**3GPP TSG-RAN4 Meeting #104-e *R4-221xxxx***

**Electronic Meeting, 15th – 26th August, 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **DraftCR** | **rev** |  | **Current version:** |  |  |
|  | | | | | | | | |
| *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 Draft CR Template structure for RedCap performance part | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_redcap-Perf | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | |  |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Big CR to incorporate all endorsed CRs at RAN4#104-e | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | **From RAN4#104-e**:   * R4-2215093: Draft CR on side conditions on RRM requirements applicability for RedCap, Ericsson   + Change #1: SSB configurations for RedCap   + Change #2: SMTC configurations for RedCap   + Change #3: Angle of Arrival (AoA) for FR2 RRM test cases   + Change #4: Testing principle for RedCap UE * Change #5: NR standalone tests with all NR cells in FR1 for RedCap   + R4-2215052: Draft CR: IDLE mode test cases for FR1 RedCap, Ericsson   + R4-2214571, "CR on 4-step random access test in FR1 for RedCap UE", Xiaomi   + R4-2214585, "CR for introduction of RRC connection mobility control test cases in FR1 for RedCap Ues", Nokia, Nokia Shanghai Bell   + R4-2214572, "CR on SSB-based RLM in-sync test in FR1 for RedCap UE", Xiaomi   + R4-2214992,"Test case on Out-of-sync Test for FR1 RedCap UE", Huawei, HiSilicon   + R4-2214926, "Draft CR on SA event triggered reporting tests without gap under DRX for intra-frequency measurement", OPPO   + R4-2214927, "Draft CR on SA event triggered reporting tests with per-UE gaps under DRX for intra-frequency measurement", OPPO   + R4-2214928, "Draft CR on SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading for intra-frequency measurement", OPPO   + R4-2214929, "Draft CR on SA NR – E-UTRAN event triggered reporting tests in non-DRX in FR1 for 1 Rx UE and 2 Rx UE", OPPO   + R4-2214930, "Draft CR on SA NR – E-UTRAN event triggered reporting tests in DRX in FR1 for 1 Rx UE and 2 Rx UE", OPPO   + R4-2214994, "Test case for intra-frequency case measurement accuracy for FR1 RedCap UE", Huawei, HiSilicon   + R4-2214720, "draft CR for test case for SA event triggered reporting without SSB time index detection when DRX is used for FR1 Redcap", vivo   + R4-2215054, "draft CR for test case for SA NR - E-UTRAN handover for Redcap", vivo   + R4-2215055, "draft CR for test case for 2-step random access test in FR1 for NR standalone for Redcap", vivvo   + R4-2215088, "DraftCR on NR UE Transmit Timing Test for FR1 for 1 and 2 Rx UE", MediaTek inc.   + R4-2215056, "draft CR for test case for BFD and LR test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode for Redcap", Vivo   + R4-2215058, "draft CR for test case for SSB based L1-RSRP measurement for beam reporting for Redcap", vivo * Change #6: NR standalone tests with one or more NR cells in FR2 for RedCap   + R4-2215053, “Draft CR: IDLE mode test cases for FR2 RedCap”, Ericsson   + R4-2214990, "Test case for handover for FR1 RedCap UE", Huawei, HiSilicon   + R4-2214573, "CR on 4-step random access test in FR2 for RedCap UE", Xiaomi   + R4-2214586, "CR for introduction of RRC connection mobility control test cases in FR2 for RedCap Ues", Nokia, Nokia Shanghai Bell   + R4-2214574, "CR on SSB-based RLM in-sync test in FR2 for RedCap UE", Xiaomi   + R4-2214993, "Test case on Out-of-sync Test for FR2 RedCap UE", Huawei, HiSilicon   + R4-2214996, "Test case on measurement procedure for FR2 RedCap UE", Huawei, HiSilicon   + R4-2214995, "Test case for intra-frequency case measurement accuracy for FR2 RedCap UE", Huawei, HiSilicon   + R4-2215059, "draft CR for test case for 2-step RA type test in FR2 for NR Standalone", Vivo * Change #7: E-UTRA standalone tests for NR RRM for RedCap   + R4-2214925, "draftCR on test for RRC connection release with redirection to NR redcap", OPPO * Change #8: NR measurements for RedCap   + R4-2214989, "CR on accuracy requirements for Redcap", Huawei, HiSilicon * Change #9: B.1 Conditions for NR RRC\_IDLE state mobility   + R4-2213414, "Draft CR on side conditions on RRM requirements applicability for RedCap", Ericsson * Change #10: B.2 Conditions for UE measurements procedures and performance requirements in RRC\_CONNECTED state   + R4-2213414, "Draft CR on side conditions on RRM requirements applicability for RedCap", Ericsson | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | No test caes to verify the core requirements | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.3.15  New clauses: A.3.10B, A.3.11A, A.3.32, A.16, A.17, A.18, A.10.1A, B.1.x1, B.1.x2, B.2.x1 and B.2.x2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**--- Start of change 1 ---**

## A.3.10B SSB Configurations for RedCap

### A.3.10B.1 SSB Configurations for FR1

A.3.10B.1.1 SSB pattern 1 for RedCap in FR1: SSB allocation for SSB SCS=30 kHz in 20 MHz

Table A.3.10B.1.1-1: SSB.1 RedCap FR1: SSB Pattern 1 for SSB SCS=30 kHz in 20 MHz channel

|  |  |
| --- | --- |
| **SSB Parameters** | **Values** |
| Channel bandwidth | 20 MHz |
| SSB SCS | 30 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSB Note 3 | 4-7 or 2-5 Note 2 |
| Slot numbers containing SSB Note 3 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-5 is chosen.  Note 3: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves | |

A.3.10B.1.2 SSB pattern 2 for RedCap in FR1: SSB allocation for SSB SCS=30 kHz in 20 MHz

Table A.3.10B.1.2-1: SSB.2 RedCap FR1: SSB Pattern 2 for SSB SCS=30 kHz in 20 MHz channel

|  |  |  |
| --- | --- | --- |
| **SSB Parameters** | **Values** | |
| Channel bandwidth | 20 MHz | |
| SSB SCS | 30 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 2 | |
| SS/PBCH block index | 0 | 1 |
| Symbol numbers containing SSB Note 3 | 4-7 or 2-5 Note 2 | 8-11 |
| Slot numbers containing SSB Note 3 | 0 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-5 is chosen.  Note 3: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

A.3.10B.1.3 SSB pattern 3 for RedCap in FR1: SSB allocation for SSB SCS=30 kHz starting from odd SFN in 20 MHz

Table A.3.10B.1.3-1: SSB.3 RedCap FR1: SSB Pattern 3 for SSB SCS=30 kHz in 20 MHz channel

|  |  |
| --- | --- |
| **SSB Parameters** | **Values** |
| Channel bandwidth | 20 MHz |
| SSB SCS | 30 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSB Note 3 | 4-7 or 2-5 Note 2 |
| Slot numbers containing SSB Note 3 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 1 |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-5 is chosen.  Note 3: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

#### A.3.10B.1.4 SSB pattern 4 for RedCap in FR1: SSB allocation for SSB SCS=15 kHz in 10 MHz

Table A.3.10B.1.4-1: SSB.4 RedCap FR1: SSB Pattern 4 for SSB SCS=15 kHz in 10 MHz channel

|  |  |
| --- | --- |
| **SSB Parameters** | **Values** |
| Channel bandwidth | 10 MHz |
| SSB SCS | 15 kHz |
| SSB periodicity (TSSB) | 80 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSB Note 2 | 2-5 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

A.3.10B.1.5 SSB pattern 5 for RedCap in FR1: SSB allocation for SSB SCS=30 kHz in 20 MHz

Table A.3.10B.1.5-1: SSB.5 RedCap FR1: SSB Pattern 5 for SSB SCS=30 kHz in 20 MHz channel

|  |  |
| --- | --- |
| **SSB Parameters** | **Values** |
| Channel bandwidth | 20 MHz |
| SSB SCS | 30 kHz |
| SSB periodicity (TSSB) | 80 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSB Note 3 | 4-7 or 2-5 Note 2 |
| Slot numbers containing SSB Note 3 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-5 is chosen.  Note 3: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves | |

A.3.10B.2 SSB Configurations for FR2

A.3.10B.2.1 SSB pattern 1 for RedCap in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.1-1: SSB.1 RedCap FR2: SSB Pattern 1 for SSB SCS = 120 kHz in 100 MHz channel with 1 SSB per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 100 MHz |
| SSB SCS | 120 kHz |
| SSB periodicity (TSSB) | 80 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSBs Note 2 | 4-7 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

**--- End of change 1 ---**

**--- Start of change 2 ---**

## A.3.11A SMTC Configurations for RedCap

### A.3.11A.1 SMTC pattern 1 for RedCap: SMTC period = 40 ms with SMTC duration = 1 ms

Table A.3.11A.1-1: SMTC.1 RedCap: SMTC Pattern 1 for SMTC period = 40 ms and duration = 1 ms

|  |  |
| --- | --- |
| SMTC Parameters | Values |
| SMTC periodicity | 40 ms |
| SMTC offset | 0 ms |
| SMTC duration | 1 ms |

### A.3.11A.2 SMTC pattern 2 for RedCap: SMTC period = 80 ms with SMTC duration = 1 ms

Table A.3.11.2-1: SMTC.2 RedCap: SMTC Pattern 1 for SMTC period = 80 ms and duration = 1 ms

|  |  |
| --- | --- |
| SMTC Parameters | Values |
| SMTC periodicity | 80 ms |
| SMTC offset | 0 ms |
| SMTC duration | 1 ms |

**--- End of change 2 ---**

**--- Start of change 3 ---**

## A.3.15 Angle of Arrival (AoA) for FR2 RRM test cases

This clause specifies the AoA setups for FR2 RRM test cases in clause A.5 and A.7. The applicable AoA setup is defined in each test case in clause A.5 and A.7.

### A.3.15.1 Setup 1: Single AoA in Rx beam peak direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, are aligned to the UE Rx beam peak direction (as defined in TS 38.101-2 [19]).

### A.3.15.2 Setup 2: Single AoA in non Rx beam peak direction

#### A.3.15.2.1 Setup 2a: Single AoA in non Rx beam peak direction without change in direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, align to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The direction (AoA) of the signals shall not be changed between test iterations.

#### A.3.15.2.2 Setup 2b: Single AoA in non Rx beam peak direction with change in direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, align to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. For UE power class 3, the direction (AoA) of the signals shall be changed for each test iteration (for UE power classes other than 3, this is FFS).

### A.3.15.3 Setup 3: 2 AoAs

There are 2 active probes in the test. The DL signals, and noise if applicable, transmitted from the two active probes, align to directions (AoAs) which are from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The relative angular offset between the directions (AoAs) of the 2 active probes, shall be changed for each test iteration. The applicable set of relative angular offsets between the 2 active probes is given in Table 3.15.3-1 for each UE power class.

Editor Note: If RAN5 finds the changing of angular offset between the directions (AoAs) of the 2 active probes per test iteration to be infeasible from the perspectives of EIS spherical coverage and other impacts, e.g.: testing time, then the test setup will be revised.

Table A.3.15.3-1: Set of relative angular offsets between active probes for each power class

|  |  |
| --- | --- |
| UE Power class | Relative angular offset between active probes |
| 1 | FFS |
| 2 | FFS |
| 3 | 30°, 60°, 90°, 120° and 150° |
| 4 | FFS |
| 5 | FFS |
| 7 | FFS |

### A.3.15.4 Setup 4: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak

#### A.3.15.4.1 Setup 4a: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak without change in direction

There are 2 active probes in the test. The DL signals, and noise if applicable, are transmitted from the two active probes. One probe is aligned to the UE Rx beam peak direction as defined in TS 38.101-2 [19]. The second is aligned to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The direction (AoA) of the non Rx beam peak signal shall not be changed between test iterations.

#### A.3.15.4.2 Setup 4b: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak with change in direction

There are 2 active probes in the test. The DL signals, and noise if applicable, are transmitted from the two active probes. One probe is aligned to the UE Rx beam peak direction as defined in TS 38.101-2 [19]. The second is aligned to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class.

For UE power class 3, the relative angular offset between the directions (AoAs) of the 2 active probes shall be changed for each test iteration, within the probe alignment described above. The applicable set of relative angular offsets between the 2 active probes is given in Table 3.15.3-1 for each UE power class.

**--- End of change 3 ---**

**--- Start of change 4 ---**

## A.3.32 Testing principle for RedCap UE

### A.3.32.1 Introduction

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

### A.3.32.2 Principle of testing for FR1

For RedCap UEs supporting 1 Rx branch, all single carrier tests specified in clause A.16 and A.18 except for tests defined for 2 Rx and/or FR2 shall be tested on any band.

For RedCap UEs supporting 2Rx branches, all single carrier tests specified in clause A.16 and A.18 except for tests defined for 1 Rx and/or FR2 shall be tested on any band.

### A.3.32.3 Principle of testing for FR2

For RedCap UEs, all single carrier tests specified in clause A.17 and A.18 except for tests defined for FR1 shall be tested on any band.

**--- End of change 4 ---**

**--- Start of change 5 ---**

# A.16 NR standalone tests with all NR cells in FR1 for RedCap

## A.16.1 SA: RRC\_IDLE state mobility for RedCap

### A.16.1.1 Cell re-selection to NR

#### A.16.1.1.1 Cell reselection to FR1 intra-frequency NR case for 1 Rx UE

##### A.16.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2B.2.3.

##### A.16.1.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.16.1.1.1.2-1, A.16.1.1.1.2-2 and A.16.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.16.1.1.1.2-1: 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, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.16.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case for 1 Rx UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
|  | |  |
| Initial condition | Active cell |  | 1, 2, 3, 4 | Cell1 |  |
| T2 end condition | Active cell |  | 1, 2, 3, 4 | Cell2 |  |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell1 |  |
| Final condition | Active cell |  | 1, 2, 3, 4 | Cell1 |  |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell2 |  |
| RF Channel Number | |  | 1, 2, 3, 4 | 1 |  |
| Time offset between cells | |  | 1, 4 | 3 ms | Asynchronous cells |
|  | |  | 2 | 3 μs | Synchronous cells |
|  | |  | 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3, 4 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1, 4 | SSB.1 FR1 |  |
|  | |  | 2 | SSB.1 FR1 |  |
|  | |  | 3 | SSB.1 RedCap FR1 |  |
| SMTC configuration | |  | 1, 4 | SMTC.2 | Configured in SIB2 of Cell 1 |
| SMTC.6 | Configured in SIB2 of Cell 2 |
| 2 | SMTC.1 |  |
| 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3, 4 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3, 4 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3, 4 | Not configured |  |
| T1 | | s | 1, 2, 3, 4 | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 1, 2, 3, 4 | [40] | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 1, 2, 3, 4 | 15 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.16.1.1.1.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN for 1 Rx UE

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 |  | 1, 2 | SR.1.1 FDD | | | SR.1.1 FDD | | |
| configuration |  | 2 | SR.1.1 TDD | | | SR.1.1 TDD | | |
|  |  | 3 | SR.2.1 TDD | | | SR.2.1 TDD | | |
| RMSI CORESET |  | 1, 2 | CR.1.1 FDD | | | CR.1.1 FDD | | |
| RMC configuration |  | 2 | CR.1.1 TDD | | | CR.1.1 TDD | | |
|  |  | 3 | CR.2.1 TDD | | | CR.2.1 TDD | | |
| Dedicated CORESET |  | 1, 4 | CCR.1.1 FDD | | | CCR.1.1 FDD | | |
| RMC configuration |  | 2 | CCR.1.1 TDD | | | CCR.1.1 TDD | | |
|  |  | 3 | CCR.2.1 TDD | | | CCR.2.1 TDD | | |
| OCNG Pattern |  | 1, 2, 3, 4 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2, 4 | -130 | | | -130 | | |
|  |  | 3 | -127 | | | -127 | | |
| Pcompensation | dB | 1, 2, 3, 4 | 0 | | | 0 | | |
| Qhysts | dB | 1, 2, 3, 4 | 0 | | | 0 | | |
| Qoffsets, n | dB | 1, 2, 3, 4 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3, 4 | SS-RSRP | | | SS-RSRP | | |
|  | dB | 1, , 4 | 16 | -3.11 | 2.79 | -infinity | 2.79 | -3.11 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
| Note2 | dBm/SCS | 1, 4 | -98 | | | | | |
|  |  | 2 | -98 | | | | | |
|  |  | 3 | -95 | | | | | |
| Note2 | dBm/15 kHz | 1, 4 | -98 | | | | | |
|  |  | 2 |  | | | | | |
|  |  | 3 |  | | | | | |
|  | dB | 1, 4 | 16 | 13 | 16 | -infinity | 16 | 13 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1, 4 | -82 | -85 | -82 | -infinity | -82 | -85 |
|  |  | 2 | -82 | -85 | -82 | -infinity | -82 | -85 |
|  |  | 3 | -79 | -82 | -79 | -infinity | -79 | -82 |
| Io | dBm/9.36 MHz | 1, 4 | -53.94 | -52.21 | -52.21 | Same as parameters specified in Cell 1 columns- | | |
|  | dBm/9.36 MHz | 2 | -53.94 | -52.21 | -52.21 |  | | |
|  | dBm/38.16 MHz | 3 | -47.85 | -46.12 | -46.12 |  | | |
| Treselection | s | 1, 2, 3, 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| SintrasearchP | dB | 1, 2, 3, 4 | 60 | | | 60 | | |
| Propagation Condition |  | 1, 2, 3, 4 | 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.16.1.1.1.3 Test Requirements

