | | | **Cell 2** | | | | |
|  |  |  | **T1** | | **T2** | **T3** | **T1** | **T2** | | | **T3** |
| RF Channel Number |  | 1, 2, 3 | 1 | | | | 2 | | | | |
| TDD configuration |  | 1 | N/A | | | | N/A | | | | |
|  |  | 2 | TDDConf.1.1 | | | | TDDConf.1.1 | | | | |
|  |  | 3 | TDDConf.2.1 | | | | TDDConf.2.1 | | | | |
|  |  |  |  | | | |  | | | | |
|  |  |  |  | | | |  | | | | |
|  |  |  |  | | | |  | | | | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | | | SR.1.1 FDD | | | | |
| 2 | SR.1.1 TDD | | | | SR.1.1 TDD | | | | |
| 3 | SR.2.1 TDD | | | | SR.2.1 TDD | | | | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | | | CR.1.1 FDD | | | | |
|  |  | 2 | CR.1.1 TDD | | | | CR.1.1 TDD | | | | |
|  |  | 3 | CR.2.1 TDD | | | | CR.2.1 TDD | | | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | | | CCR.1.1 FDD | | | | |
|  |  | 2 | CCR.1.1 TDD | | | | CCR.1.1 TDD | | | | |
|  |  | 3 | CCR.2.1 TDD | | | | CCR.2.1 TDD | | | | |
| OCNG Pattern |  | 1, 2, 3 | OP.1 defined in A.3.2.1 | | | | OP.1 defined in A.3.2.1 | | | | |
|  |  |  |  | | | |  | | | | |
|  |  |  |  | | | |  | | | | |
|  |  |  |  | | | |  | | | | |
| TRS configuration |  | 1 | TRS.1.1 FDD | | | | TRS.1.1 FDD | | | | |
| 2 | TRS.1.1 TDD | | | | TRS.1.1 TDD | | | | |
| 3 | TRS.1.2 TDD | | | | TRS.1.2 TDD | | | | |
| Initial DL BWP configuration |  | 1, 2, 3 | DLBWP.0 | | | | DLBWP.0 | | | | |
| Initial UL BWP configuration |  | 1, 2, 3 | ULBWP.0 | | | | ULBWP.0 | | | | |
| Active DL BWP confgiuration |  | 1, 2, 3 | DLBWP.1.1 | N/A | | N/A | N/A | | N/A | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | N/A | | N/A | N/A | | N/A | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3 | SSB | | | | SSB | | | | |
|  | dB | 1 | 4 | | -infinity | -infinity | -infinity | -infinity | | | 7 |
|  |  | 2 |
|  |  | 3 |
| Note2 | dBm/SCS | 1 | -98 | | | | | | | | |
|  |  | 2 | -98 | | | | | | | | |
|  |  | 3 | -95 | | | | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | | | | |
|  |  | 2 |  | | | | | | | | |
|  |  | 3 |  | | | | | | | | |
|  | dB | 1 | 4 | | -infinity | -infinity | -infinity | -infinity | | | 7 |
|  |  | 2 |  | |  |  |  |  | | |  |
|  |  | 3 |  | |  |  |  |  | | |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -94 | | -infinity | -infinity | -infinity | -infinity | | | -91 |
|  |  | 2 | -94 | | -infinity | -infinity | -infinity | -infinity | | | -91 |
|  |  | 3 | -91 | | -infinity | -infinity | -infinity | -infinity | | | -88 |
| Io | dBm/9.36 MHz | 1 | -64.59 | | -70. 05 | -70. 05 | -70. 05 | -70. 05 | | | -62.26 |
| dBm/9.36 MHz | 2 | -64.59 | | -70. 05 | -70. 05 | -70. 05 | -70.05 | | | -62.26 |
| dBm/38.16 MHz | 3 | -58.50 | | -63.94 | -63.94 | -63.94 | -63.94 | | | -56.15 |
| 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. | | | | | | | | | | | |

A.6.3.2.1.2.2 Test Requirements

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

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than 3 s.

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

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

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

Where:

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

Nfreq = 2

Tidentify\_intra\_NR = 800 ms

Tidentify\_inter\_NR = 800 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 2945 ms, allow 3 s in the test case.

A.6.3.2.1.3 Intra-frequency RRC Re-establishment in FR1 without serving cell timing

A.6.3.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR1 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.6.3.2.1.3.1-1, table A.6.3.2.1.3.1-2 and table A.6.3.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.6.3.2.1.3.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 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.6.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **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 | 3 ms | Asynchronous cells |
|  | | 2 | 3 μs | Synchronous cells |
|  | | 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 | 3000 | RRC re-establishment timer |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR1 |  |
|  | | 2 | SSB.1 FR1 |  |
|  | | 3 | SSB.2 FR1 |  |
| SMTC configuration | |  | 1 | SMTC.2 |  |
|  | | 2 | SMTC.1 |  |
|  | | 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3 | OFF |  |
| PRACH configuration | |  | 1, 2, 3 | FR1 PRACH configuration 1 | Table A.3.8.2.1-1 |
| T1 | | s | 1, 2, 3 | 5 |  |
| T2 | | s | 1, 2, 3 | 6 | Time for the UE to detect RLF |
| T3 | | s | 1, 2, 3 | 3 |  |

**Table A.6.3.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | | **Cell 2** | | |
|  |  |  | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| TDD configuration |  | 1 | N/A | | | N/A | | |
|  |  | 2 | TDDConf.1.1 | | | TDDConf.1.1 | | |
|  |  | 3 | TDDConf.2.1 | | | TDDConf.2.1 | | |
|  |  |  |  | | |  | | |
|  |  |  |  | | |  | | |
|  |  |  |  | | |  | | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | | SR.1.1 FDD | | |
| 2 | SR.1.1 TDD | | | SR.1.1 TDD | | |
| 3 | SR.2.1 TDD | | | SR.2.1 TDD | | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | | CR.1.1 FDD | | |
|  |  | 2 | CR.1.1 TDD | | | CR.1.1 TDD | | |
|  |  | 3 | CR.2.1 TDD | | | CR.2.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | | CCR.1.1 FDD | | |
|  |  | 2 | CCR.1.1 TDD | | | CCR.1.1 TDD | | |
|  |  | 3 | CCR.2.1 TDD | | | CCR.2.1 TDD | | |
| 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 | | |
|  | dB | 1 | 4 | -infinity | -infinity | -infinity | -infinity | 4 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
| Note2 | dBm/SCS | 1 | -98 | | | | | |
|  |  | 2 | -98 | | | | | |
|  |  | 3 | -95 | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | |
|  |  | 2 |  | | | | | |
|  |  | 3 |  | | | | | |
|  | dB | 1 | 4 | -infinity | -infinity | -infinity | -infinity | 4 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -94 | -infinity | -infinity | -infinity | -infinity | -94 |
|  |  | 2 | -94 | -infinity | -infinity | -infinity | -infinity | -94 |
|  |  | 3 | -91 | -infinity | -infinity | -infinity | -infinity | -91 |
| Io | dBm/9.36 MHz | 1 | -64.59 | -infinity | -infinity | -infinity | -infinity | -64.59 |
|  | dBm/9.36 MHz | 2 | -64.59 | -infinity | -infinity | -infinity | -infinity | -64.59 |
|  | dBm/38.16 MHz | 3 | -58.50 | -infinity | -infinity | -infinity | -infinity | -58.50 |
| 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. | | | | | | | | |

A.6.3.2.1.3.2 Test Requirements

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

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 2.2 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 = 800 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 2145 ms, allow 2.2 s in the test case.