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

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

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

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

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

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

Where:

Tdetect,NR\_Intra\_RedCap See Table 4.2B.2.3-1 in clause 4.2B.2.3

Tevaluate,NR\_Intra\_RedCap See Table 4.2B.2.3-1 in clause 4.2B.2.3

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

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

#### A.16.1.1.2 Cell reselection to FR1 intra-frequency NR case for 2 Rx UE

##### A.16.1.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2B.2.3.

##### A.16.1.1.2.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.16.1.1.2.2-1, A.16.1.1.2.2-2 and A.16.1.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.16.1.1.2.2-1: 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, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.16.1.1.2.2-2: General test parameters for intra frequency NR cell re-selection test case for 2 Rx UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
|  | |  |
| Initial condition | Active cell |  | 1, 2, 3, 4 | Cell1 |  |
| T2 end condition | Active cell |  | 1, 2, 3, 4 | Cell2 |  |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell1 |  |
| Final condition | Active cell |  | 1, 2, 3, 4 | Cell1 |  |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell2 |  |
| RF Channel Number | |  | 1, 2, 3, 4 | 1 |  |
| Time offset between cells | |  | 1, , 4 | 3 ms | Asynchronous cells |
|  | |  | 2 | 3 μs | Synchronous cells |
|  | |  | 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3, 4 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1, 4 | SSB.1 FR1 |  |
|  | |  | 2 | SSB.1 FR1 |  |
|  | |  | 3 | SSB.1 RedCap FR1 |  |
| SMTC configuration | |  | 1, 4 | SMTC.2 | Configured in SIB2 of Cell 1 |
| SMTC.6 | Configured in SIB2 of Cell 2 |
| 2 | SMTC.1 |  |
| 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3, 4 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3, 4 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3, 4 | Not configured |  |
| T1 | | s | 1, 2, 3, 4 | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 1, 2, 3, 4 | [40] | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 1, 2, 3, 4 | 15 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.16.1.1.2.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN for 2 Rx UE

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| TDD configuration |  | 1, 4 | N/A | | | N/A | | |
|  |  | 2 | TDDConf.1.1 | | | TDDConf.1.1 | | |
|  |  | 3 | TDDConf.2.1 | | | TDDConf.2.1 | | |
| PDSCH RMC |  | 1, 4 | SR.1.1 FDD | | | SR.1.1 FDD | | |
| configuration |  | 2 | SR.1.1 TDD | | | SR.1.1 TDD | | |
|  |  | 3 | SR.2.1 TDD | | | SR.2.1 TDD | | |
| RMSI CORESET |  | 1, 4 | CR.1.1 FDD | | | CR.1.1 FDD | | |
| RMC configuration |  | 2 | CR.1.1 TDD | | | CR.1.1 TDD | | |
|  |  | 3 | CR.2.1 TDD | | | CR.2.1 TDD | | |
| Dedicated CORESET |  | 1, 4 | CCR.1.1 FDD | | | CCR.1.1 FDD | | |
| RMC configuration |  | 2 | CCR.1.1 TDD | | | CCR.1.1 TDD | | |
|  |  | 3 | CCR.2.1 TDD | | | CCR.2.1 TDD | | |
| OCNG Pattern |  | 1, 2, 3, 4 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2, 4 | -130 | | | -130 | | |
|  |  | 3 | -127 | | | -127 | | |
| Pcompensation | dB | 1, 2, 3, 4 | 0 | | | 0 | | |
| Qhysts | dB | 1, 2, 3 | 0 | | | 0 | | |
| Qoffsets, n | dB | 1, 2, 3, 4 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3, 4 | SS-RSRP | | | SS-RSRP | | |
|  | dB | 1, 4 | 16 | -3.11 | 2.79 | -infinity | 2.79 | -3.11 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
| Note2 | dBm/SCS | 1, 4 | -98 | | | | | |
|  |  | 2 | -98 | | | | | |
|  |  | 3 | -95 | | | | | |
| Note2 | dBm/15 kHz | 1, 4 | -98 | | | | | |
|  |  | 2 |  | | | | | |
|  |  | 3 |  | | | | | |
|  | dB | 1, 4 | 16 | 13 | 16 | -infinity | 16 | 13 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1, 4 | -82 | -85 | -82 | -infinity | -82 | -85 |
|  |  | 2 | -82 | -85 | -82 | -infinity | -82 | -85 |
|  |  | 3 | -79 | -82 | -79 | -infinity | -79 | -82 |
| Io | dBm/9.36 MHz | 1, 4 | -53.94 | -52.21 | -52.21 | Same as parameters specified in Cell 1 columns- | | |
|  | dBm/9.36 MHz | 2 | -53.94 | -52.21 | -52.21 |  | | |
|  | dBm/38.16 MHz | 3 | -47.85 | -46.12 | -46.12 |  | | |
| Treselection | s | 1, 2, 3, 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| SintrasearchP | dB | 1, 2, 3, 4 | 60 | | | 60 | | |
| Propagation Condition |  | 1, 2, 3, 4 | 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.16.1.1.2.3 Test Requirements

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

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

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

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

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

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

Where:

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

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

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

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

#### A.16.1.1.3 Cell reselection to FR1 inter-frequency NR case for 1 Rx UE

##### A.16.1.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2B.2.4.

##### A.16.1.1.3.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.16.1.1.3.2-1, A.16.1.1.3.2-2 and A.16.1.1.3.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

Table A.16.1.1.3.2-1: 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 |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.16.1.1.3.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case for 1 Rx UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4 | Cell2 | The UE camps on cell 2 in the initial phase and during T1 period the UE reselects to cell 1 |
|  | Neighbour cell |  | 1, 2, 3, 4 | Cell 1 |  |
| T1 end condition | Active cell |  | 1, 2, 3, 4 | Cell1 | The UE shall perform reselection to cell 1 during T1 |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell2 |  |
| T3 end condition | Active cell |  | 1, 2, 3, 4 | Cell2 | The UE shall perform reselection to cell 2 with higher priority during T3 |
|  | Neighbour cell |  | 1, 2, 3, 4 | Cell 1 |  |
| RF Channel Number | |  | 1, 2, 3, 4 | 1, 2 |  |
| Time offset between cells | |  | 1, 4 | 3 ms | Asynchronous cells |
|  | |  | 2 | 3 μs | Synchronous cells |
|  | |  | 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3, 4 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1, 4 | SSB.1 FR1 |  |
|  | |  | 2 | SSB.1 FR1 |  |
|  | |  | 3 | SSB.1 RedCap FR1 |  |
| SMTCconfiguration | |  | 1, 4 | SMTC.2 | Configured in SIB4 of Cell 1 |
| SMTC.6 | Configured in SIB4 of Cell 2 |
| 2 | SMTC.1 |  |
| 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3, 4 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3, 4 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3, 4 | Not configured |  |
| T1 | | s | 1, 2, 3, 4 | 15 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3, 4 | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 1, 2, 3, 4 | 75 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.16.1.1.3.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN for 1 Rx UE

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| TDD configuration |  | 1, 4 | N/A | | | N/A | | |
|  |  | 2 | TDDConf.1.1 | | | TDDConf.1.1 | | |
|  |  | 3 | TDDConf.2.1 | | | TDDConf.2.1 | | |
| PDSCH RMC |  | 1, 4 | SR.1.1 FDD | | | SR.1.1 FDD | | |
| configuration |  | 2 | SR.1.1 TDD | | | SR.1.1 TDD | | |
|  |  | 3 | SR.2.1 TDD | | | SR.2.1 TDD | | |
| RMSI CORESET |  | 1, 4 | CR.1.1 FDD | | | CR.1.1 FDD | | |
| RMC configuration |  | 2 | CR.1.1 TDD | | | CR.1.1 TDD | | |
|  |  | 3 | CR.2.1 TDD | | | CR.2.1 TDD | | |
| Dedicated CORESET |  | 1, 4 | CCR.1.1 FDD | | | CCR.1.1 FDD | | |
| RMC configuration |  | 2 | CCR.1.1 TDD | | | CCR.1.1 TDD | | |
|  |  | 3 | CCR.2.1 TDD | | | CCR.2.1 TDD | | |
| OCNG Pattern |  | 1, 2, 3, 4 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2, 4 | -140 | | | -140 | | |
|  |  | 3 | -137 | | | -137 | | |
| Pcompensation | dB | 1, 2, 3, 4 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3, 4 | SS-RSRP | | | SS-RSRP | | |
|  | dB | 1, 4 | 14 | 14 | 14 | -4 | -infinity | 12 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
| Note2 | dBm/SCS | 1, 4 | -98 | | | | | |
|  |  | 2 | -98 | | | | | |
|  |  | 3 | -95 | | | | | |
| Note2 | dBm/15 kHz | 1, 4 | -98 | | | | | |
|  |  | 2 |  | | | | | |
|  |  | 3 |  | | | | | |
|  | dB | 1, 4 | 14 | 14 | 14 | -4 | -infinity | 12 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1, 4 | -84 | -84 | -84 | -102 | -infinity | -86 |
|  |  | 2 | -84 | -84 | -84 | -102 | -infinity | -86 |
|  |  | 3 | -81 | -81 | -81 | -99 | -infinity | -83 |
| Io | dBm/9.36 MHz | 1, 4 | -55.88 | -55.88 | -55.88 | -68.60 | -70.05 | -57.78 |
|  | dBm/9.36 MHz | 2 | -55.88 | -55.88 | -55.88 | -68.60 | -70.05 | -57.78 |
|  | dBm/38.16 MHz | 3 | -49.79 | -49.79 | -49.79 | -62.50 | -63.96 | -51.69 |
| Treselection | s | 1, 2, 3, 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| SnonintrasearchP | dB | 1, 2, 3, 4 | 50 | | | 50 | | |
| Threshx, highP | dB | 1, 2, 3, 4 | 48 | | | 48 | | |
| Threshserving, lowP | dB | 1, 2, 3, 4 | 44 | | | 44 | | |
| Threshx, lowP | dB | 1, 2, 3, 4 | 50 | | | 50 | | |
| Propagation Condition |  | 1, 2, 3, 4 | 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.16.1.1.3.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 2.

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

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

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

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

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

Where:

Thigher\_priority\_search See clause 4.2B.2.7

Tevaluate,NR\_Inter\_RedCap See Table 4.2B.2.4-1 in clause 4.2B.2.4

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

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

#### A.16.1.1.4 Cell reselection to FR1 inter-frequency NR case for 2 Rx UE

##### A.16.1.1.4.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2B.2.4.

##### A.16.1.1.4.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.16.1.1.4.2-1, A.16.1.1.4.2-2 and A.16.1.1.4.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

Table A.16.1.1.4.2-1: 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 |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.16.1.1.4.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case for 2 Rx UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4 | Cell2 | The UE camps on cell 2 in the initial phase and during T1 period the UE reselects to cell 1 |
|  | Neighbour cell |  | 1, 2, 3, 4 | Cell 1 |  |
| T1 end condition | Active cell |  | 1, 2, 3, 4 | Cell1 | The UE shall perform reselection to cell 1 during T1 |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell2 |  |
| T3 end condition | Active cell |  | 1, 2, 3, 4 | Cell2 | The UE shall perform reselection to cell 2 with higher priority during T3 |
|  | Neighbour cell |  | 1, 2, 3, 4 | Cell 1 |  |
| RF Channel Number | |  | 1, 2, 3, 4 | 1, 2 |  |
| Time offset between cells | |  | 1, 4 | 3 ms | Asynchronous cells |
|  | |  | 2 | 3 μs | Synchronous cells |
|  | |  | 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3, 4 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1, 4 | SSB.1 FR1 |  |
|  | |  | 2 | SSB.1 FR1 |  |
|  | |  | 3 | SSB.1 RedCap FR1 |  |
| SMTCconfiguration | |  | 1, 4 | SMTC.2 | Configured in SIB4 of Cell 1 |
| SMTC.6 | Configured in SIB4 of Cell 2 |
| 2 | SMTC.1 |  |
| 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3, 4 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3, 4 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3, 4 | Not configured |  |
| T1 | | s | 1, 2, 3, 4 | 15 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3, 4 | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 1, 2, 3 | 75 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.16.1.1.4.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN for 2 Rx UE

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| TDD configuration |  | 1, 4 | N/A | | | N/A | | |
|  |  | 2 | TDDConf.1.1 | | | TDDConf.1.1 | | |
|  |  | 3 | TDDConf.2.1 | | | TDDConf.2.1 | | |
| PDSCH RMC |  | 1, 4 | SR.1.1 FDD | | | SR.1.1 FDD | | |
| configuration |  | 2 | SR.1.1 TDD | | | SR.1.1 TDD | | |
|  |  | 3 | SR.2.1 TDD | | | SR.2.1 TDD | | |
| RMSI CORESET |  | 1, 4 | CR.1.1 FDD | | | CR.1.1 FDD | | |
| RMC configuration |  | 2 | CR.1.1 TDD | | | CR.1.1 TDD | | |
|  |  | 3 | CR.2.1 TDD | | | CR.2.1 TDD | | |
| Dedicated CORESET |  | 1, 4 | CCR.1.1 FDD | | | CCR.1.1 FDD | | |
| RMC configuration |  | 2 | CCR.1.1 TDD | | | CCR.1.1 TDD | | |
|  |  | 3 | CCR.2.1 TDD | | | CCR.2.1 TDD | | |
| OCNG Pattern |  | 1, 2, 3, 4 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2, 4 | -140 | | | -140 | | |
|  |  | 3 | -137 | | | -137 | | |
| Pcompensation | dB | 1, 2, 3, 4 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3, 4 | SS-RSRP | | | SS-RSRP | | |
|  | dB | 1, 4 | 14 | 14 | 14 | -4 | -infinity | 12 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
| Note2 | dBm/SCS | 1, 4 | -98 | | | | | |
|  |  | 2 | -98 | | | | | |
|  |  | 3 | -95 | | | | | |
| Note2 | dBm/15 kHz | 1, 4 | -98 | | | | | |
|  |  | 2 |  | | | | | |
|  |  | 3 |  | | | | | |
|  | dB | 1, 4 | 14 | 14 | 14 | -4 | -infinity | 12 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1, 4 | -84 | -84 | -84 | -102 | -infinity | -86 |
|  |  | 2 | -84 | -84 | -84 | -102 | -infinity | -86 |
|  |  | 3 | -81 | -81 | -81 | -99 | -infinity | -83 |
| Io | dBm/9.36 MHz | 1, 4 | -55.88 | -55.88 | -55.88 | -68.60 | -70.05 | -57.78 |
|  | dBm/9.36 MHz | 2 | -55.88 | -55.88 | -55.88 | -68.60 | -70.05 | -57.78 |
|  | dBm/38.16 MHz | 3 | -49.79 | -49.79 | -49.79 | -62.50 | -63.96 | -51.69 |
| Treselection | s | 1, 2, 3, 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| SnonintrasearchP | dB | 1, 2, 3, 4 | 50 | | | 50 | | |
| Threshx, highP | dB | 1, 2, 3, 4 | 48 | | | 48 | | |
| Threshserving, lowP | dB | 1, 2, 3, 4 | 44 | | | 44 | | |
| Threshx, lowP | dB | 1, 2, 3, 4 | 50 | | | 50 | | |
| Propagation Condition |  | 1, 2, 3, 4 | 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.16.1.1.4.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 2.

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

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

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

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

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

Where:

Thigher\_priority\_search See clause 4.2B.2.7

Tevaluate,NR\_Inter\_RedCap See Table 4.2B.2.4-1 in clause 4.2B.2.4

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

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

#### A.16.1.1.5 Cell reselection to FR1 intra-frequency NR case for UE fulfilling stationary relaxed measurement criterion for 1 Rx UE

##### A.16.1.1.5.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements for UE fulfilling stationary relaxed measurement criterion specified in clause 4.2B.2.9.2.