<End of change 21>

<Unchanged sections omitted>

<Start of Change 22>

#### A.6.5.1.2 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

<unchanged text omitted>

**Table A.6.5.1.2.1-3: Cell specific test parameters for FR1 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** |
| 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 |
| SNR on RLM-RS | Config 1 | dB | 1 | -7 | -15 | -4.5 | 1 |
| Config 2 | 1 | -7 | -15 | -4.5 | 1 |
| Config 3 | 1 | -7 | -15 | -4.5 | 1 |
| SNR on other channels and signals | Config 1, 2, 3 | dB | 1 |  |  |  |  |
|  | Config 1 | dBm/15 kHz | -98 | | | | |
| Config 2 | -98 | | | | |
| Config 3 | -98 | | | | |
|  | Config 1 | dBm/SCS | -98 | | | | |
| Config 2 | -98 | | | | |
| Config 3 | -95 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  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 in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.6.5.1.2.1-1.  Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6. | | | | | | | |

<End of Change 22>

<unchanged sections omitted>

<Start of Change 23>

#### A.6.5.1.4 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode

<unchanged text omitted>

**Table A.6.5.1.4.1-3: Cell specific test parameters for FR1 (Cell 1) for in-sync radio link monitoring tests in DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** |
| 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 |
| SNR on RLM-RS | Config 1 | dB | 1 | -7 | -15 | -4.5 | 1 |
| Config 2 | 1 | -7 | -15 | -4.5 | 1 |
| Config 3 | 1 | -7 | -15 | -4.5 | 1 |
| SNR on other channels and signals | Config 1, 2, 3 | dB | 1 |  |  |  |  |
|  | Config 1 | dBm/15 kHz | -98 | | | | |
| Config 2 | -98 | | | | |
| Config 3 | -98 | | | | |
|  | Config 1 | dBm/SCS | -98 | | | | |
| Config 2 | -98 | | | | |
| Config 3 | -95 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  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 in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.6.5.1.4.1-1.  Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6. | | | | | | | |

<End of Change 23>

<unchanged sections omitted>

<Start of Change 24>

#### A.6.5.1.6 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode

<unchanged text omitted>

**Table A.6.5.1.6.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** |
| 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 | 0 | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |
| EPRE ratio of PSS to SSS | | dB |
| EPRE ratio of PDSCH DMRS to SSS | | dB |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |
| EPRE ratio of OCNG DMRS to SSS | | dB |
| EPRE ratio of OCNG to OCNG DMRS | | dB |
| SNR on RLM-RS | Config 1 | dB | 1 | -7 | -15 | -4.5 | 1 |
| Config 2 | 1 | -7 | -15 | -4.5 | 1 |
| Config 3 | 1 | -7 | -15 | -4.5 | 1 |
| SNR on other channels and signals | Config 1 | dB | 1 | | | | |
| Config 2 | 1 | | | | |
| Config 3 | 1 | | | | |
|  | Config 1 | dBm/15kHz | -98 | | | | |
| Config 2 | -98 | | | | |
| Config 3 | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  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.6.5.1.6.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1. | | | | | | | |

<End of Change 24>

<unchanged sections omitted>

<Start of Change 25>

#### A.6.5.1.8 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode

<unchanged text omitted>

**Table A.6.5.1.8.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** |
| 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 | 0 | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |
| EPRE ratio of PSS to SSS | | dB |
| EPRE ratio of PDSCH DMRS to SSS | | dB |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |
| EPRE ratio of OCNG DMRS to SSS | | dB |
| EPRE ratio of OCNG to OCNG DMRS | | dB |
| SNR on RLM-RS | Config 1 | dB | 1 | -7 | -15 | -4.5 | 1 |
| Config 2 | 1 | -7 | -15 | -4.5 | 1 |
| Config 3 | 1 | -7 | -15 | -4.5 | 1 |
| SNR on other channels and signals | Config 1 | dB | 1 | | | | |
| Config 2 | 1 | | | | |
| Config 3 | 1 | | | | |
|  | Config 1 | dBm/15kHz | -98 | | | | |
| Config 2 | -98 | | | | |
| Config 3 | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  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.6.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1[A.3.6]. | | | | | | | |

<End of Change 25>

<Start of change 26>

A.6.5.2.1 Interruptions during measurements on deactivated NR SCC in FR1

<<omitting other text not chnaged>>

Table A.6.5.2.1.1-3: NR cell specific test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell1** | **Cell2** |
| Frequency Range | |  | FR1 | FR1 |
| Duplex mode | Config 1 |  | FDD | FDD |
| Config 2,5 | TDD | TDD |
| Confiq 3 | TDD | FDD |
| Confiq 4 | FDD | TDD |
| TDD configuration | Config 1 |  | Not Applicable | Not Applicable |
| Config 2 | TDDConf.1.1 | TDDConf.1.1 |
| Config 3 | TDDConf.1.1 | Not Applicable |
| Confiq 4 | Not Applicable | TDDConf.1.1 |
| Confiq 5 | TDDConf.2.1 | TDDConf.2.1 |
| BWchannel | Config 1,2,3,4 |  | 10 MHz: NRB,c = 52 | 10 MHz: NRB,c = 52 |
| Config 5 | 40 MHz: NRB,c = 106 | 40 MHz: NRB,c = 106 |
| Initial DL BWP Configuration | Config 1,2,3,4 |  | DLBWP.0.1 | DLBWP.0.1 |
| Config 5 |  | DLBWP.0.1 | DLBWP.0.1 |
| Dedicated DL BWP Configuration | Config 1,2,3,4 |  | DLBWP.1.1 | DLBWP.1.1 |
| Config 5 |  | DLBWP.1.1 | DLBWP.1.1 |
| Initial UL BWP Configuration | Config 1,2,3,4 |  | ULBWP.0.1 |  |
| Config 5 |  | ULBWP.0.1 |  |
| Dedicated UL BWP Configuration | Config 1,2,3,4 |  | ULBWP.1.1 |  |
| Config 5 |  | ULBWP.1.1 |  |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | SR.1.1 FDD |
| Config 2 | SR.1.1 TDD | SR.1.1 TDD |
| Config 3 | SR.1.1 TDD | SR.1.1 FDD |
| Confiq 4 | SR.1.1 FDD | SR.1.1 TDD |
| Confiq 5 | SR.2.1 TDD | SR.2.1 TDD |
| CSI-RS for tracking | Config 1 |  | TRS.1.1 FDD | TRS.1.1 FDD |
|  | Config 2 |  | TRS.1.1 TDD | TRS.1.1 TDD |
|  | Config 3 |  | TRS.1.1 TDD | TRS.1.1 FDD |
|  | Confiq 4 |  | TRS.1.1 FDD | TRS.1.1 TDD |
|  | Confiq 5 |  | TRS.1.2 TDD | TRS.1.2 TDD |
| RMSI CORESET parameters | Config 1 |  | CR.1.1 FDD | CR.1.1 FDD |
| Config 2 | CR.1.1 TDD | CR.1.1 TDD |
| Config 3 | CR.1.1 TDD | CR.1.1 FDD |
| Confiq 4 | CR.1.1 FDD | CR.1.1 TDD |
| Confiq 5 | CR.2.1 TDD | CR.2.1 TDD |
| Dedicated CORESET parameters | Config 1 |  | CCR.1.1 FDD | CCR.1.1 FDD |
| Config 2 | CCR.1.1 TDD | CCR.1.1 TDD |
| Config 3 | CCR.1.1 TDD | CCR.1.1 FDD |
| Config 4 | CCR.1.1 FDD | CCR.1.1 TDD |
| Config 5 | CCR.2.1 TDD | CCR.2.1 TDD |
| OCNG Patterns | |  | OP.1 | OP.1 |
| SMTC Configuration | |  | SMTC.1 | SMTC.1 |
| SSB Configuration | Config 1,2,3,4 |  | SSB.1 FR1 | SSB.1 FR1 |
| Config 5 | SSB.2 FR1 | SSB.2 FR1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| NocNote 2 | | dBm/15 kHz | -104 | -104 |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 | -87 |
| Ês/Iot | | dB | 17 | 17 |
| Ês/Noc | | dB | 17 | 17 |
| NocNote 2 | Config 1,2,3,4 | dBm/SCS | -104 | -104 |
| Config 5 | -101 | -101 |
| IoNote3 | Config 1,2,3,4 | dBm/  9.36MHz | -58.96 | -58.96 |
| Config 5 | dBm/  38.16MHz | -52.86 | -52.86 |
| Time offset to Cell1 Note 5 | | μs | - | 3 |
| Propagation Condition | |  | AWGN | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.  Note 4: Void  Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.  Note 6: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in clause 12 of TS 38.213 [3]. | | | | |

<End of Change 26>

<unchanged sections omitted>

<Start of Change 27>

A.6.5.3.1 SCell Activation and deactivation of known SCell in FR1 in non-DRX for 160ms SCell measurement cycle

A.6.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations are shown in table A.6.5.3.1.1-1 below. The test parameters are given in Tables A.6.5.3.1.1-2 and cell-specific parameters in A.6.5.3.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI in PCell for the activated SCell at latest in slot , as defined in clause 8.3. The UE shall start reporting CSI in PCell in slot and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the slot to , as defined in clause 8.3, where is the interruption length given in clause 8.2.