##### A.16.1.1.5.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.16.1.1.5.2-1, A.16.1.1.5.2-2 and A.16.1.1.5.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.16.1.1.5.2-1: 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 |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.16.1.1.5.2-2: General test parameters for FR1 intra frequency NR cell re-selection test case for UE fulfilling stationary relaxed measurement criterion for 1 Rx UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4 | Cell1 | The UE camps on cell 1 in the initial phase |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell2 |  |
| T1 end condition | Active cell |  | 1, 2, 3, 4 | Cell2 | The UE reselects to cell 2 during T1 period |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell1 |  |
| Final condition | Active cell |  | 1, 2, 3, 4 | Cell1 | The UE reselects to cell 1 during T2 period |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell2 |  |
| RF Channel Number | |  | 1, 2, 3, 4 | 1 |  |
| Time offset between cells | |  | 1, 4 | 3 ms | Asynchronous cells |
|  | | 2 | 3 μs | Synchronous cells |
|  | | 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3, 4 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1, 4 | SSB.1 FR1 |  |
|  | | 2 | SSB.1 FR1 |  |
|  | | 3 | SSB.1 RedCap FR1 |  |
| SMTC configuration | |  | 1, 4 | SMTC.2 | Configured in SIB2 of Cell 1 |
| SMTC.6 | Configured in SIB2 of Cell 2 |
| 2 | SMTC.1 |  |
| 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3, 4 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3, 4 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3, 4 | Not configured |  |
| T1 | | s | 1, 2, 3, 4 | [25] | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3, 4 | [25] | T2 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.16.1.1.5.2-3: Cell specific test parameters for FR1 intra frequency NR cell re-selection test case in AWGN for UE fulfilling stationary relaxed measurement criterion for 1 Rx UE

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 4 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | SR.1.1 FDD  SR.1.1 TDD  SR.2.1 TDD | |
|  |  | 2 | SR.1.1 TDD | |
|  |  | 3 | SR.2.1 TDD | |
| RMSI CORESET RMC configuration |  | 1, 4 | 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, 4 | 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, 4 | OP.1 defined in A.3.2.1 | | OP.1 defined in A.3.2.1 | |
| Initial DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 | | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.0.1 | | ULBWP.0.1 | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | SSB | |
| Qrxlevmin | dBm/SCS | 1, 2, 4 | -140 | | -140 | |
|  |  | 3 | -137 | | -137 | |
| Pcompensation | dB | 1, 2, 3, 4 | 0 | | 0 | |
| Qhysts | dB | 1, 2, 3, 4 | 0 | | 0 | |
| Qoffsets, n | dB | 1, 2, 3, 4 | 0 | | 0 | |
| SSearchDeltaP-Stationary | dB | 1, 2, 3, 4 | 3 | | 3 | |
| TSearchDeltaP-Stationary | s | 1, 2, 3, 4 | 5 | | 5 | |
| Cell\_selection\_and\_ reselection\_quality\_ measurement |  | 1, 2, 3, 4 | SS-RSRP | | SS-RSRP | |
|  | dB | 1, 2, 3, 4 | -3.11 | 2.79 | 2.79 | -3.11 |
| Note2 | dBm/SCS | 1, 4 | -98 | | | |
|  |  | 2 | -98 | | | |
|  |  | 3 | -95 | | | |
| Note2 | dBm/15 kHz | 1, 2, 3, 4 | -98 | | | |
|  | dB | 1, 2, 3, 4 | 13 | 16 | 16 | 13 |
| SS-RSRP Note3 | dBm/SCS | 1, 4 | -85 | -82 | -82 | -85 |
|  |  | 2 | -85 | -82 | -82 | -85 |
|  |  | 3 | -82 | -79 | -79 | -82 |
| Io | dBm/9.36 MHz | 1, 4 | -52.21 | -52.21 | specified in Cell 1 columns- | |
|  | dBm/9.36 MHz | 2 | -52.21 | -52.21 |
|  | dBm/38.16 MHz | 3 | -46.12 | -46.12 |
| Treselection | s | 1, 2, 3, 4 | 0 | 0 | 0 | 0 |
| SintrasearchP | dB | 1, 2, 3, 4 | 60 | | 60 | |
| Propagation Condition |  | 1, 2, 3, 4 | 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.16.1.1.5.3 Test Requirements

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected cell shall be less than 32 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to an already detected cell shall be less than 32 s.

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

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

Where:

Tevaluate,NR\_Intra\_RedCap\_Relax See Table 4.2B.2.9.2-1 in clause 4.2B.2.9.2 for reselection to Cell 2 during T1 with UE fulfilling stationary criterion, 30.72 s.

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

This gives a total of 32 s for the cell re-selection delay to an already detected cell for UE fulfilling stationary criterion in the test case.

#### A.16.1.1.6 Cell reselection to FR1 intra-frequency NR case for UE fulfilling stationary relaxed measurement criterion for 2 Rx UE

##### A.16.1.1.6.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements for UE fulfilling stationary relaxed measurement criterion specified in clause 4.2B.2.9.2.

##### A.16.1.1.6.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.16.1.1.6.2-1, A.16.1.1.6.2-2 and A.16.1.1.6.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.16.1.1.6.2-1: 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 |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.16.1.1.6.2-2: General test parameters for FR1 intra frequency NR cell re-selection test case for UE fulfilling stationary relaxed measurement criterion for 2 Rx UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4 | Cell1 | The UE camps on cell 1 in the initial phase |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell2 |  |
| T1 end condition | Active cell |  | 1, 2, 3, 4 | Cell2 | The UE reselects to cell 2 during T1 period |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell1 |  |
| Final condition | Active cell |  | 1, 2, 3, 4 | Cell1 | The UE reselects to cell 1 during T2 period |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell2 |  |
| RF Channel Number | |  | 1, 2, 3, 4 | 1 |  |
| Time offset between cells | |  | 1, 4 | 3 ms | Asynchronous cells |
|  | | 2 | 3 μs | Synchronous cells |
|  | | 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1, 4 | SSB.1 FR1 |  |
|  | | 2 | SSB.1 FR1 |  |
|  | | 3 | SSB.1 RedCap FR1 |  |
| SMTC configuration | |  | 1, 4 | SMTC.2 | Configured in SIB2 of Cell 1 |
| SMTC.6 | Configured in SIB2 of Cell 2 |
| 2 | SMTC.1 |  |
| 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3, 4 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3, 4 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3, 4 | Not configured |  |
| T1 | | s | 1, 2, 3, 4 | [25] | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3, 4 | [25] | T2 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.16.1.1.6.2-3: Cell specific test parameters for FR1 intra frequency NR cell re-selection test case in AWGN for UE fulfilling stationary relaxed measurement criterion for 2 Rx UE

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 4 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | SR.1.1 FDD  SR.1.1 TDD  SR.2.1 TDD | |
|  |  | 2 | SR.1.1 TDD | |
|  |  | 3 | SR.2.1 TDD | |
| RMSI CORESET RMC configuration |  | 1, 4 | 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, 4 | 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, 4 | OP.1 defined in A.3.2.1 | | OP.1 defined in A.3.2.1 | |
| Initial DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 | | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.0.1 | | ULBWP.0.1 | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | SSB | |
| Qrxlevmin | dBm/SCS | 1, 2, 4 | -140 | | -140 | |
|  |  | 3 | -137 | | -137 | |
| Pcompensation | dB | 1, 2, 3, 4 | 0 | | 0 | |
| Qhysts | dB | 1, 2, 3, 4 | 0 | | 0 | |
| Qoffsets, n | dB | 1, 2, 3, 4 | 0 | | 0 | |
| SSearchDeltaP-Stationary | dB | 1, 2, 3, 4 | 3 | | 3 | |
| TSearchDeltaP-Stationary | s | 1, 2, 3, 4 | 5 | | 5 | |
| Cell\_selection\_and\_ reselection\_quality\_ measurement |  | 1, 2, 3, 4 | SS-RSRP | | SS-RSRP | |
|  | dB | 1, 2, 3, 4 | -3.11 | 2.79 | 2.79 | -3.11 |
| Note2 | dBm/SCS | 1, 4 | -98 | | | |
|  |  | 2 | -98 | | | |
|  |  | 3 | -95 | | | |
| Note2 | dBm/15 kHz | 1, 2, 3, 4 | -98 | | | |
|  | dB | 1, 2, 3, 4 | 13 | 16 | 16 | 13 |
| SS-RSRP Note3 | dBm/SCS | 1, 4 | -85 | -82 | -82 | -85 |
|  |  | 2 | -85 | -82 | -82 | -85 |
|  |  | 3 | -82 | -79 | -79 | -82 |
| Io | dBm/9.36 MHz | 1, 4 | -52.21 | -52.21 | specified in Cell 1 columns- | |
|  | dBm/9.36 MHz | 2 | -52.21 | -52.21 |
|  | dBm/38.16 MHz | 3 | -46.12 | -46.12 |
| Treselection | s | 1, 2, 3, 4 | 0 | 0 | 0 | 0 |
| SintrasearchP | dB | 1, 2, 3, 4 | 60 | | 60 | |
| Propagation Condition |  | 1, 2, 3, 4 | 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.16.1.1.6.3 Test Requirements

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected cell shall be less than 32 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to an already detected cell shall be less than 32 s.

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

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

Where:

Tevaluate,NR\_Intra\_RedCap\_Relax See Table 4.2B.2.9.2-2 in clause 4.2B.2.9.2 for reselection to Cell 2 during T1 with UE fulfilling stationary criterion, 30.72 s.

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

This gives a total of 32 s for the cell re-selection delay to an already detected cell for UE fulfilling stationary criterion in the test case.

#### A.16.1.1.7 Cell reselection to FR1 inter-frequency NR case for UE fulfilling stationary relaxed measurement criterion for 1 Rx UE

##### A.16.1.1.7.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2B.2.10.2, for UE fulfilling stationary relaxed measurement criterion.

##### A.16.1.1.7.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.16.1.1.7.2-1, A.16.1.1.7.2-2 and A.16.1.1.7.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

As specified in the Test Purpose, the UE is configured with the stationary relaxed measurement criterion for UE defined in clause 5.2.4.9.1 in [1]. So, Cell 2 and Cell 1 configure the UE as follows:

* *stationaryMobilityEvaluation* [2] criterion is configured according to the parameters listed in Table A.16.1.1.7.2-3;
* *cellEdgeEvaluationWhileStationary* [2] criterion is not configured;
* *combineRelaxedMeasCondition2* [2] is not configured;

Table A.16.1.1.7.2-1: 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 |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.16.1.1.7.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case for UE fulfilling stationary relaxed measurement criterion for 1 Rx UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4 | Cell2 | The UE camps on cell 2 in the initial phase, it fulfills stationary relaxation measurements criterion, and during T1 period the UE reselects to cell 1 |
| Neighbour cells |  | 1, 2, 3, 4 | Cell1 |
| T1 end condition | Active cell |  | 1, 2, 3, 4 | Cell1 | The UE shall perform reselection to cell 1 during T1 |
| Neighbour cells |  | 1, 2, 3, 4 | Cell2 |
| T2 end condition | Active cell |  | 1, 2, 3, 4 | Cell2 | The UE shall perform reselection to cell 2 with higher priority during T2 |
| Neighbour cells |  | 1, 2, 3, 4 | Cell1 |
| RF Channel Number | |  | 1, 2, 3, 4 | 1, 2 |  |
| Time offset between cells | |  | 1, 4 | 3 ms | Asynchronous cells |
|  | |  | 2 | 3 μs | Synchronous cells |
|  | |  | 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3, 4 | Not Sent | No additional delays in random access procedure. |
| SSB Configuration | |  | 1, 4 | SSB.1 FR1 |  |
|  | |  | 2 | SSB.1 FR1 |  |
|  | |  | 3 | SSB.1 RedCap FR1 |  |
| SMTCconfiguration | |  | 1, 4 | SMTC.2 | Configured in SIB4 of Cell 1 |
| SMTC.6 | Configured in SIB4 of Cell 2 |
| 2 | SMTC.1 |  |
| 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3, 4 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3, 4 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3, 4 | Not configured |  |
| T1 | | s | 1, 2, 3, 4 | 25 s | T1 is defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3, 4 | 25 s | T2 is defined so that cell re-selection reaction time is taken into account. |

Table A.16.1.1.7.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN for UE fulfilling stationary relaxed measurement criterion for 1 Rx UE

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | | |
|  |  |  | T1 | T2 | T1 | | T2 |
| TDD configuration |  | 1, 4 | N/A | | N/A | | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | | |
| PDSCH RMC |  | 1, 4 | SR.1.1 FDD | | SR.1.1 FDD | | |
| configuration |  | 2 | SR.1.1 TDD | | SR.1.1 TDD | | |
|  |  | 3 | SR.2.1 TDD | | SR.2.1 TDD | | |
| RMSI CORESET |  | 1, 4 | CR.1.1 FDD | | CR.1.1 FDD | | |
| RMC configuration |  | 2 | CR.1.1 TDD | | CR.1.1 TDD | | |
|  |  | 3 | CR.2.1 TDD | | CR.2.1 TDD | | |
| Dedicated CORESET |  | 1, 4 | CCR.1.1 FDD | | CCR.1.1 FDD | | |
| RMC configuration |  | 2 | CCR.1.1 TDD | | CCR.1.1 TDD | | |
|  |  | 3 | CCR.2.1 TDD | | CCR.2.1 TDD | | |
| OCNG Pattern |  | 1, 2, 3, 4 | OP.1 defined in A.3.2.1 | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.0.1 | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2, 4 | -140 | | -140 | | |
|  |  | 3 | -137 | | -137 | | |
| Pcompensation | dB | 1, 2, 3, 4 | 0 | | 0 | | |
| Qhysts | dB | 1, 2, 3, 4 | 0 | | 0 | | |
| Qoffsets, n | dB | 1, 2, 3, 4 | 0 | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3, 4 | SS-RSRP | | SS-RSRP | | |
|  | dB | 1, 4 | 14 | 14 | -4 | 12 | |
|  |  | 2 |  |  |  |  | |
|  |  | 3 |  |  |  |  | |
| Note2 | dBm/SCS | 1, 4 | -98 | | | | |
|  |  | 2 | -98 | | | | |
|  |  | 3 | -95 | | | | |
| Note2 | dBm/15 kHz | 1, 4 | -98 | | | | |
|  |  | 2 |  | | | | |
|  |  | 3 |  | | | | |
|  | dB | 1, 4 | 14 | 14 | -4 | | 12 |
|  |  | 2 |  |  |  | |  |
|  |  | 3 |  |  |  | |  |
| SS-RSRP Note3 | dBm/SCS | 1, 4 | -84 | -84 | -102 | | -86 |
|  |  | 2 | -84 | -84 | -102 | | -86 |
|  |  | 3 | -81 | -81 | -99 | | -83 |
| Io | dBm/9.36 MHz | 1, 4 | -55.88 | -55.88 | -68.60 | | -57.78 |
|  | dBm/9.36 MHz | 2 | -55.88 | -55.88 | -68.60 | | -57.78 |
|  | dBm/38.16 MHz | 3 | -49.79 | -49.79 | -62.50 | | -51.69 |
| Treselection | s | 1, 2, 3, 4 | 0 | 0 | 0 | | 0 |
| SnonintrasearchP | dB | 1, 2, 3, 4 | Not sent | | Not sent | | |
| Threshx, highP | dB | 1, 2, 3, 4 | 48 | | 48 | | |
| Threshserving, lowP | dB | 1, 2, 3, 4 | 44 | | 44 | | |
| Threshx, lowP | dB | 1, 2, 3, 4 | 50 | | 50 | | |
| SSearchDeltaP-Stationary | dB | 1, 2, 3 | 3 | | 3 | | |
| TSearchDeltaP-Stationary | s | 1, 2, 3 | 5 | | 5 | | |
| 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.16.1.1.7.3 Test Requirements

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

The cell re-selection delay to a lower priority cell for UE fulfilling stationary relaxed measurements shall be less than 32 s.

The cell reselection delay to an already detected higher priority cell for UE fulfilling stationary relaxed measurements is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRCSetupRequest message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to an already detected higher priority cell for UE fulfilling stationary relaxed measurements shall be less than 32 s.

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

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

Where:

Tevaluate,NR\_Inter\_RedCap\_Relax See Table 4.2B.2.10.2-1 in clause 4.2B.2.10.2

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

This gives a total of 32 s for the cell re-selection delay to an already detected lower priority cell and 32 s for the cell re-selection delay to an already detected higher priority cell, for UE fulfilling stationary relaxed measurements in the test case.

#### A.16.1.1.8 Cell reselection to FR1 inter-frequency NR case for UE fulfilling stationary relaxed measurement criterion for 2 Rx UE

##### A.16.1.1.8.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2B.2.10.2, for UE fulfilling stationary relaxed measurement criterion.

##### A.16.1.1.8.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.16.1.1.8.2-1, A.16.1.1.8.2-2 and A.16.1.1.8.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

As specified in the Test Purpose, the UE is configured with the stationary relaxed measurement criterion for UE defined in clause 5.2.4.9.1 in [1]. So, Cell 2 and Cell 1 configure the UE as follows:

* *stationaryMobilityEvaluation* [2] criterion is configured according to the parameters listed in Table A.16.1.1.8.2-3;
* *cellEdgeEvaluationWhileStationary* [2] criterion is not configured;
* *combineRelaxedMeasCondition2* [2] is not configured;

Table A.16.1.1.8.2-1: 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 |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.16.1.1.8.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case for UE fulfilling stationary relaxed measurement criterion for 2 Rx UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4 | Cell2 | The UE camps on cell 2 in the initial phase, it fulfills stationary relaxation measurements criterion, and during T1 period the UE reselects to cell 1 |
| Neighbour cells |  | 1, 2, 3, 4 | Cell1 |
| T1 end condition | Active cell |  | 1, 2, 3, 4 | Cell1 | The UE shall perform reselection to cell 1 during T1 |
| Neighbour cells |  | 1, 2, 3, 4 | Cell2 |
| T2 end condition | Active cell |  | 1, 2, 3, 4 | Cell2 | The UE shall perform reselection to cell 2 with higher priority during T2 |
| Neighbour cells |  | 1, 2, 3, 4 | Cell1 |
| RF Channel Number | |  | 1, 2, 3, 4 | 1, 2 |  |
| Time offset between cells | |  | 1, 4 | 3 ms | Asynchronous cells |
|  | |  | 2 | 3 μs | Synchronous cells |
|  | |  | 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3, 4 | Not Sent | No additional delays in random access procedure. |
| SSB Configuration | |  | 1, 4 | SSB.1 FR1 |  |
|  | |  | 2 | SSB.1 FR1 |  |
|  | |  | 3 | SSB.1 RedCap FR1 |  |
| SMTCconfiguration | |  | 1, 4 | SMTC.2 | Configured in SIB4 of Cell 1 |
| SMTC.6 | Configured in SIB4 of Cell 2 |
| 2 | SMTC.1 |  |
| 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3, 4 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3, 4 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3, 4 | Not configured |  |
| T1 | | s | 1, 2, 3, 4 | 25 s | T1 is defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3, 4 | 25 s | T2 is defined so that cell re-selection reaction time is taken into account. |

Table A.16.1.1.8.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN for UE fulfilling stationary relaxed measurement criterion for 2 Rx UE

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | | |
|  |  |  | T1 | T2 | T1 | | T2 |
| TDD configuration |  | 1, 4 | N/A | | N/A | | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | | |
| PDSCH RMC |  | 1, 4 | SR.1.1 FDD | | SR.1.1 FDD | | |
| configuration |  | 2 | SR.1.1 TDD | | SR.1.1 TDD | | |
|  |  | 3 | SR.2.1 TDD | | SR.2.1 TDD | | |
| RMSI CORESET |  | 1, 4 | CR.1.1 FDD | | CR.1.1 FDD | | |
| RMC configuration |  | 2 | CR.1.1 TDD | | CR.1.1 TDD | | |
|  |  | 3 | CR.2.1 TDD | | CR.2.1 TDD | | |
| Dedicated CORESET |  | 1, 4 | CCR.1.1 FDD | | CCR.1.1 FDD | | |
| RMC configuration |  | 2 | CCR.1.1 TDD | | CCR.1.1 TDD | | |
|  |  | 3 | CCR.2.1 TDD | | CCR.2.1 TDD | | |
| OCNG Pattern |  | 1, 2, 3, 4 | OP.1 defined in A.3.2.1 | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.0.1 | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2, 4 | -140 | | -140 | | |
|  |  | 3 | -137 | | -137 | | |
| Pcompensation | dB | 1, 2, 3, 4 | 0 | | 0 | | |
| Qhysts | dB | 1, 2, 3, 4 | 0 | | 0 | | |
| Qoffsets, n | dB | 1, 2, 3, 4 | 0 | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3, 4 | SS-RSRP | | SS-RSRP | | |
|  | dB | 1, 4 | 14 | 14 | -4 | 12 | |
|  |  | 2 |  |  |  |  | |
|  |  | 3 |  |  |  |  | |
| Note2 | dBm/SCS | 1, 4 | -98 | | | | |
|  |  | 2 | -98 | | | | |
|  |  | 3 | -95 | | | | |
| Note2 | dBm/15 kHz | 1, 4 | -98 | | | | |
|  |  | 2 |  | | | | |
|  |  | 3 |  | | | | |
|  | dB | 1, 4 | 14 | 14 | -4 | | 12 |
|  |  | 2 |  |  |  | |  |
|  |  | 3 |  |  |  | |  |
| SS-RSRP Note3 | dBm/SCS | 1, 4 | -84 | -84 | -102 | | -86 |
|  |  | 2 | -84 | -84 | -102 | | -86 |
|  |  | 3 | -81 | -81 | -99 | | -83 |
| Io | dBm/9.36 MHz | 1, 4 | -55.88 | -55.88 | -68.60 | | -57.78 |
|  | dBm/9.36 MHz | 2 | -55.88 | -55.88 | -68.60 | | -57.78 |
|  | dBm/38.16 MHz | 3 | -49.79 | -49.79 | -62.50 | | -51.69 |
| Treselection | s | 1, 2, 3, 4 | 0 | 0 | 0 | | 0 |
| SnonintrasearchP | dB | 1, 2, 3, 4 | Not sent | | Not sent | | |
| Threshx, highP | dB | 1, 2, 3, 4 | 48 | | 48 | | |
| Threshserving, lowP | dB | 1, 2, 3, 4 | 44 | | 44 | | |
| Threshx, lowP | dB | 1, 2, 3, 4 | 50 | | 50 | | |
| SSearchDeltaP-Stationary | dB | 1, 2, 3, 4 | 3 | | 3 | | |
| TSearchDeltaP-Stationary | s | 1, 2, 3, 4 | 5 | | 5 | | |
| Propagation Condition |  | 1, 2, 3, 4 | 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.16.1.1.8.3 Test Requirements

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

The cell re-selection delay to a lower priority cell for UE fulfilling stationary relaxed measurements shall be less than 32 s.

The cell reselection delay to an already detected higher priority cell for UE fulfilling stationary relaxed measurements is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRCSetupRequest message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to an already detected higher priority cell for UE fulfilling stationary relaxed measurements shall be less than 32 s.

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

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

Where:

Tevaluate,NR\_Inter\_RedCap\_Relax See Table 4.2B.2.10.2-2 in clause 4.2B.2.10.2

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

This gives a total of 32 s for the cell re-selection delay to an already detected lower priority cell and 32 s for the cell re-selection delay to an already detected higher priority cell, for UE fulfilling stationary relaxed measurements in the test case.

### A.16.1.2 Inter-RAT E-UTRAN cell re-selection for RedCap

#### A.16.1.2.1 Cell reselection to higher priority E-UTRAN for 1RX

##### A.16.1.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2B.2.5 when the E-UTRAN cell is of higher priority.

##### A.16.1.2.1.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.16.1.2.1.2-1, A.16.1.2.1.2-2, A.16.1.2.1.2-3 and A.16.1.2.1.2-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. NR cell 1 is already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of higher priority than cell 1.

Table A.16.1.2.1.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of serving cell | Description of target cell |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 6 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.16.1.2.1.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 | The UE camps on cell 1 in the initial phase and during T2 period the UE reselects to cell 2. |
| T2 end | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 | The UE shall perform reselection to cell |
| condition | Neighbour cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 | 2 during T2. |
| T3 end | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 | The UE shall perform reselection to cell |
| condition | Neighbour cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 | 1 during T3 for iteration of the tests. |
| Access Barring Information | | - | 1, 2, 3, 4, 5, 6, 7, 8 | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 1.28 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2, 3, 4, 5, 6, 7, 8 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| E-UTRAN PRACH configuration index | |  | 1, 2, 3, 7 | 53 | As specified in table 5.7.1-2 in TS 36.211 [23] |
|  | | 4, 5, 6, 8 | 4 |  |
| E-UTRAN PRACH | |  | 1, 2, 3 | 53 | As specified in table 5.7.1-2 in |
| configuration index | |  | 4, 5, 6 | 4 | TS 36.211 [23] |
| T1 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | >7 | During T1, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T2. |
| T2 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 75 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 15 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.16.1.2.1.2-3: Cell specific test parameters for NR cell 1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | |
|  |  |  | T1 | T2 | T3 |
| TDD configuration |  | 1, 4, 7, 8 | N/A | | |
|  |  | 2, 5 | TDDConf.1.1 | | |
|  |  | 3, 6 | TDDConf.2.1 | | |
| PDSCH parameters |  | 1, 4, 7, 8 | SR.1.1 FDD | | |
|  |  | 2, 5 | SR.1.1 TDD | | |
|  |  | 3, 6 | SR.2.1 TDD | | |
| RMSI CORESET parameters |  | 1, 4, 7, 8 | CR.1.1 FDD | | |
|  |  | 2, 5 | CR.1.1 TDD | | |
|  |  | 3, 6 | CR.2.1 TDD | | |
| Dedicated CORESET parameters |  | 1, 4, 7, 8 | CCR.1.1 FDD | | |
|  |  | 2, 5 | CCR.1.1 TDD | | |
|  |  | 3, 6 | CCR.2.1 TDD | | |
| SSB parameters |  | 1, 4, 7, 8 | SSB.1 FR1 | | |
|  |  | 2, 5 | SSB.1 FR1 | | |
|  |  | 3, 6 | SSB.1 RedCap FR1 | | |
| NR SMTC parameters |  | 1, 4, 7, 8 | SMTC.2 | | |
|  |  | 2, 5 | SMTC.1 | | |
|  |  | 3, 6 | SMTC.1 | | |
| OCNG Pattern |  | 1, 2, 3, 4, 5, 6, 7, 8 | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4, 5, 6, 7, 8 | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4, 5, 6, 7, 8 | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6, 7, 8 | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2, 4, 5 | -140 | | |
|  |  | 3, 6 | -137 | | |
|  | dBm/SCS | 1, 4, 7, 8 | -98 | | |
|  |  | 2, 5 | -98 | | |
|  |  | 3, 6 | -95 | | |
|  | dBm/15 kHz | 1, 2, 3, 4, 5, 6, 7, 8 | -98 | | |
| SS-RSRP | dBm/SCS | 1, 4, 7, 8 | -84 | -84 | -84 |
|  |  | 2, 5 | -84 | -84 | -84 |
|  |  | 3, 6 | -81 | -81 | -81 |
|  | dB | 1, 4, 7, 8 | 14 | 14 | 14 |
|  |  | 2, 5 |  |  |  |
|  |  | 3, 6 |  |  |  |
|  | dB | 1, 4, 7, 8 | 14 | 14 | 14 |
|  |  | 2, 5 |  |  |  |
|  |  | 3, 6 |  |  |  |
| Io | dBm/9.36 MHz | 1, 4, 7, 8 | -55.88 | -55.88 | -55.88 |
|  | dBm/9.36 MHz | 2, 5 | -55.88 | -55.88 | -55.88 |
|  | dBm/38.16 MHz | 3, 6 | -49.79 | -49.79 | -49.79 |
| Treselection | S | 1, 2, 3, 4, 5, 6, 7, 8 | 0 | | |
| SnonintrasearchP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 50 | | |
| Threshx, highP (Note 2) | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 48 | | |
| Threshserving, lowP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 44 | | |
| Threshx, lowP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 50 | | |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6, 7, 8 | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, high** which is included in NR system information, and is a threshold for the E-UTRA target cell | | | | | |

Table A.16.1.2.1.2-4: Cell specific test parameters for E-UTRA cell 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 2** | | | |
|  |  | **T1** | **T2** | | **T3** |
| E-UTRA RF Channel number |  | 1 | | | |
| BWchannel | MHz | 10 | | | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | | | |
| PBCH\_RA | dB | 0 | | | |
| PBCH\_RB | dB |  | | | |
| PSS\_RA | dB |  | | | |
| SSS\_RA | dB |  | | | |
| PCFICH\_RB | dB |  | | | |
| PHICH\_RA | dB |  | | | |
| PHICH\_RB | dB |  | | | |
| PDCCH\_RA | dB |  | | | |
| PDCCH\_RB | dB |  | | | |
| PDSCH\_RA | dB |  | | | |
| PDSCH\_RB | dB |  | | | |
| OCNG\_RANote 1 | dB |  | | | |
| OCNG\_RBNote 1 | dB |  | | | |
| Qrxlevmin | dBm | -140 | | | |
|  | dBm/15 kHz | -98 | | | |
| RSRP | dBm/15 KHz | -infinity | | -86 | -102 |
|  | dB | -infinity | | 12 | -4 |
|  | dB | -infinity | | 12 | -4 |
| TreselectionEUTRAN | S | 0 | | | |
| SnonintrasearchP | dB | Not sent | | | |
| Threshx, highP | dB | 48 | | | |
| Threshserving, lowP | dB | 44 | | | |
| Threshx, lowP (Note 2) | dB | 50 | | | |
| Propagation Condition |  | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, Low** which is included in E-UTRA system information, and is a threshold for the NR target cell | | | | | |

##### A.16.1.2.1.3 Test Requirements

The cell reselection delay to a higher priority E-UTRAN cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

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

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

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

Where:

Thigher\_priority\_search\_RedCap See clause 4.2B.2.7

Tevaluate, E-UTRAN\_RedCap  See Table 4.2B.2.5-1 in clause 4.2B.2.5

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

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority E-UTRAN cell.

#### A.16.1.2.2 Cell reselection to higher priority E-UTRAN for 2RX

##### A.16.1.2.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2.2.5 when the E-UTRAN cell is of higher priority.

##### A.16.1.2.2.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.16.1.2.2.2-1, A. 16.1.2.2.2-2, A. 16.1.2.2.2-3 and A. 16.1.2.2.2-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. NR cell 1 is already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of higher priority than cell 1.

Table A.16.1.2.2.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of serving cell | Description of target cell |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 6 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A. 16.1.2.2.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 | The UE camps on cell 1 in the initial phase and during T2 period the UE reselects to cell 2. |
| T2 end | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 | The UE shall perform reselection to cell |
| condition | Neighbour cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 | 2 during T2. |
| T3 end | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 | The UE shall perform reselection to cell |
| condition | Neighbour cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 | 1 during T3 for iteration of the tests. |
| Access Barring Information | | - | 1, 2, 3, 4, 5, 6, 7, 8 | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 1.28 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2, 3, 4, 5, 6, 7, 8 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| E-UTRAN PRACH configuration index | |  | 1, 2, 3, 7 | 53 | As specified in table 5.7.1-2 in TS 36.211 [23] |
|  | | 4, 5, 6, 8 | 4 |  |
| E-UTRAN PRACH | |  | 1, 2, 3 | 53 | As specified in table 5.7.1-2 in |
| configuration index | |  | 4, 5, 6 | 4 | TS 36.211 [23] |
| T1 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | >7 | During T1, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T2. |
| T2 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 75 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 15 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A. 16.1.2.2.2-3: Cell specific test parameters for NR cell 1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | |
|  |  |  | T1 | T2 | T3 |
| TDD configuration |  | 1, 4, 7, 8 | N/A | | |
|  |  | 2, 5 | TDDConf.1.1 | | |
|  |  | 3, 6 | TDDConf.2.1 | | |
| PDSCH parameters |  | 1, 4, 7, 8 | SR.1.1 FDD | | |
|  |  | 2, 5 | SR.1.1 TDD | | |
|  |  | 3, 6 | SR.2.1 TDD | | |
| RMSI CORESET parameters |  | 1, 4, 7, 8 | CR.1.1 FDD | | |
|  |  | 2, 5 | CR.1.1 TDD | | |
|  |  | 3, 6 | CR.2.1 TDD | | |
| Dedicated CORESET parameters |  | 1, 4, 7, 8 | CCR.1.1 FDD | | |
|  |  | 2, 5 | CCR.1.1 TDD | | |
|  |  | 3, 6 | CCR.2.1 TDD | | |
| SSB parameters |  | 1, 4, 7, 8 | SSB.1 FR1 | | |
|  |  | 2, 5 | SSB.1 FR1 | | |
|  |  | 3, 6 | SSB.1 RedCap FR1 | | |
| NR SMTC parameters |  | 1, 4, 7, 8 | SMTC.2 | | |
|  |  | 2, 5 | SMTC.1 | | |
|  |  | 3, 6 | SMTC.1 | | |
| OCNG Pattern |  | 1, 2, 3, 4, 5, 6, 7, 8 | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4, 5, 6, 7, 8 | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4, 5, 6, 7, 8 | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6, 7, 8 | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2, 4, 5 | -140 | | |
|  |  | 3, 6 | -137 | | |
|  | dBm/SCS | 1, 4, 7, 8 | -98 | | |
|  |  | 2, 5 | -98 | | |
|  |  | 3, 6 | -95 | | |
|  | dBm/15 kHz | 1, 2, 3, 4, 5, 6, 7, 8 | -98 | | |
| SS-RSRP | dBm/SCS | 1, 4, 7, 8 | -84 | -84 | -84 |
|  |  | 2, 5 | -84 | -84 | -84 |
|  |  | 3, 6 | -81 | -81 | -81 |
|  | dB | 1, 4, 7, 8 | 14 | 14 | 14 |
|  |  | 2, 5 |  |  |  |
|  |  | 3, 6 |  |  |  |
|  | dB | 1, 4, 7, 8 | 14 | 14 | 14 |
|  |  | 2, 5 |  |  |  |
|  |  | 3, 6 |  |  |  |
| Io | dBm/9.36 MHz | 1, 4, 7, 8 | -55.88 | -55.88 | -55.88 |
|  | dBm/9.36 MHz | 2, 5 | -55.88 | -55.88 | -55.88 |
|  | dBm/38.16 MHz | 3, 6 | -49.79 | -49.79 | -49.79 |
| Treselection | S | 1, 2, 3, 4, 5, 6, 7, 8 | 0 | | |
| SnonintrasearchP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 50 | | |
| Threshx, highP (Note 2) | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 48 | | |
| Threshserving, lowP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 44 | | |
| Threshx, lowP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 50 | | |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6, 7, 8 | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, high** which is included in NR system information, and is a threshold for the E-UTRA target cell | | | | | |

Table A. 16.1.2.2.2-4: Cell specific test parameters for E-UTRA cell 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 2** | | | |
|  |  | **T1** | **T2** | | **T3** |
| E-UTRA RF Channel number |  | 1 | | | |
| BWchannel | MHz | 10 | | | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | | | |
| PBCH\_RA | dB | 0 | | | |
| PBCH\_RB | dB |  | | | |
| PSS\_RA | dB |  | | | |
| SSS\_RA | dB |  | | | |
| PCFICH\_RB | dB |  | | | |
| PHICH\_RA | dB |  | | | |
| PHICH\_RB | dB |  | | | |
| PDCCH\_RA | dB |  | | | |
| PDCCH\_RB | dB |  | | | |
| PDSCH\_RA | dB |  | | | |
| PDSCH\_RB | dB |  | | | |
| OCNG\_RANote 1 | dB |  | | | |
| OCNG\_RBNote 1 | dB |  | | | |
| Qrxlevmin | dBm | -140 | | | |
|  | dBm/15 kHz | -98 | | | |
| RSRP | dBm/15 KHz | -infinity | | -86 | -102 |
|  | dB | -infinity | | 12 | -4 |
|  | dB | -infinity | | 12 | -4 |
| TreselectionEUTRAN | S | 0 | | | |
| SnonintrasearchP | dB | Not sent | | | |
| Threshx, highP | dB | 48 | | | |
| Threshserving, lowP | dB | 44 | | | |
| Threshx, lowP (Note 2) | dB | 50 | | | |
| Propagation Condition |  | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, Low** which is included in E-UTRA system information, and is a threshold for the NR target cell | | | | | |

##### A.16.1.2.2.3 Test Requirements

The cell reselection delay to a higher priority E-UTRAN cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

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

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

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

Where:

Thigher\_priority\_search\_RedCap See clause 4.2B.2.7

Tevaluate, E-UTRAN\_RedCap  See Table 4.2B.2.5-1 in clause 4.2B.2.5

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

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority E-UTRAN cell.