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot , as defined in clause 8.3, and The starting point of any PCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

**Table A.6.5.3.1.1-1: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations**

|  |  |
| --- | --- |
| **Config** | **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 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.6.5.3.1.1-2: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF Channel Number |  | 1,2 | Two NR radio channel (1, 2) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index |  | 0 | CQI reporting for SCell every four slot |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 7 | During this time the PSCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] depends on UE’s capability |
| TCSI\_Reporting | ms |  | the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2]  is the subcarrier spacing configuration for DL |

**Table A.6.5.3.1.1-3: Cell specific test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **T1** | | | **T2** | | **T3** | | |
|  | | | |  | **Cell 1** | **Cell 2** | | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** | |
| Duplex mode | Config 1 | | |  | FDD | | | | | | | |
|  | Config 2,3 | | |  | TDD | | | | | | | |
| TDD configuration | Config 1 | | |  | Not applicable | | | | | | | |
|  | Config 2 | | |  | TDDConf.1.1 | | | | | | | |
|  | Config 3 | | |  | TDDConf.2.1 | | | | | | | |
| BWchannel | Config 1,2 | | | MHz | 10: NRB,c = 52 | | | | | | | |
|  | Config 3 | | |  | 40: NRB,c = 106 | | | | | | | |
| Initial BWP configuration | | | |  | DLBWP.0.2 | | | | | | | |
| TCI state | | | |  | TCI.State.0 | | | | | | | |
| TRS Configuration | | | |  | TRS.1.1 TDD | | | | | | | |
| PDSCH Reference measurement channel | Config 1 | | |  | SR.1.1 FDD | | - | SR.1.1 FDD | - | SR.1.1 FDD | | - |
|  | Config 2 | | |  | SR.1.1 TDD | |  | SR.1.1 TDD |  | SR.1.1 TDD | |  |
|  | Config 3 | | |  | SR2.1 TDD | |  | SR2.1 TDD |  | SR2.1 TDD | |  |
| Dedicated CORESET parameters | Config 1 | | |  | CCR.1.1 FDD | | - | CCR.1.1 FDD | - | CCR.1.1 FDD | | - |
|  | Config 2 | | |  | CCR.1.1 TDD | |  | CCR.1.1 TDD |  | CCR.1.1 TDD | |  |
|  | Config 3 | | |  | CCR2.1 TDD | |  | CCR2.1 TDD |  | CCR2.1 TDD | |  |
| RMSI CORESET parameters | Config 1 | | |  | CR.1.1 FDD | | - | CR.1.1 FDD | - | CR.1.1 FDD | | - |
|  | Config 2 | | |  | CR.1.1 TDD | |  | CR.1.1 TDD |  | CR.1.1 TDD | |  |
|  | Config 3 | | |  | CR2.3 TDD | |  | CR2.3 TDD |  | CR2.3 TDD | |  |
| OCNG Patterns | | | |  | OP.1 | | | | | | | |
| SSB Configuration | | | Config 1,2 |  | SSB.1 FR1 | | | | | | | |
|  | | | Config 3 | SSB.2 FR1 | | | | | | | |
| CSI-RS configuration for CSI reporting | | | Config 1 |  | CSI-RS.1.1 FDD | | | | | | | |
| Config 2 |  | CSI-RS.1.1 TDD | | | | | | | |
| Config 3 |  | CSI-RS.2.1 TDD | | | | | | | |
| SMTC configuration | | | |  | SMTC.1 | | | | | | | |
| CSI reporting periodicity | | | | ms | 5 | | | | | | | |
| EPRE ratio of PSS to SSS | | | | dB | 0 | | | | | | | |
| EPRE ratio of PBCH DMRS to SSS | | | |  |  | | | | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | |  |  | | | | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | |  |  | | | | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | |  |  | | | | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | | |  |  | | | | | | | |
| EPRE ratio of PDSCH to PDSCH | | | |  |  | | | | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | |  |  | | | | | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | |  |  | | | | | | | |
| Note2 | | Config 1,2 | | dBm/15kHz | -104 | | | | | | | |
|  | | Config 3 | |  | -101 | | | | | | | |
|  | | | | dB | 17 | | | | | | | |
|  | | | | dB | 17 | | | | | | | |
| SS-RSRPNote3 | | Config 1,2 | | dBm/SCS | -87 | | | | | | | |
|  | | Config 3 | |  | -84 | | | | | | | |
| SCH\_RP Note 3 | | | | dBm/15 kHz | -87 | | | | | | | |
| Io Note3 | | | Config 1,2 | dBm/  9.36MHz | -58.96 | | | | | | | |
| Config 3 | dBm/  38.16MHz | -52.87 | | | | | | | |
| Propagation condition | | | | - | AWGN | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP, Io and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. | | | | | | | | | | | | |

<End of Change 27>

<unchanged sections omitted>

<Start of Change 28>

A.6.5.3.5 Direct SCell activation at handover with known SCell in FR1

A.6.5.3.5.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD and TDD-TDD intra frequency handover with direct SCell activation requirements specified in subclause 8.3.5.

Supported test configurations are shown in table A.6.5.3.5.1-1. Both handover with direct SCell activation requirements are tested by using the parameters in table A.6.5.3.5.1-2, and A.6.5.3.5.1-3.

The test scenario comprises of three NR FDD or NR TDD FR1 carriers and the 3 cells as given in tables A.6.5.3.5.1-1 and A.6.5.3.5.1-2. The test consists of three successive time periods, with time durations of T1, T2, and T3 respectively.

At the start of time duration T1, the UE is in connected mode with PCell and SCell1 (cell 2) is in activated state and UE is reporting CQI for both PCell and SCell1.

Time period T2 starts when UE receives a handover command to Cell 3 that also activates SCell1 (Cell2). This is done using an *RRCReconfiguration* message with parameter *sCellState* set to *activated* for the SCell1 (Cell 2). The message is sent from the test equipment to the UE and is received in a subframe # denoted n at the UE antenna connector. The UE shall accomplish the activation of the SCell no later than subframe (n +Ndirect).

Time period T3 starts at (n +Ndirect), at which point UE shall be reporting a valid CQI for both PCell and SCell1.

**Table A.6.5.3.5.1-1: Intra-frequency handover with direct SCell activation from FR1 to FR1 test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  SCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  SCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | PCell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  SCell: 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.6.5.3.5.1-2: General test parameters Intra-frequency handover with direct SCell activation from FR1 to FR1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | PCell |  | Cell 1 |  |
| SCell |  | Cell 2 |  |
| Target cell |  | Cell 3 |  |
| Final condition | PCell |  | Cell 3 |  |
| SCell |  | Cell 2 |  |
| neighbour cell |  | Cell 1 |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | |  | FR1 PRACH configuration 1 | As specified in table Table 6.3.3.2-3 in TS 38.211 [6] |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | [TBD] | UE is in connected mode with PCell and SCell1 (cell 2) is in activated state. UE receives a handover command |
| T2 | | s | [n +Ndirect] | UE shall accomplish the activation of the SCell |
| T3 | | s | [1] |  |
| THARQ | | slot | k | k is a number of slots indicated by the PDSCH-to-HARQ\_feedback timing indicator field in a corresponding DCI format or provided by *dl-DataToUL-ACK* if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3] |
| TCSI\_Reporting | | ms | 2 | the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |
| k | | ms |  | As specified in clause 4.3 of TS 38.213 [3] |

<End of Change 28>

<unchanged sections omitted>

<Start of Change 29>

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

<unchanged sections omitted>

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | | | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** | **T1** | **T2** | **T3** | **T4** | **T5** |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | | | | | |
| AoA1 | | | | | AoA2 | | | | |
| Assumption for UE beams Note 5 | |  | Rough | | | | | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | | Not sent | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |
| EPRE ratio of PBCH to PBCH DMRS | | dB |
| EPRE ratio of PSS to SSS | | dB |
| EPRE ratio of PDSCH DMRS to SSS | | dB |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |
| EPRE ratio of OCNG DMRS to SSS | | dB |
| EPRE ratio of OCNG to OCNG DMRS | | dB |
| ssb-Index 0 SNR | Config 1 | dB | 2Note 6 | -6Note 6 | -15 | -4.5 | 2Note 6 |
| ssb-Index 1 SNR | Config 1 |  | Not sent | | | | | 2Note 6 | -15 | -15 | -15 | -15 |
| SNR on other channels and signals | Config 1 | dB | 2Note 6 | | | | | N/A | | | | |
|  | Config 1 | dBm/ 15kHz | -92.1 | | | | | -92.1 | | | | |
| Time multiplexing of the downlink transmissions from each AoA | |  | Defined in Figure A.7.5.1.2.1-2 | | | | | | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | | | | | |

<End of Change 29>

<unchanged sections omitted>

<Start of Change 30>

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

<unchanged text omitted>

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 5 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |
| EPRE ratio of PSS to SSS | | dB |
| EPRE ratio of PDSCH DMRS to SSS | | dB |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |
| EPRE ratio of OCNG DMRS to SSS | | dB |
| EPRE ratio of OCNG to OCNG DMRS | | dB |
| ssb-Index 0 SNR | Config 1 | dB | 2Note 6 | -6Note 6 | -15 | -4.5 | 2Note 6 |
| ssb-Index 1 SNR | Config 1 | 2Note 6 | -15 | -15 | -15 | -15 |
| SNR on other channels and signals | Config 1 | dB | 2Note 6 | | | | |
|  | Config 1 | dBm/15KHz | -104.7dBm | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.3  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

<End of Change 30>

<unchanged sections omitted>

<Start of Change 31>

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

<unchanged text omitted>

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | | | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** | **T1** | **T2** | **T3** | **T4** | **T5** |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | | | | | |
| AoA1 | | | | | AoA2 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | | Not sent | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |
| EPRE ratio of PSS to SSS | | dB |
| EPRE ratio of PDSCH DMRS to SSS | | dB |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |
| EPRE ratio of OCNG DMRS to SSS | | dB |
| EPRE ratio of OCNG to OCNG DMRS | | dB |
| SNR on RLM-RS1 | Config 1 | dB | 2Note 11 | -6Note 11 | -15 | -4.5 | 2Note 11 |
| SNR on RLM-RS2 | Config 1 |  | Not sent | | | | | 2Note 11 | -14 | -15 | -15 | -14 |
| SNR on other channels and signals | Config 1 | dB | 2Note 11 | | | | | N/A | | | | |
|  | Config 1 | dBm/ 15KHz | -92.1 | | | | | -92.1 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.5.1.6.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | | | | | |

<End of Change 31>

<unchanged sections omitted>

<Start of Change 32>

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

<unchanged text omitted>

**Table A.7.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** |
| AoA setup | | dB | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |
| EPRE ratio of PSS to SSS | | dB |
| EPRE ratio of PDSCH DMRS to SSS | | dB |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |
| EPRE ratio of OCNG DMRS to SSS | | dB |
| EPRE ratio of OCNG to OCNG DMRS | | dB |
| SNR on RLM-RS1 | Config 1 | dB | 2Note 11 | -6Note 11 | -15 | -4.5 | 2Note 11 |
| SNR on RLM-RS1 | Config 1 | dB | 2Note 11 | -14 | -15 | -15 | -14 |
| SNR on RLM-RS1 | Config 1 | dB | 2Note 11 | | | | |
|  | Config 1 | dBm/15KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 10: Information about types of UE beams 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. | | | | | | | |

<End of Change 32>

<unchanged sections omitted>

<Start of Change 33>

A.7.5.3.1 SCell Activation and deactivation for SCell in FR2 intra-band in non-DRX

A.7.5.3.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.1.1 except the PCell and SCell are in FR2 intra-band.

The supported test configurations are shown in table A.7.5.3.1.1-1 below. The general test parameters are the same as defined in Table A.6.5.3.1.1-2 except those described in Tables A.7.5.3.1.1-2, and cell specific test parameters are described in Tables A.7.5.3.1.1-3. OTA related test parameters are shown in table A.7.5.3.1.1-4 below.

**Table A.7.5.3.1.1-1: Supported test configurations for FR2 SCell activation case**

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

**Table A.7.5.3.1.1-2: General test parameters for FR2 SCell activation case**

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

**Table A.7.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ParameterNote 5** | **Unit** | **T1** | | **T2** | | **T3** | |
|  |  | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| SSB ARFCN |  | freq1 | freq2 | freq1 | freq2 | freq1 | freq2 |
| Duplex mode |  | TDD | | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | |
| Downlink initial BWP Configuration |  | DLBWP.0.1 | | DLBWP.0.1 | | DLBWP.0.1 | |
| Downlink dedicated BWP Configuration |  | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | ULBWP.0.1 | | ULBWP.0.1 | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | |
| TRS configuration |  | TRS.2.1 TDD | | TRS.2.1 TDD | | TRS.2.1 TDD | |
| TCI state |  | TCI.State.0 | | TCI.State.0 | | TCI.State.0 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Parameters |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | | | | | |
| SSB Configuration |  | SSB.1 FR2 | | | | | |
| SMTC Configuration |  | SMTC.1 | | | | | |
| EPRE ratio of PSS to SSS | dB | 0 | | | | | |
| EPRE ratio of PBCH\_DMRS to SSS |  |  | | | | | |
| EPRE ratio of PBCH to PBCH\_DMRS |  |  | | | | | |
| EPRE ratio of PDCCH\_DMRS to SSS |  |  | | | | | |
| EPRE ratio of PDCCH to PDCCH\_DMRS |  |  | | | | | |
| EPRE ratio of PDSCH\_DMRS to SSS |  |  | | | | | |
| EPRE ratio of PDSCH to PDSCH\_DMRS |  |  | | | | | |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  | | | | | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  | | | | | |
| Propagation conditions |  | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: All parameters apply for configuration 1 and 2 | | | | | | | |

**Table A.7.5.3.1.1-4: OTA related test parameters for FR2 SCell activation case**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ParameterNote 6** | **Unit** | **Cell 1** | | | **Cell 2** | | |
|  |  | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Angle of arrival configuration |  | Setup 1 according to table A.3.15.1 | | | Setup 1 according to table A.3.15.1 | | |
| Assumption for UE beams Note 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -104.7 | | | -104.7 | | |
| Note1 | dBm/SCSNote3 | -95.7 | | | -95.7 | | |
|  | dB | 7 | | | 7 | | |
| SS-RSRPNote2 | dBm/SCS Note4 | -88.7 | | | -88.7 | | |
|  | dB | 7 | | | 7 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -58.92 | | | -58.92 | | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | |

<End of Change 33>

<unchanged sections omitted>

<Start of Change 34>

A.7.5.3.2 SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2

A.7.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.1.1 except the PCell is in FR1 and SCell is in FR2.

The supported test configurations are the same as defined in Table A.7.5.3.2.1-1. The general test parameters are the same as defined in Table A.6.5.3.1.1-2 except that the length of T2 is 2s. And cell specific test parameters are described in Tables A.7.5.3.2.1-2. OTA related test parameters are the same as defined in Table A.7.5.3.2.1-3.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 is increased to same level as for cell 1.