A.16.1.2.3 Cell reselection to lower priority E-UTRAN for 1RX

##### A.16.1.2.3.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2B.2.5 when the E-UTRAN cell is of lower priority.

##### A. 16.1.2.3.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A16.1.2.3.2-1, A16.1.2.3.2-2, A16.1.2.3.2-3 and A16.1.2.3.2-4. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

Table A.16.1.2.3.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of serving cell | Description of target cell |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 6 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.16.1.2.3.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 | The UE camps on cell 1 in the initial phase. |
|  | Neighbour cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 |  |
| T1 end condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 | The UE shall perform reselection to cell 2 during T1. |
|  | Neighbour cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 |  |
| T2 end condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 | The UE shall perform reselection to cell 1 during T2 for iteration of the tests. |
|  | Neighbour cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 |  |
| Access Barring Information | | - | 1, 2, 3, 4, 5, 6, 7, 8 | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 1.28 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2, 3, 4, 5, 6, 7, 8 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| E-UTRAN PRACH configuration index | |  | 1, 2, 3, 7 | 534 | As specified in table 5.7.1-2 in TS 36.211 [23] |
|  | |  | 4, 5, 6, 8 |  |  |
| T1 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 15 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 75 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A. 16.1.2.3.2-3: Cell specific test parameters for NR cell 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | |
|  |  |  | **T1** | **T2** |
| TDD configuration |  | 1, 4, 7, 8 | N/A | |
|  |  | 2, 5 | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4, 7, 8 | SR.1.1 FDD | |
|  |  | 2, 5 | SR.1.1 TDD | |
|  |  | 3, 6 | SR.2.1 TDD | |
| RMSI CORESET RMC |  | 1, 4, 7, 8 | CR.1.1 FDD | |
| configuration |  | 2, 5 | CR.1.1 TDD | |
|  |  | 3, 6 | CR.2.1 TDD | |
| Dedicated CORESET RMC |  | 1, 4, 7, 8 | CCR.1.1 FDD | |
| configuration |  | 2, 5 | CCR.1.1 TDD | |
|  |  | 3, 6 | CCR.2.1 TDD | |
| SSB configuration |  | 1, 4, 7, 8 | SSB.1 FR1 | |
|  |  | 2, 5 | SSB.1 FR1 | |
|  |  | 3, 6 | SSB.1 RedCap FR1 | |
| SMTC configuration |  | 1, 4, 7, 8 | SMTC.2 | |
|  |  | 2, 5 | SMTC.1 | |
|  |  | 3, 6 | SMTC.1 | |
| OCNG Pattern |  | 1, 2, 3, 4, 5, 6, 7, 8 | OP.1 defined in A.3.2.1 | |
| Initial DL BWP configuration |  | 1, 2, 3, 4, 5, 6, 7, 8 | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2, 3, 4, 5, 6, 7, 8 | ULBWP.0.1 | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6, 7, 8 | SSB | |
| Qrxlevmin | dBm/SCS | 1, 2, 4, 5 | -140 | |
|  |  | 3, 6 | -137 | |
|  | dBm/SCS | 1, 4, 7, 8 | -98 | |
|  |  | 2, 5 | -98 | |
|  |  | 3, 6 | -95 | |
|  | dBm/15 kHz | 1, 2, 3, 4, 5, 6, 7, 8 | -98 | |
| SS-RSRP | dBm/SCS | 1, 4, 7, 8 | -102 | -86 |
|  |  | 2, 5 | -102 | -86 |
|  |  | 3, 6 | -99 | -83 |
|  | dB | 1, 4, 7, 8 | -4 | 12 |
|  |  | 2, 5 |  |  |
|  |  | 3, 6 |  |  |
|  | dB | 1, 4, 7, 8 | -4 | 12 |
|  |  | 2, 5 |  |  |
|  |  | 3, 6 |  |  |
| Io | dBm/9.36 MHz | 1, 4, 7, 8 | -68.60 | -57.78 |
|  | dBm/9.36 MHz | 2, 5 | -68.60 | -57.78 |
|  | dBm/38.16 MHz | 3, 6 | -62.50 | -51.69 |
| Treselection | S | 1, 2, 3, 4, 5, 6, 7, 8 | 0 | |
| SnonintrasearchP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | Not sent | |
| Threshx, highP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 48 | |
| Threshserving, lowP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 44 | |
| Threshx, lowP (Note 2) | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 50 | |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6, 7, 8 | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, high** which is included in NR system information, and is a threshold for the E-UTRA target cell | | | | |

Table A.16.1.2.3.2-4: Cell specific test parameters for E-UTRA cell 2

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
|  |  | T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -84 | -84 |
|  | dB | 14 | 14 |
|  | dB | 14 | 14 |
| TreselectionEUTRAN | S | 0 | |
| SnonintrasearchP | dB | Not sent | |
| Threshx, highP (Note 2) | dB | 48 | |
| Threshserving, lowP | dB | 44 | |
| Threshx, lowP | dB | 50 | |
| Propagation Condition |  | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, high** which is included in E-UTRA system information, and is a threshold for the NR target cell | | | |

##### A.16.1.2.3.3 Test Requirements

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

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

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

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: Tevaluate, E-UTRAN + TSI-E-UTRA,

Where:

Thigher\_priority\_search\_RedCap See clause 4.2B.2.7

Tevaluate, E-UTRAN\_RedCap  See Table 4.2B.2.5-1 in clause 4.2B.2.5

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

This gives a total of 7.68 s, allow 8 s for the cell re-selection delay to a lower priority E-UTRAN cell.

A.16.1.2.4 Cell reselection to lower priority E-UTRAN for 2RX

##### A.16.1.2.4.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2B.2.5 when the E-UTRAN cell is of lower priority.

##### A.16.1.2.4.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A16.1.2.4.2-1, A16.1.2.4.2-2, A16.1.2.4.2-3 and A16.1.2.4.2-4. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

Table A.16.1.2.4.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of serving cell | Description of target cell |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 6 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A. 16.1.2.4.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 | The UE camps on cell 1 in the initial phase. |
|  | Neighbour cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 |  |
| T1 end condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 | The UE shall perform reselection to cell 2 during T1. |
|  | Neighbour cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 |  |
| T2 end condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 | The UE shall perform reselection to cell 1 during T2 for iteration of the tests. |
|  | Neighbour cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 |  |
| Access Barring Information | | - | 1, 2, 3, 4, 5, 6, 7, 8 | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 1.28 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2, 3, 4, 5, 6, 7, 8 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| E-UTRAN PRACH configuration index | |  | 1, 2, 3, 7 | 534 | As specified in table 5.7.1-2 in TS 36.211 [23] |
|  | |  | 4, 5, 6, 8 |  |  |
| T1 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 15 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 75 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A. 16.1.2.4.2-3: Cell specific test parameters for NR cell 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | |
|  |  |  | **T1** | **T2** |
| TDD configuration |  | 1, 4, 7, 8 | N/A | |
|  |  | 2, 5 | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4, 7, 8 | SR.1.1 FDD | |
|  |  | 2, 5 | SR.1.1 TDD | |
|  |  | 3, 6 | SR.2.1 TDD | |
| RMSI CORESET RMC |  | 1, 4, 7, 8 | CR.1.1 FDD | |
| configuration |  | 2, 5 | CR.1.1 TDD | |
|  |  | 3, 6 | CR.2.1 TDD | |
| Dedicated CORESET RMC |  | 1, 4, 7, 8 | CCR.1.1 FDD | |
| configuration |  | 2, 5 | CCR.1.1 TDD | |
|  |  | 3, 6 | CCR.2.1 TDD | |
| SSB configuration |  | 1, 4, 7, 8 | SSB.1 FR1 | |
|  |  | 2, 5 | SSB.1 FR1 | |
|  |  | 3, 6 | SSB.1 RedCap FR1 | |
| SMTC configuration |  | 1, 4, 7, 8 | SMTC.2 | |
|  |  | 2, 5 | SMTC.1 | |
|  |  | 3, 6 | SMTC.1 | |
| OCNG Pattern |  | 1, 2, 3, 4, 5, 6, 7, 8 | OP.1 defined in A.3.2.1 | |
| Initial DL BWP configuration |  | 1, 2, 3, 4, 5, 6, 7, 8 | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2, 3, 4, 5, 6, 7, 8 | ULBWP.0.1 | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6, 7, 8 | SSB | |
| Qrxlevmin | dBm/SCS | 1, 2, 4, 5 | -140 | |
|  |  | 3, 6 | -137 | |
|  | dBm/SCS | 1, 4 | -98 | |
|  |  | 2, 5 | -98 | |
|  |  | 3, 6 | -95 | |
|  | dBm/15 kHz | 1, 2, 3, 4, 5, 6, 7, 8 | -98 | |
| SS-RSRP | dBm/SCS | 1, 4, 7, 8 | -102 | -86 |
|  |  | 2, 5 | -102 | -86 |
|  |  | 3, 6 | -99 | -83 |
|  | dB | 1, 4, 7, 8 | -4 | 12 |
|  |  | 2, 5 |  |  |
|  |  | 3, 6 |  |  |
|  | dB | 1, 4, 7, 8 | -4 | 12 |
|  |  | 2, 5 |  |  |
|  |  | 3, 6 |  |  |
| Io | dBm/9.36 MHz | 1, 4, 7, 8 | -68.60 | -57.78 |
|  | dBm/9.36 MHz | 2, 5 | -68.60 | -57.78 |
|  | dBm/38.16 MHz | 3, 6 | -62.50 | -51.69 |
| Treselection | S | 1, 2, 3, 4, 5, 6, 7, 8 | 0 | |
| SnonintrasearchP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | Not sent | |
| Threshx, highP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 48 | |
| Threshserving, lowP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 44 | |
| Threshx, lowP (Note 2) | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 50 | |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6, 7, 8 | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, high** which is included in NR system information, and is a threshold for the E-UTRA target cell | | | | |

Table A. 16.1.2.4.2-4: Cell specific test parameters for E-UTRA cell 2

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
|  |  | T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -84 | -84 |
|  | dB | 14 | 14 |
|  | dB | 14 | 14 |
| TreselectionEUTRAN | S | 0 | |
| SnonintrasearchP | dB | Not sent | |
| Threshx, highP (Note 2) | dB | 48 | |
| Threshserving, lowP | dB | 44 | |
| Threshx, lowP | dB | 50 | |
| Propagation Condition |  | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, high** which is included in E-UTRA system information, and is a threshold for the NR target cell | | | |

##### A.16.1.3.1.3 Test Requirements

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

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

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

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: Tevaluate, E-UTRAN + TSI-E-UTRA,

Where:

Thigher\_priority\_search\_RedCap See clause 4.2B.2.7

Tevaluate, E-UTRAN\_RedCap  See Table 4.2B.2.5-1 in clause 4.2B.2.5

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

This gives a total of 7.68 s, allow 8 s for the cell re-selection delay to a lower priority E-UTRAN cell.

#### A.16.1.2.5 Cell reselection to lower priority E-UTRAN for UE fulfilling stationary relaxed measurement criterion for 1 Rx UE

##### A.16.1.2.5.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection when UE fulfills the stationary relaxed measurement criterion specified in clause 4.2B.2.11.2 and the E-UTRAN cell is of lower priority.

##### A.16.1.2.5.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.16.1.2.5.2-1, A.16.1.2.5.2-2, A.16.1.2.5.2-3 and A.16.1.2.5.2-4. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

As specified in the Test Purpose, the UE is configured with the stationary relaxed measurement criterion defined in clause 5.2.4.9.1 in [1]. So, Cell 1 configures the UE as follows:

* *stationaryMobilityEvaluation* [2] criterion is configured according to the parameters listed in Table A.16.1.1.8.2-3;
* *cellEdgeEvaluationWhileStationary* [2] criterion is not configured;
* *combineRelaxedMeasCondition2* [2] is not configured;

Table A.16.1.2.5.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of serving cell | Description of target cell |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 6 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.16.1.2.5.2-2: General test parameters for NR to E-UTRAN cell re-selection test case for UE fulfilling stationary criterion for 1 Rx UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 | The UE camps on cell 1 in the initial phase, it fulfills stationary criterion, and during T1 period the UE reselects to cell 2 |
| Neighbour cells |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 |
| T1 end condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 | The UE shall perform reselection to cell 2 during T1 |
| Neighbour cells |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 |
| T2 end condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 | The UE shall perform reselection to cell 1 with higher priority during T2 for iteration of the tests. |
| Neighbour cells |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 |
| Access Barring Information | | - | 1, 2, 3, 4, 5, 6, 7, 8 | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 0.64 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2, 3, 4, 5, 6, 7, 8 | TBD | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| E-UTRAN PRACH configuration index | |  | 1, 2, 3, 7, 8 | 53 | As specified in table 5.7.1-2 in TS 36.211 [23] |
| 4, 5, 6 | 4 |
| T1 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 24 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 24 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.16.1.2.5.2-3: Cell specific test parameters for NR cell 1 for 1 Rx UE

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | |
|  |  |  | T1 | T2 |
| TDD configuration |  | 1, 4,7, 8 | N/A | |
|  |  | 2, 5 | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4, 8 | SR.1.1 FDD | |
|  |  | 2, 5 | SR.1.1 TDD | |
|  |  | 3, 6 | SR.2.1 TDD | |
| RMSI CORESET RMC |  | 1, 4, 8 | CR.1.1 FDD | |
| configuration |  | 2, 5 | CR.1.1 TDD | |
|  |  | 3, 6 | CR.2.1 TDD | |
| Dedicated CORESET RMC |  | 1, 4, 8 | CCR.1.1 FDD | |
| configuration |  | 2, 5 | CCR.1.1 TDD | |
|  |  | 3, 6 | CCR.2.1 TDD | |
| SSB configuration |  | 1, 4, 8 | SSB.1 FR1 | |
|  |  | 2, 5 | SSB.1 FR1 | |
|  |  | 3, 6 | SSB.2 FR1 | |
| SMTC configuration |  | 1, 4, 8 | SMTC.2 | |
|  |  | 2, 5 | SMTC.1 | |
|  |  | 3, 6 | SMTC.1 | |
| OCNG Pattern |  | 1, 2, 3, 4, 5, 6, 7, 8 | OP.1 defined in A.3.2.1 | |
| Initial DL BWP configuration |  | 1, 2, 3, 4, 5, 6, 7, 8 | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2, 3, 4, 5, 6, 7, 8 | ULBWP.0.1 | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6, 7, 8 | SSB | |
| Qrxlevmin | dBm/SCS | 1, 2, 4, 5 | -140 | |
|  |  | 3, 6 | -137 | |
|  | dBm/SCS | 1, 4, 8 | -98 | |
|  |  | 2, 5 | -98 | |
|  |  | 3, 6 | -95 | |
|  | dBm/15 kHz | 1, 2, 3, 4, 5, 6, 7, 8 | -98 | |
| SS-RSRP | dBm/SCS | 1, 4, 8 | -102 | -86 |
|  |  | 2, 5 | -102 | -86 |
|  |  | 3, 6 | -99 | -83 |
|  | dB | 1, 4, 8 | -4 | 12 |
|  |  | 2, 5 |  |  |
|  |  | 3, 6 |  |  |
|  | dB | 1, 4, 8 | -4 | 12 |
|  |  | 2, 5 |  |  |
|  |  | 3, 6 |  |  |
| Io | dBm/9.36 MHz | 1, 4, 8 | -68.60 | -57.78 |
|  | dBm/9.36 MHz | 2, 5 | -68.60 | -57.78 |
|  | dBm/38.16 MHz | 3, 6 | -62.50 | -51.69 |
| TreselectionP | S | 1, 2, 3, 4, 5, 6, 7, 8 | 0 | |
| Snonintrasearch | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 50 | |
| Threshx, highP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 48 | |
| Threshserving, lowP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 44 | |
| Threshx, lowP (Note 2) | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 50 | |
| SSearchDeltaP-Stationary | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 3 | |
| TSearchDeltaP-Stationary | s | 1, 2, 3, 4, 5, 6, 7, 8 | 5 | |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6, 7, 8 | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, low** which is included in NR system information, and is a threshold for the E-UTRA target cell | | | | |

**Table A.16.1.2.5.2-4: Cell specific test parameters for E-UTRA cell 2 for 1 Rx UE**

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
|  |  | T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |  | |
| PSS\_RA | dB |  | |
| SSS\_RA | dB |  | |
| PCFICH\_RB | dB |  | |
| PHICH\_RA | dB |  | |
| PHICH\_RB | dB |  | |
| PDCCH\_RA | dB |  | |
| PDCCH\_RB | dB |  | |
| PDSCH\_RA | dB |  | |
| PDSCH\_RB | dB |  | |
| OCNG\_RANote 1 | dB |  | |
| OCNG\_RBNote 1 | dB |  | |
| Qrxlevmin | dBm | -140 | |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -84 | -84 |
|  | dB | 14 | 14 |
|  | dB | 14 | 14 |
| TreselectionEUTRAN | S | 0 | |
| Snonintrasearch | dB | Not sent | |
| Threshx, high (Note 2) | dB | 48 | |
| Threshserving, low | dB | 44 | |
| Threshx, low | dB | 50 | |
| Propagation Condition |  | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, high** which is included in E-UTRA system information, and is a threshold for the NR target cell | | | |

##### A.16.1.2.5.3 Test Requirements

The cell reselection delay to a lower priority E-UTRAN cell with UE fulfilling stationary relaxed measurement criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCConnectionRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 32 s.