During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot m+TL1-RSRP. In the next DL slot after slot m+TL1-RSRP, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

**Table A.7.5.3.2.1-1: Supported test configurations for FR2 SCell activation case**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode  Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode  Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 3 | PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations | |

**Table A.7.5.3.2.1-2: Cell specific test parameters for FR2 SCell activation case**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ParameterNote 5** | | **Unit** | **T1** | | | | **T2** | | | | **T3** | | |
|  | |  | **Cell 1** | | **Cell 2** | | **Cell 1** | | **Cell 2** | | **Cell 1** | | **Cell 2** |
| SSB ARFCN | |  | Freq1 | | Freq2 | | Freq1 | | Freq2 | | Freq1 | | Freq2 |
| Duplex mode | Config 1 |  | FDD | | TDD | | FDD | | TDD | | FDD | | TDD |
|  | Config 2,3 |  | TDD | | | | | | | | | | |
| TDD configuration | Config 1 |  | Not Applicable | | TDDConf.3.1 | | Not Applicable | | TDDConf.3.1 | | Not Applicable | | TDDConf.3.1 |
|  | Config 2,3 |  | TDDConf.1.1 | |  | | TDDConf.1.1 | |  | | TDDConf.1.1 | |  |
| Downlink initial BWP Configuration | Config 1,2,3 |  | DLBWP.0.1 | | | | | | | | | | |
| Downlink dedicated BWP Configuration | Config 1,2,3 |  | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 |
| Uplink initial BWP configuration | Config 1,2,3 |  | ULBWP.0.1 | | ULBWP.0.1 | | ULBWP.0.1 | | ULBWP.0.1 | | ULBWP.0.1 | | ULBWP.0.1 |
| Uplink dedicated BWP configuration | Config 1,2,3 |  | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 |
| TRS configuration | Config 1,2,3 |  | N/A | | TRS.2.1 TDD | | N/A | | TRS.2.1 TDD | | N/A | | TRS.2.1 TDD |
| TCI state | Config 1,2,3 |  | TCI.State.0 | | TCI.State.0 | | TCI.State.0 | | TCI.State.0 | | TCI.State.0 | | TCI.State.0 |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | 100: NRB,c = 66 | | 10: NRB,c = 52 | | 100: NRB,c = 66 | | 10: NRB,c = 52 | | 100: NRB,c = 66 |
|  | Config 3 |  | 40: NRB,c = 106 | |  | | 40: NRB,c = 106 | |  | | 40: NRB,c = 106 | |  |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | - | | SR.1.1 FDD | | - | | SR.1.1 FDD | | - |
|  | Config 2 |  | SR.1.1 TDD | |  | | SR.1.1 TDD | |  | | SR.1.1 TDD | |  |
|  | Config 3 |  | SR.2.1 TDD | |  | | SR.2.1 TDD | |  | | SR.2.1 TDD | |  |
| RMSI CORESET Parameters | Config 1 |  | CR.1.1 FDD | | - | | CR.1.1 FDD | | - | | CR.1.1 FDD | | - |
|  | Config 2 |  | CR.1.1 TDD | |  | | CR.1.1 TDD | |  | | CR.1.1 TDD | |  |
|  | Config 3 |  | CR.2.1 TDD | |  | | CR.2.1 TDD | |  | | CR.2.1 TDD | |  |
| Dedicated CORESET Parameters | Config 1 |  | CCR.1.1 FDD | | - | | CCR.1.1 FDD | | - | | CCR.1.1 FDD | | - |
|  | Config 2 |  | CCR.1.1 TDD | |  | | CCR.1.1 TDD | |  | | CCR.1.1 TDD | |  |
|  | Config 3 |  | CCR.2.1 TDD | |  | | CCR.2.1 TDD | |  | | CCR.2.1 TDD | |  |
| OCNG Patterns | |  | OP.1 | | | | | | | | | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 | | SSB.3 FR2 | | SSB.1 FR1 | | SSB.3 FR2 | | SSB.1 FR1 | | SSB.3 FR2 |
|  | Config 3 |  | SSB.2 FR1 | |  | | SSB.2 FR1 | |  | | SSB.2 FR1 | |  |
| CSI-RS configuration | Config 1~3 |  | NA | | NA | | NA | | CSI-RS.3.1 TDD Note 6 | | NA | | CSI-RS.3.1 TDD |
| CSI reporting periodicity Note 7 | Config 1~3 | ms | NA | | 5 | | NA | | 5 | | NA | | 5 |
| 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 | |  | NA  Link only, see clause A.3.7A | AWGN | | NA  Link only, see clause A.3.7A | | AWGN | | NA  Link only, see clause A.3.7A | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: All parameters apply for configuration 1, 2 and 3  Note 6: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 7: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | | | | | |

**Table A.7.5.3.2.1-3: OTA related test parameters for FR1 PCell activation case with FR2 SCell**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 2** | | | **Cell 1** | | |
|  | |  | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Angle of arrival configuration | |  | Setup 1 according to clause A.3.15.1 | | | NA  Link only, see clause A.3.7A | | |
| Assumption for UE beams Note 7 | |  | Rough | | |  | | |
| Note1 | | dBm/15kHz | -104.7 | | |  | | |
| Note1 | Config 1,2 | dBm/SCS | -95.7 | | |  | | |
|  | Config 3, |  |  | | |
| SS-RSRPNote2 | Config 1,2 | dBm/SCS Note3 | -88.7 | | |  | | |
|  | Config 3 |  |  | | |
|  | Config 1,2,3 | dB | 7 | | |  | | |
|  | | dB | 7 | | |  | | |
| IoNote2 | Config 1,2 | dBm/ChBWNote4,Note6 | -58.92 | | |  | | |
|  | Config 3 |  |  | | |  | | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: ChBW is 94.04 MHz for Cell2, 9.36 MHz for Cell 1 in configurations 1,2, 38.1 MHz in configurations 3  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. | | | | | | | | |

<End of Change 34>

<unchanged sections omitted>

<Start of Change 35>

A.7.5.3.3 SCell Activation and deactivation for SCell in FR2 inter-band in non-DRX

A.7.5.3.3.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.1.1 except the PCell and SCell are in FR2 inter-band.

The supported test configurations are shown in table A.7.5.3.3.1-1 below. The general test parameters are described in Tables A.7.5.3.3.1-2, and cell specific test parameters are described in Tables A.7.5.3.3.1-3. OTA related test parameters are shown in table A.7.5.3.3.1-4 below.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell. A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m.

The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 is increased to same level as for cell 2. During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot m+TL1-RSRP. In the next DL slot after slot m+TL1-RSRP, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PSCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

**Table A.7.5.3.3.1-1: Supported test configurations for FR2 SCell activation in FR2 inter-band**

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

**Table A.7.5.3.3.1-2: General test parameters for FR2 SCell activation in FR2 inter-band**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF Channel Number |  | 1,2 | Two NR radio channels are used for this test. RF channel number 1 is in band 1 and RF channel number 2 is in band 2, where bands 1 and 2 are inter-band CA operating bands in FR2 as specified in Table 5.2A.2-1 in TS38.101-2. |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index |  | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | ≤8 | A random value from 0μs to 8μs |
| T1 | s | 7 | During this time the PCell shall be known and the SCell configured and detected. |
| T2 | s | 2 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] depends on UE’s capability |
| TCSI\_Reporting | ms | 2 | the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |

**Table A.7.5.3.3.1-3: Cell specific test parameters for FR2 SCell activation in FR2 inter-band**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ParameterNote 5** | **Unit** | **T1** | | **T2** | | **T3** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| SSB ARFCN |  | freq1 | freq2 | freq1 | freq2 | freq1 | freq2 |
| Duplex mode |  | TDD | | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | |
| Downlink initial BWP Configuration |  | DLBWP.0.1 | | DLBWP.0.1 | | DLBWP.0.1 | |
| Downlink dedicated BWP Configuration |  | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | ULBWP.0.1 | | ULBWP.0.1 | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | |
| TRS configuration |  | TRS.2.1 TDD | | TRS.2.1 TDD | | TRS.2.1 TDD | |
| TCI state |  | TCI.State.0 | | TCI.State.0 | | TCI.State.0 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Parameters |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| CSI-RS configuration |  | NA | NA | NA | CSI-RS.3.1 TDD Note 2 | NA | CSI-RS.3.1 TDD |
| CSI reporting periodicity Note 3 |  | NA | 5 | NA | 5 | NA | 5 |
| OCNG Patterns |  | OP.1 | | | | | |
| SSB Configuration |  | SSB.1 FR2 | | | | | |
| SMTC Configuration |  | SMTC.1 | | | | | |
| EPRE ratio of PSS to SSS | dB | 0 | | | | | |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 3: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | |