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

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: Tevaluate,EUTRAN\_Relax + TSI-E-UTRA,

Where:

Tevaluate,EUTRAN\_Relax See Table 4.2B.2.11.2-1 in clause 4.2B.2.11.2

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

This gives a total of 30.72 (Tevaluate,EUTRAN\_Relax) + 1.28 (TSI-E-UTRA) = 32 s for the cell re-selection delay to a lower priority E-UTRAN cell for stationary relaxed measurement criterion.

#### A.16.1.2.6 Cell reselection to lower priority E-UTRAN for UE fulfilling stationary relaxed measurement criterion for 2 Rx UE

##### A.16.1.2.6.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection when UE fulfills the stationary relaxed measurement criterion specified in clause 4.2B.2.11.2 and the E-UTRAN cell is of lower priority.

##### A.16.1.2.6.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.16.1.2.6.2-1, A.16.1.2.6.2-2, A.16.1.2.6.2-3 and A.16.1.2.6.2-4. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

As specified in the Test Purpose, the UE is configured with the stationary relaxed measurement criterion defined in clause 5.2.4.9.1 in [1]. So, Cell 1 configures the UE as follows:

* *stationaryMobilityEvaluation* [2] criterion is configured according to the parameters listed in Table A.16.1.1.8.2-3;
* *cellEdgeEvaluationWhileStationary* [2] criterion is not configured;
* *combineRelaxedMeasCondition2* [2] is not configured;

Table A.16.1.2.6.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of serving cell | Description of target cell |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 6 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.16.1.2.6.2-2: General test parameters for NR to E-UTRAN cell re-selection test case for UE fulfilling stationary criterion for 2 Rx UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 | The UE camps on cell 1 in the initial phase, it fulfills stationary criterion, and during T1 period the UE reselects to cell 2 |
| Neighbour cells |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 |
| T1 end condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 | The UE shall perform reselection to cell 2 during T1 |
| Neighbour cells |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 |
| T2 end condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 | The UE shall perform reselection to cell 1 with higher priority during T2 for iteration of the tests. |
| Neighbour cells |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 |
| Access Barring Information | | - | 1, 2, 3, 4, 5, 6, 7, 8 | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 0.64 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2, 3, 4, 5, 6, 7, 8 | TBD | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| E-UTRAN PRACH configuration index | |  | 1, 2, 3, 7 | 53 | As specified in table 5.7.1-2 in TS 36.211 [23] |
| 4, 5, 6, 8 | 4 |
| T1 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 24 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 24 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.16.1.2.6.2-3: Cell specific test parameters for NR cell 1 for 2 Rx UE

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | |
|  |  |  | T1 | T2 |
| TDD configuration |  | 1, 4, 7, 8 | N/A | |
|  |  | 2, 5 | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4, 7, 8 | SR.1.1 FDD | |
|  |  | 2, 5 | SR.1.1 TDD | |
|  |  | 3, 6 | SR.2.1 TDD | |
| RMSI CORESET RMC |  | 1, 4, 7, 8 | CR.1.1 FDD | |
| configuration |  | 2, 5 | CR.1.1 TDD | |
|  |  | 3, 6 | CR.2.1 TDD | |
| Dedicated CORESET RMC |  | 1, 4, 7, 8 | CCR.1.1 FDD | |
| configuration |  | 2, 5 | CCR.1.1 TDD | |
|  |  | 3, 6 | CCR.2.1 TDD | |
| SSB configuration |  | 1, 4, 7, 8 | SSB.1 FR1 | |
|  |  | 2, 5 | SSB.1 FR1 | |
|  |  | 3, 6 | SSB.2 FR1 | |
| SMTC configuration |  | 1, 4, 7, 8 | SMTC.2 | |
|  |  | 2, 5 | SMTC.1 | |
|  |  | 3, 6 | SMTC.1 | |
| OCNG Pattern |  | 1, 2, 3, 4, 5, 6, 7, 8 | OP.1 defined in A.3.2.1 | |
| Initial DL BWP configuration |  | 1, 2, 3, 4, 5, 6, 7, 8 | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2, 3, 4, 5, 6, 7, 8 | ULBWP.0.1 | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6, 7, 8 | SSB | |
| Qrxlevmin | dBm/SCS | 1, 2, 4, 5 | -140 | |
|  |  | 3, 6 | -137 | |
|  | dBm/SCS | 1, 4, 7, 8 | -98 | |
|  |  | 2, 5 | -98 | |
|  |  | 3, 6 | -95 | |
|  | dBm/15 kHz | 1, 2, 3, 4, 5, 6, 7, 8 | -98 | |
| SS-RSRP | dBm/SCS | 1, 4, 7, 8 | -102 | -86 |
|  |  | 2, 5 | -102 | -86 |
|  |  | 3, 6 | -99 | -83 |
|  | dB | 1, 4, 7, 8 | -4 | 12 |
|  |  | 2, 5 |  |  |
|  |  | 3, 6 |  |  |
|  | dB | 1, 4, 7, 8 | -4 | 12 |
|  |  | 2, 5 |  |  |
|  |  | 3, 6 |  |  |
| Io | dBm/9.36 MHz | 1, 4, 7, 8 | -68.60 | -57.78 |
|  | dBm/9.36 MHz | 2, 5 | -68.60 | -57.78 |
|  | dBm/38.16 MHz | 3, 6 | -62.50 | -51.69 |
| TreselectionP | S | 1, 2, 3, 4, 5, 6, 7, 8 | 0 | |
| Snonintrasearch | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 50 | |
| Threshx, highP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 48 | |
| Threshserving, lowP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 44 | |
| Threshx, lowP (Note 2) | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 50 | |
| SSearchDeltaP-Stationary | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 3 | |
| TSearchDeltaP-Stationary | s | 1, 2, 3, 4, 5, 6, 7, 8 | 5 | |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6, 7, 8 | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, low** which is included in NR system information, and is a threshold for the E-UTRA target cell | | | | |

**Table A.16.1.2.6.2-4: Cell specific test parameters for E-UTRA cell 2 for 2 Rx UE**

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
|  |  | T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |  | |
| PSS\_RA | dB |  | |
| SSS\_RA | dB |  | |
| PCFICH\_RB | dB |  | |
| PHICH\_RA | dB |  | |
| PHICH\_RB | dB |  | |
| PDCCH\_RA | dB |  | |
| PDCCH\_RB | dB |  | |
| PDSCH\_RA | dB |  | |
| PDSCH\_RB | dB |  | |
| OCNG\_RANote 1 | dB |  | |
| OCNG\_RBNote 1 | dB |  | |
| Qrxlevmin | dBm | -140 | |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -84 | -84 |
|  | dB | 14 | 14 |
|  | dB | 14 | 14 |
| TreselectionEUTRAN | S | 0 | |
| Snonintrasearch | dB | Not sent | |
| Threshx, high (Note 2) | dB | 48 | |
| Threshserving, low | dB | 44 | |
| Threshx, low | dB | 50 | |
| Propagation Condition |  | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, high** which is included in E-UTRA system information, and is a threshold for the NR target cell | | | |

##### A.16.1.2.6.3 Test Requirements

The cell reselection delay to a lower priority E-UTRAN cell with UE fulfilling stationary relaxed measurement criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCConnectionRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 32 s.

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

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: Tevaluate,EUTRAN\_Relax + TSI-E-UTRA,

Where:

Tevaluate,EUTRAN\_Relax See Table 4.2B.2.11.2-1 in clause 4.2B.2.11.2

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

This gives a total of 30.72 (Tevaluate,EUTRAN\_Relax) + 1.28 (TSI-E-UTRA) = 32 s for the cell re-selection delay to a lower priority E-UTRAN cell for stationary relaxed measurement criterion.

## A.16.2 SA: RRC\_INACTIVE state mobility for RedCap

## A.16.3 RRC\_CONNECTED state mobility for RedCap

### A.16.3.1 Handover

#### A.16.3.1.1 Intra-frequency handover from FR1 to FR1; known target cell for 1 Rx UE

#### A.16.3.1.2 Intra-frequency handover from FR1 to FR1; known target cell for 2 Rx UE

#### A.16.3.1.3 Intra-frequency handover from FR1 to FR1; unknown target cell for 1 Rx UE

#### A.16.3.1.4 Intra-frequency handover from FR1 to FR1; unknown target cell for 2 Rx UE

#### A.16.3.1.5 Inter-frequency handover from FR1 to FR1; unknown target cell for 1 Rx UE

#### A.16.3.1.6 Inter-frequency handover from FR1 to FR1; unknown target cell for 2 Rx UE

#### A.16.3.1.7 SA NR - E-UTRAN handover for 1Rx UE

##### A.16.3.1.7.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to E-UTRAN handover requirements as specified in clause 6.1D.2.1.

The test comprises of one NR carrier and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 9.1.2-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.16A.16.3.1.7-1. General test parameters are provided in Table A.16A.16.3.1. x1-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.16.3.1.7-3 and A.16.3.1.7-4 respectively.

Table A.16.3.1.7-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD |
| 3 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE FDD |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD |
| 6 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE TDD |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.16.3.1.7-2: General test parameters for SA inter-RAT E-UTRAN handover

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | 1 NR carrier frequency is used in the test |
| LTE RF Channel Number | |  | 2 | 1 E-UTRAN carrier frequency is used in the test |
| Initial conditions | Active cell |  | Cell 1 | NR cell |
|  | Neighbouring cell |  | Cell 2 | E-UTRAN cell |
| Final condition | Active cell |  | Cell 2 |  |
| NR measurement quantity | |  | SS-RSRP |  |
| E-UTRAN measurement quantity | |  | RSRP |  |
| b2-Threshold1 | | dBm | As specified in Table A.16.3.1.10-3 | Absolute NR SS-RSRP threshold for event B2 |
| b2-Threshold2EUTRAN | | dBm | -98 | Absolute E-UTRAN RSRP threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | |  | 0 | As specified in Table 9.1.2-1 started before T2 starts |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.16.3.1.7-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Configuration | Cell 1 | | |
|  | |  |  | T1 | T2 | T3 |
| RF channel number | |  | 1, 2, 3, 4, 5, 6,7 | 1 | | |
| Duplex mode | |  | 1, 4 | FDD | | |
|  | |  | 2, 3, 5, 6 | TDD | | |
| 7 | HD-FDD | | |
| TDD Configuration | |  | 2, 5 | TDDConf.1.1 | | |
|  | |  | 3, 6 | TDDConf.1.2 | | |
| BWchannel | | MHz | 1, 4,7 | 10: NRB,c = 52 (FDD) | | |
|  | |  | 2, 5 | 10: NRB,c = 52 (TDD) | | |
|  | |  | 3, 6 | 20: NRB,c = 51 (TDD) | | |
| PDSCH reference measurement channel | |  | 1, 4,7 | SR.1.1 FDD | | |
|  | |  | 2, 5 | SR.1.1 TDD | | |
|  | |  | 3, 6 | SR.2.1 TDD | | |
| CORSET reference channel | |  | 1, 4,7 | CR.1.1 FDD | | |
|  | |  | 2, 5 | CR.1.1 TDD | | |
|  | |  | 3, 6 | CR.2.1 TDD | | |
| TRS configuration | |  | 1, 4,7 | TRS.1.1 FDD | | |
|  | |  | 2, 5 | TRS.1.1 TDD | | |
|  | |  | 3, 6 | TRS.1.2 TDD | | |
| OCNG patternNote1 | |  | 1, 2, 3, 4, 5, 6,7 | OP.1 | | |
| BWP | Initial DL BWP |  | 1, 2, 3, 4, 5, 6,7 | DLBWP.0.1 | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | |
| SMTC configuration | |  | 1, 2, 3, 4, 5, 6,7 | SMTC.1 RedCap | | |
| SSB configuration | |  | 1, 2, 4, 5,7 | SSB.1 FR1 | | |
|  | |  | 3, 6 | SSB.1 RedCap FR1 | | |
| b2-Threshold1 | | dBm | 1, 2, 4, 5 | -96 | | |
|  | |  | 3, 6 | -93 | | |
| EPRE ratio of PSS to SSS | | dB | 1, 2, 3, 4, 5, 6,7 | 0 | | |
| EPRE ratio of PBCH\_DMRS to SSS | |  |  |  | | |
| EPRE ratio of PBCH to PBCH\_DMRS | |  |  |  | | |
| EPRE ratio of PDCCH\_DMRS to SSS | |  |  |  | | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |  |  |  | | |
| EPRE ratio of PDSCH\_DMRS to SSS | |  |  |  | | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |  |  |  | | |
| EPRE ratio of OCNG DMRS to SSS | |  |  |  | | |
| EPRE ratio of OCNG to OCNG DMRS | |  |  |  | | |
| *Noc*Note2 | | dBm/15 KHz | 1, 2, 3, 4, 5, 6,7 | -100 | -104 | -100 |
| *Noc*Note2 | | dBm/SCS | 1, 2, 4, 5,7 | -100 | -104 | -100 |
|  | |  | 3, 6 | -97 | -101 | -97 |
| Ês/Noc | | dB | 1, 2, 3, 4, 5, 6,7 | 12 | 0 | -4 |
| Ês/IotNote3 | | dB | 1, 2, 3, 4, 5, 6,7 | 12 | 0 | -4 |
| SS-RSRPNote3 | | dBm/SCS | 1, 2, 4, 5,7 | -88 | -104 | -104 |
|  | |  | 3, 6 | -85 | -101 | -101 |
| IoNote3 | | dBm/9.36 MHz | 1, 2, 4, 5,7 | -59.78 | -73.04 | -70.59 |
|  | | dBm/38.16 MHz | 3, 6 | -53.68 | -66.9448 | -64.49 |
| Propagation condition | |  | 1, 2, 3, 4, 5, 6,7,8 | AWGN | | |
| Antenna Configuration and Correlation Matrix | |  | 1, 2, 3, 4, 5, 6,7 | 1x2 Low | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for *Noc* to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

Table A.16.3.1.7-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 2 | | |
|  |  |  | T1 | T2 | T3 |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 2 | | |
| Duplex mode |  | 1, 2, 3 | FDD | | |
| 4, 5, 6 | TDD | | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | | |
| PRACH ConfigurationNote2 |  | 1, 2, 3 | 4 | | |
|  |  | 4, 5, 6 | 53 | | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | | |
|  |  | 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | | |
|  |  | 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | | |
| OCNG PatternsNote3 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | | |
|  |  | 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | | |
| PBCH\_RB |  |  |  | | |
| PSS\_RA |  |  |  | | |
| SSS\_RA |  |  |  | | |
| PCFICH\_RB |  |  |  | | |
| PHICH\_RA |  |  |  | | |
| PHICH\_RB |  |  |  | | |
| PDCCH\_RA |  |  |  | | |
| PDCCH\_RB |  |  |  | | |
| PDSCH\_RA |  |  |  | | |
| PDSCH\_RB |  |  |  | | |
| OCNG\_RANote4 |  |  |  | | |
| OCNG\_RBNote4 |  |  |  | | |
| NocNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 | | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 8 | 78 |
| Ês/IotNote6 | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 78 | 78 |
| RSRPNote6 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -90 | -90 |
| SCH\_RPNote6 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -90 | -90 |
| IoNote6 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -67.21  +10log(NRB,c/100) | -58.57  +10log(NRB,c/100) | -58.57  +10log(NRB,c/100) |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN | | |
| Antenna Configuration and Correlation Matrix Note7 |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].  Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 6: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | | |

##### A.16.3.1.7.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 85 ms from the beginning of time period T3.

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

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

RRC procedure delay = 50 ms and Tinterrupt = 35 ms in the test based on requirements specified in clause 6.1D.2.1.

This gives a total of 85 ms.

#### A.16.3.1.8 SA NR - E-UTRAN handover for 2Rx UE

##### A.16.3.1.8.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to E-UTRAN handover requirements as specified in clause 6.1D.2.1.

The test comprises of one NR carrier and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 9.1.2-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.16.3.1. x2-1. General test parameters are provided in Table A.16.3.1. x2-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.16.3.1. x2-3 and A.16.3.1. x2-4 respectively.