**Table A.7.5.3.3.1-4: OTA related test parameters for FR2 SCell activation in FR2 inter-band**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ParameterNote 6** | **Unit** | **Cell 1** | | | **Cell 2** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| AoA setup |  | Setup 3 as specified in clause A.3.15 | | | | | |
| **AoA1** | | | **AoA2** | | |
| Assumption for UE beams Note 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -92.1 | | | -92.1 | | |
| Note1 | dBm/SCSNote3 | -83.1 | | | -83.1 | | |
|  | dB | 0 | | | 0 | | |
| SS-RSRPNote2 | dBm/SCS Note4 | -83.1 | | | -83.1 | | |
|  | dB | 0 | | | 0 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -51.1 | | | -51.1 | | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: All parameters apply for configuration 1  Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | |

<End of Change 35>

<unchanged sections omitted>

<Start of Change 36>

A.7.5.3.4 Direct SCell activation at SCell addition of known SCell in FR2

A.7.5.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the delay and interruption for direct SCell activation delay at SCell addition are within the requirements stated in clause 8.3.4.

The supported test configurations are shown in Table A.7.5.3.4.1-1 below. The general test parameters are given in Table A.7.5.3.4.1-2 and cell-specific test parameters in Table A.7.5.3.4.1-3. OTA related test parameters are shown in Table A.7.5.3.4.1-4.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two FR2 carriers and two NR cells. Before the test starts the UE is connected to Cell 1 (PCell) on carrier #1, but is not aware of Cell 2 on NR carrier #2. Cell 1 and Cell 2 have constant signal levels throughout the test. The UE is monitoring the PCell. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the Cell 2 is monitored by the UE. During T1, Cell 2 should be detected and measured by the UE such that it meets the condition for known cell defined in clause 8.3.4 for direct SCell activation.

Time period T2 starts when the *RRCReconfiguration* message for the configuration and activation of Cell 2 (the SCell), which is sent from the test equipment, is received at the UE antenna connector in a slot # denoted m. The test equipment shall set the parameter *sCellState* to *activated* for the SCell, which causes Cell 2 to become configured and activated.

Time period T3 starts at (m + Ndirect), at which point UE shall be reporting a valid CQI for both PCell and SCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during the activation of SCell. The test equipment verifies the activation time by counting the slots from the time when the SCell activation message is sent until a CQI report with other than CQI index 0 is received.

**Table A.7.5.3.4.1-1: Supported test configurations**

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

**Table A.7.5.3.4.1-2: General test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF Channel Number |  | 1,2 | Two NR radio channels (1,2) in FR2 are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured and activated SCell |  | Cell 2 | Configured and activated SCell on NR RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| T1 | s | 7 | During this time the measurement for Cell 2 is configured, and Cell 2 is detected. |
| T2 | s | Ndirect | During this time the UE shall configure and activate Cell 2 as SCell. |
| T3 | ms | 100 | During this time the UE shall report valid CQI for both PCell and SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots indicated by the PDSCH-to-HARQ\_feedback timing indicator field in a corresponding DCI format or provided by *dl-DataToUL-ACK* if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3] |
| k | slot |  | As specified in clause 4.3 of TS 38.213 [3] |

**Table A.7.5.3.4.1-3: Cell specific test parameters**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | | | **Cell 2** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| SSB ARFCN | |  | freq1 | | | freq2 | | |
| Duplex mode | Config 1 |  | TDD | | | | | |
| TDD configuration | Config 1 |  | TDDConf.3.1 | | | | | |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 | | | | | |
| DL initial BWP configuration | Config 1 |  | DLBWP.0.1 | | | | | |
| DL dedicated BWP configuration | Config 1 |  | DLBWP.1.1 | | | | | |
| UL initial BWP configuration | Config 1 |  | ULBWP.0.1 | | | | | |
| UL dedicated BWP configuration | Config 1 |  | ULBWP.1.1 | | | | | |
| Timing offset to Cell 1 | | ms | Not Applicable | | | 0 | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.3.1 TDD | | | SR.3.1 TDD | | |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD | | | CR.3.1 TDD | | |
| RMC CORESET Reference Channel | Config 1 |  | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| TRS configuration | Config 1 |  | TRS.2.1 TDD | | | TRS.2.1 TDD | | |
| CSI-RS configuration | Config 1 |  | CSI-RS.3.1 TDD | | | CSI-RS.3.1 TDD | | |
| CSI reporting periodicity | Config 1 | ms | 5 | | | 5 | | |
| OCNG Patterns | |  | OP.1 | | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | |
| SSB configuration | Config 1 |  | SSB.1 FR2 | | | SSB.1 FR2 | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | | | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Propagation condition | | - | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | | | | |

**Table A.7.5.3.4.1-4: OTA related test parameters**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ParameterNote 6** | **Unit** | **Cell 1** | | | **Cell 2** | | |
|  |  | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Angle of arrival configuration |  | Setup 1 according to A.3.15.1 | | | | | |
| Assumption for UE beamsNote 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -112 | | | -112 | | |
| Note1 | dBm/SCSNote3 | -102.97 | | | -102.97 | | |
|  | dB | 14 | | | 14 | | |
| SS-RSRPNote2 | dBm/SCS Note4 | -88.97 | | | -88.97 | | |
|  | dB | 14 | | | 14 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -59.81 | | | -59.81 | | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: All parameters apply for configuration 1  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

<End of Change 36>

<unchanged sections omitted>

<Start of Change 37>

A.7.5.3.5 Direct SCell activation at handover with known SCell in FR2

A.7.5.3.5.1 Test Purpose and Environment

This test is to verify the requirements specified in sub clause 8.3.5 for the FR2 handover with direct SCell activation.

The test scenario comprises of three FR2 cells, one source PCell (Cell 1), one target PCell (Cell 2) and one SCell (Cell 3). The test consists of three successive time periods, with time durations of T1, T2, and T3 respectively.

At the start of time duration T1, the UE is in connected mode with PCell (Cell 1). Both Cell 2 and Cell 3 are known to UE and UE is reporting CQI for all Cell 1.

Time period T2 starts when UE receives a handover command that initiate handover of UE to Cell2 and also activates Cell 3. This is done using an *RRCConnectionReconfiguration* message with parameter *sCellState* set to *activated* for the Cell 3. The message is sent from the test equipment to the UE and is received in a slot number n at the UE antenna connector. The UE shall accomplish the handover, addition and activation of the SCell no later than slot (n +).

Time period T3 starts at (n +), at which point UE shall be reporting a valid CSI for both Cell 2 and Cell 3 as given in tables A.7.5.3.5.1-1 and A.7.5.3.5.1-2.

**Table A.7.5.3.5.1-1: Supported test configurations for FR2 handover with direct SCell activation case**

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

**Table A.7.5.3.5.1-2: General test parameters for FR2 handover with direct SCell activation case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| RF Channel Number | |  | 1, 2, 3 | Three NR radio channels are used for this test, Cell 1, Cell2 and Cell 3 use RF channel 1, 2 and 3 respectively. |
| A4-Offset | | dBm | -120 |  |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| Initial conditions | Source cell |  | Cell 1 | Source Cell |
| Target cell |  | Cell 2 | Neighbour cell |
| SCell |  | Cell 3 | SCell is not added and activated |
| Final condition | Source cell |  | Cell 2 | Cell 2 is Source cell after handover |
| Neighbour cell |  | Cell 1 | Neighbour cell |
| SCell |  | Cell 3 | SCell is added and activated |