Table A.16.3.1.8-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD |
| 3 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE FDD |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD |
| 6 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE TDD |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.16.3.1.8-2: General test parameters for SA inter-RAT E-UTRAN handover

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | 1 NR carrier frequency is used in the test |
| LTE RF Channel Number | |  | 2 | 1 E-UTRAN carrier frequency is used in the test |
| Initial conditions | Active cell |  | Cell 1 | NR cell |
|  | Neighbouring cell |  | Cell 2 | E-UTRAN cell |
| Final condition | Active cell |  | Cell 2 |  |
| NR measurement quantity | |  | SS-RSRP |  |
| E-UTRAN measurement quantity | |  | RSRP |  |
| b2-Threshold1 | | dBm | As specified in Table A.16.3.1.10-3 | Absolute NR SS-RSRP threshold for event B2 |
| b2-Threshold2EUTRAN | | dBm | -98 | Absolute E-UTRAN RSRP threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | |  | 0 | As specified in Table 9.1.2-1 started before T2 starts |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.16.3.1.8-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Configuration | Cell 1 | | |
|  | |  |  | T1 | T2 | T3 |
| RF channel number | |  | 1, 2, 3, 4, 5, 6,7 | 1 | | |
| Duplex mode | |  | 1, 4 | FDD | | |
|  | |  | 2, 3, 5, 6 | TDD | | |
| 7 | HD-FDD | | |
| TDD Configuration | |  | 2, 5 | TDDConf.1.1 | | |
|  | |  | 3, 6 | TDDConf.1.2 | | |
| BWchannel | | MHz | 1, 4,7 | 10: NRB,c = 52 (FDD) | | |
|  | |  | 2, 5 | 10: NRB,c = 52 (TDD) | | |
|  | |  | 3, 6 | 20: NRB,c = 51 (TDD) | | |
| PDSCH reference measurement channel | |  | 1, 4,7 | SR.1.1 FDD | | |
|  | |  | 2, 5 | SR.1.1 TDD | | |
|  | |  | 3, 6 | SR.2.1 TDD | | |
| CORSET reference channel | |  | 1, 4,7 | CR.1.1 FDD | | |
|  | |  | 2, 5 | CR.1.1 TDD | | |
|  | |  | 3, 6 | CR.2.1 TDD | | |
| TRS configuration | |  | 1, 4,7 | TRS.1.1 FDD | | |
|  | |  | 2, 5 | TRS.1.1 TDD | | |
|  | |  | 3, 6 | TRS.1.2 TDD | | |
| OCNG patternNote1 | |  | 1, 2, 3, 4, 5, 6,7 | OP.1 | | |
| BWP | Initial DL BWP |  | 1, 2, 3, 4, 5, 6,7 | DLBWP.0.1 | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | |
| SMTC configuration | |  | 1, 2, 3, 4, 5, 6,7 | SMTC.1 RedCap | | |
| SSB configuration | |  | 1, 2, 4, 5,7 | SSB.1 FR1 | | |
|  | |  | 3, 6 | SSB.1 RedCap FR1 | | |
| b2-Threshold1 | | dBm | 1, 2, 4, 5,7 | -96 | | |
|  | |  | 3, 6 | -93 | | |
| EPRE ratio of PSS to SSS | | dB | 1, 2, 3, 4, 5, 6,7 | 0 | | |
| EPRE ratio of PBCH\_DMRS to SSS | |  |  |  | | |
| EPRE ratio of PBCH to PBCH\_DMRS | |  |  |  | | |
| EPRE ratio of PDCCH\_DMRS to SSS | |  |  |  | | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |  |  |  | | |
| EPRE ratio of PDSCH\_DMRS to SSS | |  |  |  | | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |  |  |  | | |
| EPRE ratio of OCNG DMRS to SSS | |  |  |  | | |
| EPRE ratio of OCNG to OCNG DMRS | |  |  |  | | |
| *Noc*Note2 | | dBm/15 KHz | 1, 2, 3, 4, 5, 6,7 | -100 | -104 | -100 |
| *Noc*Note2 | | dBm/SCS | 1, 2, 4, 5,7 | -100 | -104 | -100 |
|  | |  | 3, 6 | -97 | -101 | -97 |
| Ês/Noc | | dB | 1, 2, 3, 4, 5, 6,7 | 12 | 0 | -4 |
| Ês/IotNote3 | | dB | 1, 2, 3, 4, 5, 6,7 | 12 | 0 | -4 |
| SS-RSRPNote3 | | dBm/SCS | 1, 2, 4, 5,7 | -88 | -104 | -104 |
|  | |  | 3, 6 | -85 | -101 | -101 |
| IoNote3 | | dBm/9.36 MHz | 1, 2, 4, 5,7 | -59.78 | -73.04 | -70.59 |
|  | | dBm/38.16 MHz | 3, 6 | -53.68 | -66.9448 | -64.49 |
| Propagation condition | |  | 1, 2, 3, 4, 5, 6,7 | AWGN | | |
| Antenna Configuration and Correlation Matrix | |  | 1, 2, 3, 4, 5, 6,7 | 1x2 Low | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for *Noc* to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

Table A.16.3.1.8-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 2 | | |
|  |  |  | T1 | T2 | T3 |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 2 | | |
| Duplex mode |  | 1, 2, 3 | FDD | | |
| 4, 5, 6 | TDD | | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | | |
| PRACH ConfigurationNote2 |  | 1, 2, 3 | 4 | | |
|  |  | 4, 5, 6 | 53 | | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | | |
|  |  | 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | | |
|  |  | 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | | |
| OCNG PatternsNote3 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | | |
|  |  | 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | | |
| PBCH\_RB |  |  |  | | |
| PSS\_RA |  |  |  | | |
| SSS\_RA |  |  |  | | |
| PCFICH\_RB |  |  |  | | |
| PHICH\_RA |  |  |  | | |
| PHICH\_RB |  |  |  | | |
| PDCCH\_RA |  |  |  | | |
| PDCCH\_RB |  |  |  | | |
| PDSCH\_RA |  |  |  | | |
| PDSCH\_RB |  |  |  | | |
| OCNG\_RANote4 |  |  |  | | |
| OCNG\_RBNote4 |  |  |  | | |
| NocNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 | | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 8 | 78 |
| Ês/IotNote6 | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 78 | 78 |
| RSRPNote6 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -90 | -90 |
| SCH\_RPNote6 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -90 | -90 |
| IoNote6 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -67.21  +10log(NRB,c/100) | -58.57  +10log(NRB,c/100) | -58.57  +10log(NRB,c/100) |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN | | |
| Antenna Configuration and Correlation Matrix Note7 |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].  Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 6: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | | |

##### A.16.3.1.8.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 85 ms from the beginning of time period T3.

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

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

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

Tinterrupt = 35 ms in the test; Tinterrupt is defined in clause 6.1.2.1.

This gives a total of 85 ms.

#### A.16.3.1.9 SA NR - E-UTRAN handover with unknown target cell for 1 Rx UE

##### A.16.3.1.9.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to E-UTRAN handover requirements for the case when the target E-UTRAN cell is unknown as specified in clause 6.1D.2.1.

The test comprises of one NR carrier and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable. No Gap pattern shall be configured.

A RRC message implying handover shall be sent to the UE during period T1. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.16.3.1.9-1. General test parameters are provided in Table A.16.3.1. x1-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.16.3.1.9-3 and A.16.3.1.9-4 respectively.

Table A.16.3.1.9-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD |
| 3 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE FDD |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD |
| 6 | NR 30kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE TDD |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.16.3.1.9-2: General test parameters for SA inter-RAT E-UTRAN handover

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | 1 NR carrier frequency is used in the test |
| LTE RF Channel Number | |  | 2 | 1 E-UTRAN carrier frequency is used in the test |
| Initial conditions | Active cell |  | Cell 1 | NR cell |
|  | Neighbouring cell |  | Cell 2 | E-UTRAN cell |
| Final condition | Active cell |  | Cell 2 |  |
| NR measurement quantity | |  | SS-RSRP |  |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| T1 | | s | ≤5 |  |
| T2 | | s | 1 |  |

Table A.16.3.1.9-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Configuration** | **Cell 1** | |
|  | |  |  | **T1** | **T2** |
| RF channel number | |  | 1, 2, 3, 4, 5, 6,7 | 1 | |
| Duplex mode | |  | 1, 4 | FDD | |
|  | |  | 2, 3, 5, 6 | TDD | |
| 7 | HD-FDD | |
| TDD Configuration | |  | 2, 5 | TDDConf.1.1 | |
|  | |  | 3, 6 | TDDConf.1.2 | |
| BWchannel | | MHz | 1, 4,7 | 10: NRB,c = 52 (FDD) | |
|  | |  | 2, 5 | 10: NRB,c = 52 (TDD) | |
|  | |  | 3, 6 | 20: NRB,c = 51 (TDD) | |
| PDSCH reference measurement channel | |  | 1, 4,7 | SR.1.1 FDD | |
|  | |  | 2, 5 | SR.1.1 TDD | |
|  | |  | 3, 6 | SR.2.1 TDD | |
| CORSET reference channel | |  | 1, 4,7 | CR.1.1 FDD | |
|  | |  | 2, 5 | CR.1.1 TDD | |
|  | |  | 3, 6 | CR.2.1 TDD | |
| TRS configuration | |  | 1, 4,7 | TRS.1.1 FDD | |
|  | |  | 2, 5 | TRS.1.1 TDD | |
|  | |  | 3, 6 | TRS.1.2 TDD | |
| OCNG patternNote1 | |  | 1, 2, 3, 4, 5, 6,7 | OP.1 | |
| BWP | Initial DL BWP |  | 1, 2, 3, 4, 5, 6,7 | DLBWP.0.1 | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | |
| SMTC configuration | |  | 1, 2, 3, 4, 5, 6,7 | SMTC.1 RedCap | |
| SSB configuration | |  | 1, 2, 4, 5,7 | SSB.1 FR1 | |
|  | |  | 3, 6 | SSB.1 RedCap FR1 | |
| EPRE ratio of PSS to SSS | | dB | 1, 2, 3, 4, 5, 6,7 | 0 | |
| EPRE ratio of PBCH\_DMRS to SSS | |  |  |  | |
| EPRE ratio of PBCH to PBCH\_DMRS | |  |  |  | |
| EPRE ratio of PDCCH\_DMRS to SSS | |  |  |  | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |  |  |  | |
| EPRE ratio of PDSCH\_DMRS to SSS | |  |  |  | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS | |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS | |  |  |  | |
| *Noc*Note2 | | dBm/15 KHz | 1, 2, 3, 4, 5, 6,7 | -98 | |
| *Noc*Note2 | | dBm/SCS | 1, 2, 4, 5,7 | -98 | |
|  | |  | 3, 6 | -95 | |
| Ês/Noc | | dB | 1, 2, 3, 4, 5, 6,7 | 0 | 0 |
| Ês/IotNote3 | | dB | 1, 2, 3, 4, 5, 6,7 | 0 | 0 |
| SS-RSRPNote3 | | dBm/SCS | 1, 2, 4, 5,7 | -98 | -98 |
|  | |  | 3, 6 | -95 | -95 |
| IoNote3 | | dBm/9.36 MHz | 1, 2, 4, 5,7 | -67.04 | -67.04 |
|  | | dBm/38.16 MHz | 3, 6 | -60.94 | -60.94 |
| Propagation condition | |  | 1, 2, 3, 4, 5, 6,7 | AWGN | |
| Antenna Configuration and Correlation Matrix | |  | 1, 2, 3, 4, 5, 6,7 | 1x2 Low | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for *Noc* to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

Table A.16.3.1.9-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 2 | |
|  |  |  | T1 | T2 |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 2 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
|  |  | 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PRACH ConfigurationNote2 |  | 1, 2, 3 | 4 | |
|  |  | 4, 5, 6 | 53 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote3 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote4 |  |  |  | |
| OCNG\_RBNote4 |  |  |  | |
| NocNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| Ês/IotNote6 | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| RSRPNote6 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -91 |
| SCH\_RPNote6 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -91 |
| IoNote6 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -70.22 | -62.43 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN | |
| Antenna Configuration and Correlation Matrix Note7 |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].  Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 6: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | |

##### A.16.3.1.9.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 165 ms from the beginning of time period T2.

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

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

RRC procedure delay = 50 ms and Tinterrupt = 35 ms in the test based on requirements specified in clause 6.1D.2.1.

This gives a total of 165 ms.

#### A.16.3.1.10 SA NR - E-UTRAN handover with unknown target cell for 2 Rx UE

##### A.16.3.1.10.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to E-UTRAN handover requirements for the case when the target E-UTRAN cell is unknown as specified in clause 6.1D.2.1.

The test comprises of one NR carrier and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable. No Gap pattern shall be configured.

A RRC message implying handover shall be sent to the UE during period T1. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.16.3.1.10-1. General test parameters are provided in Table A.16.3.1. x2-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.16.3.1.10-3 and A.16.3.1.10-4 respectively.

Table A.16.3.1.10-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD |
| 3 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE FDD |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD |
| 6 | NR 30kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE TDD |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.16.3.1.10-2: General test parameters for SA inter-RAT E-UTRAN handover

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | 1 NR carrier frequency is used in the test |
| LTE RF Channel Number | |  | 2 | 1 E-UTRAN carrier frequency is used in the test |
| Initial conditions | Active cell |  | Cell 1 | NR cell |
|  | Neighbouring cell |  | Cell 2 | E-UTRAN cell |
| Final condition | Active cell |  | Cell 2 |  |
| NR measurement quantity | |  | SS-RSRP |  |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| T1 | | s | ≤5 |  |
| T2 | | s | 1 |  |

Table A.16.3.1.10-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Configuration** | **Cell 1** | |
|  | |  |  | **T1** | **T2** |
| RF channel number | |  | 1, 2, 3, 4, 5, 6,7 | 1 | |
| Duplex mode | |  | 1, 4 | FDD | |
|  | |  | 2, 3, 5, 6 | TDD | |
| 7 | HD-FDD | |
| TDD Configuration | |  | 2, 5 | TDDConf.1.1 | |
|  | |  | 3, 6 | TDDConf.1.2 | |
| BWchannel | | MHz | 1, 4,7 | 10: NRB,c = 52 (FDD) | |
|  | |  | 2, 5 | 10: NRB,c = 52 (TDD) | |
|  | |  | 3, 6 | 20: NRB,c = 51 (TDD) | |
| PDSCH reference measurement channel | |  | 1, 4,7 | SR.1.1 FDD | |
|  | |  | 2, 5 | SR.1.1 TDD | |
|  | |  | 3, 6 | SR.2.1 TDD | |
| CORSET reference channel | |  | 1, 4,7 | CR.1.1 FDD | |
|  | |  | 2, 5 | CR.1.1 TDD | |
|  | |  | 3, 6 | CR.2.1 TDD | |
| TRS configuration | |  | 1, 4,7 | TRS.1.1 FDD | |
|  | |  | 2, 5 | TRS.1.1 TDD | |
|  | |  | 3, 6 | TRS.1.2 TDD | |
| OCNG patternNote1 | |  | 1, 2, 3, 4, 5, 6,7 | OP.1 | |
| BWP | Initial DL BWP |  | 1, 2, 3, 4, 5, 6,7 | DLBWP.0.1 | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | |
| SMTC configuration | |  | 1, 2, 3, 4, 5, 6,7 | SMTC.1 RedCap | |
| SSB configuration | |  | 1, 2, 4, 5,7 | SSB.1 FR1 | |
|  | |  | 3, 6 | SSB.1 RedCap FR1 | |
| EPRE ratio of PSS to SSS | | dB | 1, 2, 3, 4, 5, 6,7 | 0 | |
| EPRE ratio of PBCH\_DMRS to SSS | |  |  |  | |
| EPRE ratio of PBCH to PBCH\_DMRS | |  |  |  | |
| EPRE ratio of PDCCH\_DMRS to SSS | |  |  |  | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |  |  |  | |
| EPRE ratio of PDSCH\_DMRS to SSS | |  |  |  | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS | |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS | |  |  |  | |
| *Noc*Note2 | | dBm/15 KHz | 1, 2, 3, 4, 5, 6,7 | -98 | |
| *Noc*Note2 | | dBm/SCS | 1, 2, 4, 5,7 | -98 | |
|  | |  | 3, 6 | -95 | |
| Ês/Noc | | dB | 1, 2, 3, 4, 5, 6,7 | 0 | 0 |
| Ês/IotNote3 | | dB | 1, 2, 3, 4, 5, 6,7 | 0 | 0 |
| SS-RSRPNote3 | | dBm/SCS | 1, 2, 4, 5,7 | -98 | -98 |
|  | |  | 3, 6 | -95 | -95 |
| IoNote3 | | dBm/9.36 MHz | 1, 2, 4, 5,7 | -67.04 | -67.04 |
|  | | dBm/38.16 MHz | 3, 6 | -60.94 | -60.94 |
| Propagation condition | |  | 1, 2, 3, 4, 5, 6,7 | AWGN | |
| Antenna Configuration and Correlation Matrix | |  | 1, 2, 3, 4, 5, 6,7 | 1x2 Low | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for *Noc* to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

Table A.16.3.1.10-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 2 | |
|  |  |  | T1 | T2 |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 2 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
|  |  | 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PRACH ConfigurationNote2 |  | 1, 2, 3 | 4 | |
|  |  | 4, 5, 6 | 53 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote3 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote4 |  |  |  | |
| OCNG\_RBNote4 |  |  |  | |
| NocNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| Ês/IotNote6 | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| RSRPNote6 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -91 |
| SCH\_RPNote6 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -91 |
| IoNote6 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -70.22 | -62.43 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN | |
| Antenna Configuration and Correlation Matrix Note7 |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].  Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 6: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | |

##### A.16.3.1.10.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 165 ms from the beginning of time period T2.

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

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

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

Tinterrupt = 115 ms in the test; Tinterrupt is defined in clause 6.1.2.1.

This gives a total of 165 ms.

### A.16.3.2 RRC Connection Mobility Control

#### A.16.3.2.1 SA: RRC Re-establishment

##### A.16.3.2.1.1 Intra-frequency RRC Re-establishment in FR1 for 1 Rx UE

A.16.3.2.1.1.1 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 6.2.1B.