**Table A.7.5.3.5.1-3: Cell specific test parameters for FR2 SCell activation case**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ParameterNote 5** | **Unit** | **T1** | | | **T2** | | | **T3** | | |
| **Cell 1** | **Cell 2** | **Cell 3** | **Cell 1** | **Cell 2** | **Cell 3** | **Cell 1** | **Cell 2** | **Cell 3** |
| SSB ARFCN |  | freq1 | freq2 | freq 3 | freq1 | freq2 | freq 3 | freq1 | freq2 | freq3 |
| Duplex mode |  | TDD | | | TDD | | | TDD | | |
| TDD configuration |  | TDDConf.3.1 | | | TDDConf.3.1 | | | TDDConf.3.1 | | |
| Downlink initial BWP Configuration |  | DLBWP.0.1 | | | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Downlink dedicated BWP Configuration |  | DLBWP.1.1 | | | DLBWP.1.1 | | | DLBWP.1.1 | | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | | ULBWP.0.1 | | | ULBWP.0.1 | | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | | ULBWP.1.1 | | | ULBWP.1.1 | | |
| TRS configuration |  | TRS.2.1 TDD | | | TRS.2.1 TDD | | | TRS.2.1 TDD | | |
| TCI state |  | TCI.State.0 | | | TCI.State.0 | | | TCI.State.0 | | |
| BWchannel | MHz | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | | - | SR.3.1 TDD | | - | SR.3.1 TDD | |  |
| RMSI CORESET Parameters |  | CR.3.1 TDD | | - | CR.3.1 TDD | | - | CR.3.1 TDD | |  |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | | - | CCR.3.1 TDD | | - | CCR.3.1 TDD | |  |
| OCNG Patterns |  | OP.1 | | | | | | | | |
| SSB Configuration |  | SSB.1 FR2 | | | | | | | | |
| SMTC Configuration |  | SMTC.1 | | | | | | | | |
| PRACH configuration |  | FR2 PRACH configuration 1 | | | | | | | | |
| EPRE ratio of PSS to SSS | dB | 0 | | | | | | | | |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | AWGN | | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Void | | | | | | | | | | |

**Table A.7.5.3.5.1-4: OTA related test parameters for FR2 SCell activation case**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ParameterNote 6** | **Unit** | **Cell 1** | | | **Cell 2** | | | **Cell 3** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Angle of arrival configuration |  | Setup 1 according to table A.3.15.1 | | | Setup 1 according to table A.3.15.1 | | | Setup 1 according to table A.3.15.1 | | |
| Assumption for UE beams Note 7 |  | Rough | | | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -112 | | | -112 | | | -112 | | |
| Note1 | dBm/SCSNote3 | -102.97 | | | -102.97 | | | -102.97 | | |
|  | dB | 14 | | | 14 | | | 14 | | |
| SS-RSRPNote2 | dBm/SCS Note4 | -88.97 | | | -88.97 | | | -88.97 | | |
|  | dB | 14 | | | 14 | | | 14 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -88.80 | | | -88.80 | | | -88.80 | | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | | | | |

<End of Change 37>

<unchanged sections omitted>

<Start of Change 38>

#### A.7.6.3.1 SSB based L1-RSRP measurement when DRX is not used

<<unchanged text omitted>>

A.7.6.3.1.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.1.2-1 and Table A.7.6.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

**Table A.7.6.3.1.2-1: General test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Value** |
| SSB GSCN | 1~2 |  | freq1 |
| Duplex mode | 1~2 |  | TDD |
| TDD Configuration | 1~2 |  | TDDConf.3.1 |
| BWchannel | 1~2 | MHz | 100: NRB,c = 66 |
| Data RBs allocated | 1~2 |  | 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.2 TDD |
|  | 2 |  | SR.3.3 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD |
|  | 2 |  | CR.3.2 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD |
|  | 2 |  | CCR.3.7 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
|  | 2 | SSB.2 FR2 |
| OCNG Patterns | 1~2 |  | OP.1 |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.3  ULBWP.1.3 |
| SMTC configuration | 1~2 |  | SMTC.1 |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 |
| DRX configuration | 1~2 |  | Off |
| reportConfigType | 1~2 |  | periodic |
| reportQuantity | 1~2 |  | ssb-Index-RSRP |
| Number of reported RS | 1~2 |  | 2 |
| L1-RSRP reporting period | 1~2 | slot | 640 |
| T1 | 1~2 | s | 5 |
| T2 | 1~2 | s | 2 |
| EPRE ratio of PSS to SSS | 1~2 | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation condition | 1~2 |  | AWGN |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |

<End of Change 38>

<unchanged sections omitted>

<Start of Change 39>

A.7.7.1.3 SA inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

A.7.7.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.7.7.1.3.1-1.

**Table A.7.7.1.3.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test**

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

A.7.7.1.3.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) in FR1 and Cell 2 in FR2 . The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2 below. Absolute accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2. The inter-frequency measurements are supported by a measurement gap.

**Table A.7.7.1.3.2-1: SS-RSRP inter-frequency test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** | | **Test 2** | |
|  |  |  | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| SSB ARFCN | 1~3 |  | freq1 | freq2 | freq1 | freq2 |
| BWchannel | 1 | MHz | 10:  NRB,c = 52 | 100:  NRB,c = 66 | 10:  NRB,c = 52 | 100:  NRB,c = 66 |
|  | 2 |  | 10:  NRB,c = 52 |  | 10:  NRB,c = 52 |  |
|  | 3 |  | 40:  NRB,c = 106 |  | 40:  NRB,c = 106 |  |
| Data RBs allocated | 1,2 |  | 52 | TBD | 52 | TBD |
|  | 3 |  | 106 |  | 106 |  |
| Duplex mode | 1 |  | FDD | TDD | FDD | TDD |
|  | 2 |  | TDD |  | TDD |  |
|  | 3 |  | TDD |  | TDD |  |
| TDD configuration | 1 |  | N/A | TDDConf.3.1 | N/A | TDDConf.3.1 |
|  | 2 |  | TDDConf.1.1 |  | TDDConf.1.1 |  |
|  | 3 |  | TDDConf.2.1 |  | TDDConf.2.1 |  |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | - | SR.1.1 FDD | - |
|  | 2 |  | SR.1.1 TDD |  | SR.1.1 TDD |  |
|  | 3 |  | SR.2.1 FDD |  | SR.2.1 FDD |  |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | - | CR.1.1 FDD | - |
|  | 2 |  | CR.1.1 TDD | - | CR.1.1 TDD | - |
|  | 3 |  | CR.2.1 FDD | - | CR.2.1 FDD | - |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | - | CCR.1.1 FDD | - |
|  | 2 |  | CCR.1.1 TDD | - | CCR.1.1 TDD | - |
|  | 3 |  | CCR.2.1 TDD | - | CCR.2.1 TDD | - |
| SSB configuration | 1 |  | SSB.1 FR1 | SSB.1 FR2 | SSB.1 FR1 | SSB.1 FR2 |
|  | 2 |  | SSB.1 FR1 |  | SSB.1 FR1 |  |
|  | 3 |  | SSB.2 FR1 |  | SSB.2 FR1 |  |
| OCNG Patterns | 1~3 |  | OP.1 | | OP.1 | |
| Initial BWP Configuration | 1~3 |  | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP configuration | 1~3 |  | DLBWP.1.3  ULBWP.1.3 | | DLBWP.1.3  ULBWP.1.3 | |
| TRS Configuration | 1~3 |  | TRS.2.1 TDD | | TRS.2.1 TDD | |
| PDCCH/PDSCH TCI Configuration | 1~3 |  | TCI.State.2 | | TCI.State.2 | |
| SMTC configuration | 1~3 |  | SMTC.1 | | SMTC.1 | |
| Time offset between Cell 2 and Cell 1 | 1~3 | μs | 3 | | 3 | |
| EPRE ratio of PSS to SSS | 1~3 | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |  |
| Propagation condition | 1~3 | - | NA  Link only, see clause A.3.7A | AWGN | NA  Link only, see clause A.3.7A | AWGN |
| Antenna configuration | 1~3 | - |  | 1x2 |  | 1x2 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | | |

**Table A.7.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** | | **Test 2 NOTE 3** | |
|  |  |  | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| Angle of arrival configuration according to clause A.3.15 |  |  | NA | Setup 2b | NA | Setup 2b |
| Assumption for UE beamsNote 4 |  |  | N/A | Rough | N/A | Rough |
|  | 1~3 | dBm/15kHz | NA  Link only, see clause A.3.7A | -90 | NA  Link only, see clause A.3.7A | NA |
|  | 1,2 | dBm/SSB SCS |  | -80.97 |  | NA |
| 3 |  |  | -80.97 |  | NA |
|  | 1~3 | dB |  | -4 |  | NA |
| SSB\_RPNote1 | 1,2 | dBm/SCS |  | -84.97 |  | As in Table B.2.3-2 |
|  | 3 |  |  | -84.97 |  | As in Table B.2.3-2 |
| IoNote1 | 1~3 | dBm/  95.04MHz |  | -50.53 |  | SSB\_RP+28.98 |
|  | 1~3 | dB |  | -4 |  | NA |
| Note 1: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: Void  Note 3: No additional noise is added by the test system in Test 2.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | |

<End of Change 39>

<Unchanged sections omitted>

<Start of Change 40>

A.7.7.2.1 SA intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.8.1.1.

A.7.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.2.1.2-1. . The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.7.7.2.1.2-2 and Table A.7.7.2.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.7.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations**

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

**Table A.7.7.2.1.2-2: SS-RSRQ Intra frequency test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | **Test 2** | |
|  | |  | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| SSB ARFCN | |  | Freq1 | | Freq1 | |
| Duplex mode | |  | TDD | | TDD | |
| TDD configuration | |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | DLBWP.0.1 | | | |
|  | Dedicated DL BWP |  | DLBWP.1.1 | | | |
|  | Initial UL BWP |  | ULBWP.0.1 | | | |
|  | Dedicated UL BWP |  | ULBWP.1.1 | | | |
| TRS configuration | |  | TRS.2.1 TDD |  | TRS.2.1 TDD |  |
| TCI state | |  | TCI.State.0 |  | TCI.State.0 |  |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD |  | SR.3.1 TDD |  |
| RMSI CORESET Reference Channel | |  | CR.3.1 TDD | - | CR.3.1 TDD |  |
| Control channel RMC | |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns | |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration | |  | SMTC.1 | | | |
| SSB configuration | |  | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 |
| PDSCH/PDCCH subcarrier spacing | | kHz | 120 | 120 | 120 | 120 |
| SS-RSSI-Measurement | |  | Not Applicable | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS | |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | |  |  |  |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |  |  |  |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |  |  |  |  |
| Propagation condition | |  | AWGN | | AWGN | |
| Antenna configuration | |  | 1x2 | 1x2 | 1x2 | 1x2 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void  Note 5: Void | | | | | | |

**Table A.7.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Unit** | **Test 1** | | | **Test 2** | | | |
|  |  | **Cell 1** | **Cell 2** | | **Cell 1** | | **Cell 2** | |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | Setup 1according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 9 |  | Rough | | | | | | |
| Note1 | dBm/15kHzNote4 | -95 | | | | -95 | | |
| Note1 | dBm/SCSNote3 | -86 | | | | -86 | | |
|  | dB | 3 | | 3 | | -3 | | -3 |
| SSB\_RPNote2 | dBm/SCS Note4 | -83 | | -83 | | -89 | | -89 |
| SS-RSRQ Note2 | dB | -14.77 | | -14.77 | | -16.81 | | -16.81 |
|  | dB | -1.76 | | -1.76 | | -4.76 | | -4.76 |
| IoNote2 | dBm/95.04 MHz Note4 | -50 | | | | -54 | | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRQ, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Void  Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

A.7.7.2.1.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ-2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal RSRQ+3.5dB to Nominal RSRQ-3.5dB according to the requirements in clause 10.1.8.1.1. Nominal RSRQ is the value shown in table A.7.7.2.1.2-3.

A.7.7.2.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter-frequency measurement.

A.7.7.2.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.7.7.2.2.2-2 and Table A.7.7.2.2.2-3.. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

**Table A. 7.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations**

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

**Table A.7.7.2.2.2-2: SS-RSRQ Inter frequency general test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | **Test 2** | |
|  | |  | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| SSB ARFCN | |  | Freq1 | freq2 | freq1 | Freq2 |
| SSB Configuration | |  | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 |
| Duplex mode | |  | TDD | | TDD | |
| TDD configuration | |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | DLBWP.0.1 | | | |
| Dedicated DL BWP |  | DLBWP.1.1 | | | |
| Initial UL BWP |  | ULBWP.0.1 | | | |
| Dedicated UL BWP |  | ULBWP.1.1 | | | |
| TRS configuration | |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state | |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel | |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| OCNG Patterns | |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration | |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| PDSCH/PDCCH subcarrier spacing | | kHz | 120 | 120 | 120 | 120 |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS | |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | |  |  |  |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |  |  |  |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |  |  |  |  |
| Propagation conditions | |  | AWGN | AWGN | AWGN | AWGN |
| Antenna configuration | |  | 1x2 | 1x2 | 1x2 | 1x2 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void | | | | | | |

**Table A.7.7.2.2.2-3: SS-RSRQ Inter frequency OTA related test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
|  |  | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| AoA setup |  | Setup 1 in clause A.3.15. | | Setup 1 in clause A.3.15. | |
| Assumption for UE beamsNote 8 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -94.03 | -94.03 | -94.03 | -94.03 |
| Note1 | dBm/SCSNote3 | -85.0 | -85.0 | -85.0 | -85.0 |
|  | dB | -1.75 | -1.75 | -3 | -1.75 |
| SSB\_RPNote2 | dBm/SCS Note4 | -86.75 | -86.75 | -88 | -88 |
| SS-RSRQNote2 | dB | -14.75 | -14.75 | -15.56 | -15.56 |
|  | dB | -1.75 | -1.75 | -3 | -3 |
| IoNote2 | dBm/95.04 MHz Note4 | -53.8 | -53.8 | -54.25 | -54.25 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRQ, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.7.7.2.2.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ -2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ +3.5dB to Nominal SS-RSRQ -3.5dB according to the requirements in clause 10.1.10.1.1.

The SS-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.1.2.

<End of Change 40>

<unchanged sections omitted>

<Start of Change 41>

#### A.7.7.3.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

##### A.7.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.15.1.1 and 10.1.15.1.2 for inter-frequency measurement.

##### A.7.7.3.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.7.7.3.2.2-2 and Table A.7.7.3.2.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

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

**Table A.7.7.3.2.2-2: SS-SINR Inter frequency general test parameters**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN |  | freq1 | freq2 | freq1 | freq2 | freq1 | freq2 |
| Duplex mode |  | TDD | | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | | | | | |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | | | | | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | | | | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | | | | |
| DRX cycle configuration | ms | Not applicable | | | | | |
| TRS configuration |  | TRS.2.1 TDD | | | | | |
| TCI state |  | TCI.State.0 | | | | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |  |  |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS |  |  |  |  |  |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS |  |  |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS |  |  |  |  |  |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS |  |  |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS |  |  |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |  |  |
| Propagation conditions |  | AWGN | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna configuration |  | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void | | | | | | | |

Table A.7.7.3.2.2-3: SS-SINR Inter frequency OTA related test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration | degrees | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 10 |  | Rough | | Rough | | Rough | |
| Note1 | dBm/15kHz Note4 | -105 | -105 | -105 | -105 | -105 | -105 |
| Note1 | dBm/SCS Note3 | -96 | -96 | -96 | -96 | -96 | -96 |
|  | dB | -0.5 | -0.5 | 11.0 | 11.0 | -3.0 | -3.0 |
| SSB\_RPNote2 | dBm/SCS Note4 | -96.5 | -96.5 | -85 | -85 | -99 | -99 |
| SS-SINRNote2 | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
|  | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
| IoNote2 | dBm/95.04 MHz Note4 | -69.3 | -69.3 | -55.4 | -55.4 | -65.24 | -65.24 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-SINR, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Void  Note 9: Void  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.7.3.2.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR +3dB to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.15.1.1.

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.1.2.

<End of Change 41>

<Unchanged sections omitted>

<Start of Change 42>

#### A.7.7.4.1 SSB based L1-RSRP measurement

A.7.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.5.2 and clause 10.1.20.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.7.7.4.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

**Table A.7.7.4.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

<End of Change 42>