The test parameters are given in table A.16.3.2.1.1.1-1, table A.16.3.2.1.1.1-2 and table A.16.3.2.1.1.1-3 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.16.3.2.1.1.1-1: 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, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.16.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1 for 1 Rx UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4 | Cell1 |  |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell2 |  |
| Final condition | Active cell |  | 1, 2, 3, 4 | Cell2 |  |
| RF Channel Number | |  | 1, 2, 3, 4 | 1 |  |
| Time offset between cells | |  | 1 | 3 ms | Asynchronous cells |
|  | | 2 | 3 μs | Synchronous cells |
|  | | 3 | 3 μs | Synchronous cells |
|  | |  | 4 | 3 ms | Asynchronous cells |
| N310 | | - | 1, 2, 3, 4 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1, 2, 3, 4 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1, 2, 3, 4 | 0 | Radio link failure timer; |
| T311 | | ms | 1, 2, 3, 4 | 3000 | RRC re-establishment timer |
| Access Barring Information | | - | 1, 2, 3, 4 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR1 |  |
|  | | 2 | SSB.1 FR1 |  |
|  | | 3 | SSB.1 RedCap FR1 |  |
|  | |  | 4 | SSB.1 FR1 |  |
| SMTC configuration | |  | 1 | SMTC.2 |  |
|  | | 2 | SMTC.1 |  |
|  | | 3 | SMTC.1 |  |
|  | |  | 4 | SMTC.2 |  |
| DRX cycle length | | s | 1, 2, 3, 4 | OFF |  |
| PRACH configuration | |  | 1, 2, 3, 4 | FR1 PRACH configuration 1 | Table A.3.8.2.1-1 |
| T1 | | s | 1, 2, 3, 4 | 5 |  |
| T2 | | ms | 1, 2, 3, 4 | 440 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1B in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1B.5 in TS 38.133 ) |
| T3 | | s | 1, 2, 3, 4 | 2 |  |

Table A.16.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1 for 1 Rx UE

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 | | | | |
|  |  | 4 | N/A | | | | | N/A | | | | |
| 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 | | | | |
|  |  | 4 | SR.1.1 FDD | | | | | SR.1.1 FDD | | | | |
| 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 | | | | |
|  |  | 4 | CR.1.1 FDD | | | | | CR.1.1 FDD | | | | |
| 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 | | | | |
|  |  | 4 | CCR.1.1 FDD | | | | | CCR.1.1 FDD | | | | |
| OCNG Pattern |  | 1, 2, 3, 4 | 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 | | | | |
|  |  | 4 | TRS.1.1 FDD | | | | | TRS.1.1 FDD | | | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 | | | | | DLBWP.0.1 | | | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.0.1 | | | | | ULBWP.0.1 | | | | |
| Active DL BWP confgiuration |  | 1, 2, 3, 4 | DLBWP.1.1 | N/A | | N/A | | N/A | | N/A | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.1.1 | N/A | | N/A | | N/A | | N/A | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | | | | SSB | | | | |
|  | dB | 1 | 1.54 | | -infinity | | -infinity | -3.79 | 4 | | | 4 |
|  |  | 2 |
|  |  | 3 |
|  |  | 4 |  | |  | |  |  |  | | |  |
| Note2 | dBm/SCS | 1 | -98 | | | | | | | | | |
|  |  | 2 | -98 | | | | | | | | | |
|  |  | 3 | -95 | | | | | | | | | |
|  |  | 4 | -98 | | | | | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | | | | | |
|  |  | 2 |  | | | | | | | | | |
|  |  | 3 |  | | | | | | | | | |
|  |  | 4 |  | | | | | | | | | |
|  | dB | 1 | 7 | | -infinity | | -infinity | 4 | 4 | | | 4 |
|  |  | 2 |
|  |  | 3 |
|  |  | 4 |  | |  | |  |  |  | | |  |
| 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 |
|  |  | 4 | -91 | | -infinity | | -infinity | -94 | -94 | | | -94 |
| 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/18.36 MHz | 3 | -57.81 | | -61.66 | | -61.66 | -57.81 | -61.66 | | | -61.66 |
|  | dBm/9.36 MHz | 4 | -60.74 | | -64.59 | | -64.59 | -60.74 | -64.59 | | | -64.59 |
| Propagation Condition |  | 1, 2, 3, 4 | 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.16.3.2.1.1.2 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.16.3.2.1.2 Intra-frequency RRC Re-establishment in FR1 for 2 Rx UE

A.16.3.2.1.2.1 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 6.2.1B.

The test parameters are given in table A.16.3.2.1.2.1-1, table A.16.3.2.1.2.1-2 and table A.16.3.2.1.2.1-3 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, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.16.3.2.1.2.1-1: 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, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.16.3.2.1.2.1-2: 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, 4 | Cell1 |  |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell2 |  |
| Final condition | Active cell |  | 1, 2, 3, 4 | Cell2 |  |
| RF Channel Number | |  | 1, 2, 3, 4 | 1 |  |
| Time offset between cells | |  | 1 | 3 ms | Asynchronous cells |
|  | | 2 | 3 μs | Synchronous cells |
|  | | 3 | 3 μs | Synchronous cells |
|  | |  | 4 | 3 ms | Asynchronous cells |
| N310 | | - | 1, 2, 3, 4 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1, 2, 3, 4 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1, 2, 3, 4 | 0 | Radio link failure timer; |
| T311 | | ms | 1, 2, 3, 4 | 3000 | RRC re-establishment timer |
| Access Barring Information | | - | 1, 2, 3, 4 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR1 |  |
|  | | 2 | SSB.1 FR1 |  |
|  | | 3 | SSB.1 RedCap FR1 |  |
|  | |  | 4 | SSB.1 FR1 |  |
| SMTC configuration | |  | 1 | SMTC.2 |  |
|  | | 2 | SMTC.1 |  |
|  | | 3 | SMTC.1 |  |
|  | |  | 4 | SMTC.2 |  |
| DRX cycle length | | s | 1, 2, 3, 4 | OFF |  |
| PRACH configuration | |  | 1, 2, 3, 4 | FR1 PRACH configuration 1 | Table A.3.8.2.1-1 |
| T1 | | s | 1, 2, 3, 4 | 5 |  |
| T2 | | ms | 1, 2, 3, 4 | 240 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1B in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1B.5 in TS 38.133 ) |
| T3 | | s | 1, 2, 3, 4 | 2 |  |

Table A.16.3.2.1.2.1-3: 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 | | | | |
|  |  | 4 | N/A | | | | | N/A | | | | |
| 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 | | | | |
|  |  | 4 | SR.1.1 FDD | | | | | SR.1.1 FDD | | | | |
| 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 | | | | |
|  |  | 4 | CR.1.1 FDD | | | | | CR.1.1 FDD | | | | |
| 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 | | | | |
|  |  | 4 | CCR.1.1 FDD | | | | | CCR.1.1 FDD | | | | |
| OCNG Pattern |  | 1, 2, 3, 4 | 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 | | | | |
|  |  | 4 | TRS.1.1 FDD | | | | | TRS.1.1 FDD | | | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 | | | | | DLBWP.0.1 | | | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.0.1 | | | | | ULBWP.0.1 | | | | |
| Active DL BWP confgiuration |  | 1, 2, 3, 4 | DLBWP.1.1 | N/A | | N/A | | N/A | | N/A | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.1.1 | N/A | | N/A | | N/A | | N/A | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | | | | SSB | | | | |
|  | dB | 1 | 1.54 | | -infinity | | -infinity | -3.79 | 4 | | | 4 |
|  |  | 2 |
|  |  | 3 |
|  |  | 4 |  | |  | |  |  |  | | |  |
| Note2 | dBm/SCS | 1 | -98 | | | | | | | | | |
|  |  | 2 | -98 | | | | | | | | | |
|  |  | 3 | -95 | | | | | | | | | |
|  |  | 4 | -98 | | | | | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | | | | | |
|  |  | 2 |  | | | | | | | | | |
|  |  | 3 |  | | | | | | | | | |
|  |  | 4 |  | | | | | | | | | |
|  | dB | 1 | 7 | | -infinity | | -infinity | 4 | 4 | | | 4 |
|  |  | 2 |
|  |  | 3 |
|  |  | 4 |  | |  | |  |  |  | | |  |
| 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 |
|  |  | 4 | -91 | | -infinity | | -infinity | -94 | -94 | | | -94 |
| 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/18.36 MHz | 3 | -57.81 | | -61.66 | | -61.66 | -57.81 | -61.66 | | | -61.66 |
|  | dBm/9.36 MHz | 4 | -60.74 | | -64.59 | | -64.59 | -60.74 | -64.59 | | | -64.59 |
| Propagation Condition |  | 1, 2, 3, 4 | 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.16.3.2.1.2.2 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 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.16.3.2.1.3 Inter-frequency RRC Re-establishment in FR1 for 1 Rx UE

A.16.3.2.1.3.1 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 6.2.1B.

The test parameters are given in table A.16.3.2.1.3.1-1, table A.16.3.2.1.3.1-2 and table A.16.3.2.1.3.1-3 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, 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.16.3.2.1.3.1-1: 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, 20 MHz bandwidth, TDD duplex mode | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.16.3.2.1.3.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR1 for 1 Rx UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4 | Cell1 |  |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell2 |  |
| Final condition | Active cell |  | 1, 2, 3, 4 | Cell2 |  |
| RF Channel Number | |  | 1, 2, 3, 4 | 1, 2 |  |
| Time offset between cells | |  | 1 | 3 ms | Asynchronous cells |
|  | | 2 | 3 μs | Synchronous cells |
|  | | 3 | 3 μs | Synchronous cells |
|  | |  | 4 | 3 ms | Asynchronous cells |
| N310 | | - | 1, 2, 3, 4 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1, 2, 3, 4 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1, 2, 3, 4 | 0 | Radio link failure timer; |
| T311 | | ms | 1, 2, 3, 4 | 5000 | RRC re-establishment timer |
| Access Barring Information | | - | 1, 2, 3, 4 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR1 |  |
|  | | 2 | SSB.1 FR1 |  |
|  | | 3 | SSB.1 RedCap FR1 |  |
|  | |  | 4 | SSB.1 FR1 |  |
| SMTC configuration | |  | 1 | SMTC.2 |  |
|  | | 2 | SMTC.1 |  |
|  | | 3 | SMTC.1 |  |
|  | |  | 4 | SMTC.2 |  |
| DRX cycle length | | S | 1, 2, 3, 4 | OFF |  |
| PRACH configuration | |  | 1, 2, 3, 4 | FR1 PRACH configuration 1 | Table A.3.8.2.1-1 |
| T1 | | S | 1, 2, 3, 4 | 5 |  |
| T2 | | ms | 1, 2, 3, 4 | 440 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1B in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1B.5 in TS 38.133 ) |
| T3 | | S | 1, 2, 3, 4 | 5 |  |

Table A.16.3.2.1.3.1-3: 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, 4 | 1 | | | | 2 | | | | |
| TDD configuration |  | 1 | N/A | | | | N/A | | | | |
|  |  | 2 | TDDConf.1.1 | | | | TDDConf.1.1 | | | | |
|  |  | 3 | TDDConf.2.1 | | | | TDDConf.2.1 | | | | |
|  |  | 4 | N/A | | | | N/A | | | | |
| 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 | | | | |
|  |  | 4 | SR.1.1 FDD | | | | SR.1.1 FDD | | | | |
| 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 | | | | |
|  |  | 4 | CR.1.1 FDD | | | | CR.1.1 FDD | | | | |
| 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 | | | | |
|  |  | 4 | CCR.1.1 FDD | | | | CCR.1.1 FDD | | | | |
| OCNG Pattern |  | 1, 2, 3, 4 | 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 | | | | |
|  |  | 4 | TRS.1.2 TDD | | | | TRS.1.2 TDD | | | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 | | | | DLBWP.0.1 | | | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.0.1 | | | | ULBWP.0.1 | | | | |
| Active DL BWP confgiuration |  | 1, 2, 3, 4 | DLBWP.1.1 | N/A | | N/A | N/A | | N/A | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.1.1 | N/A | | N/A | N/A | | N/A | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | | | SSB | | | | |
|  | dB | 1 | 4 | | -infinity | -infinity | -infinity | -infinity | | | 7 |
|  |  | 2 |
|  |  | 3 |
|  |  | 4 |  | |  |  |  |  | | |  |
| Note2 | dBm/SCS | 1 | -98 | | | | | | | | |
|  |  | 2 | -98 | | | | | | | | |
|  |  | 3 | -95 | | | | | | | | |
|  |  | 4 | -98 | | | | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | | | | |
|  |  | 2 |  | | | | | | | | |
|  |  | 3 |  | | | | | | | | |
|  |  | 4 |  | | | | | | | | |
|  | dB | 1 | 4 | | -infinity | -infinity | -infinity | -infinity | | | 7 |
|  |  | 2 |  | |  |  |  |  | | |  |
|  |  | 3 |  | |  |  |  |  | | |  |
|  |  | 4 |  | |  |  |  |  | | |  |
| 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 |
|  |  | 4 | -94 | | -infinity | -infinity | -infinity | -infinity | | | -91 |
| 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/18.36 MHz | 3 | -61.66 | | -67.12 | -67.12 | -67.12 | -67.12 | | | -59.33 |
|  | dBm/9.36 MHz | 4 | -64.59 | | -70.05 | -70.05 | -70.05 | -70.05 | | | -62.26 |
| Propagation Condition |  | 1, 2, 3, 4 | 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.16.3.2.1.3.2 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 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.16.3.2.1.4 Inter-frequency RRC Re-establishment in FR1 for 2 Rx UE

A.16.3.2.1.4.1 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 6.2.1B.

The test parameters are given in table A.16.3.2.1.4.1-1, table A.16.3.2.1.4.1-2 and table A.16.3.2.1.4.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. 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.16.3.2.1.4.1-1: 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, 20 MHz bandwidth, TDD duplex mode | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.16.3.2.1.4.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR1 for 2 Rx UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4 | Cell1 |  |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell2 |  |
| Final condition | Active cell |  | 1, 2, 3, 4 | Cell2 |  |
| RF Channel Number | |  | 1, 2, 3, 4 | 1, 2 |  |
| Time offset between cells | |  | 1 | 3 ms | Asynchronous cells |
|  | | 2 | 3 μs | Synchronous cells |
|  | | 3 | 3 μs | Synchronous cells |
|  | |  | 4 | 3 ms | Asynchronous cells |
| N310 | | - | 1, 2, 3, 4 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1, 2, 3, 4 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1, 2, 3, 4 | 0 | Radio link failure timer; |
| T311 | | ms | 1, 2, 3, 4 | 5000 | RRC re-establishment timer |
| Access Barring Information | | - | 1, 2, 3, 4 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR1 |  |
|  | | 2 | SSB.1 FR1 |  |
|  | | 3 | SSB.1 RedCap FR1 |  |
|  | |  | 4 | SSB.1 FR1 |  |
| SMTC configuration | |  | 1 | SMTC.2 |  |
|  | | 2 | SMTC.1 |  |
|  | | 3 | SMTC.1 |  |
|  | |  | 4 | SMTC.2 |  |
| DRX cycle length | | S | 1, 2, 3, 4 | OFF |  |
| PRACH configuration | |  | 1, 2, 3, 4 | FR1 PRACH configuration 1 | Table A.3.8.2.1-1 |
| T1 | | S | 1, 2, 3, 4 | 5 |  |
| T2 | | ms | 1, 2, 3, 4 | 240 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1B in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1B.5 in TS 38.133 ) |
| T3 | | S | 1, 2, 3, 4 | 5 |  |

Table A.16.3.2.1.4.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR1 for 2 Rx UE

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | | Cell 2 | | | | |
|  |  |  | T1 | | T2 | T3 | T1 | T2 | | | T3 |
| RF Channel Number |  | 1, 2, 3, 4 | 1 | | | | 2 | | | | |
| TDD configuration |  | 1 | N/A | | | | N/A | | | | |
|  |  | 2 | TDDConf.1.1 | | | | TDDConf.1.1 | | | | |
|  |  | 3 | TDDConf.2.1 | | | | TDDConf.2.1 | | | | |
|  |  | 4 | N/A | | | | N/A | | | | |
| 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 | | | | |
|  |  | 4 | SR.1.1 FDD | | | | SR.1.1 FDD | | | | |
| 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 | | | | |
|  |  | 4 | CR.1.1 FDD | | | | CR.1.1 FDD | | | | |
| 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 | | | | |
|  |  | 4 | CCR.1.1 FDD | | | | CCR.1.1 FDD | | | | |
| OCNG Pattern |  | 1, 2, 3, 4 | 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 | | | | |
|  |  | 4 | TRS.1.1 FDD | | | | TRS.1.1 FDD | | | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 | | | | DLBWP.0.1 | | | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.0.1 | | | | ULBWP.0.1 | | | | |
| Active DL BWP confgiuration |  | 1, 2, 3, 4 | DLBWP.1.1 | N/A | | N/A | N/A | | N/A | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.1.1 | N/A | | N/A | N/A | | N/A | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | | | SSB | | | | |
|  | dB | 1 | 4 | | -infinity | -infinity | -infinity | -infinity | | | 7 |
|  |  | 2 |
|  |  | 3 |
|  |  | 4 |  | |  |  |  |  | | |  |
| Note2 | dBm/SCS | 1 | -98 | | | | | | | | |
|  |  | 2 | -98 | | | | | | | | |
|  |  | 3 | -95 | | | | | | | | |
|  |  | 4 | -98 | | | | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | | | | |
|  |  | 2 |  | | | | | | | | |
|  |  | 3 |  | | | | | | | | |
|  |  | 4 |  | | | | | | | | |
|  | dB | 1 | 4 | | -infinity | -infinity | -infinity | -infinity | | | 7 |
|  |  | 2 |  | |  |  |  |  | | |  |
|  |  | 3 |  | |  |  |  |  | | |  |
|  |  | 4 |  | |  |  |  |  | | |  |
| 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 |
|  |  | 4 | -94 | | -infinity | -infinity | -infinity | -infinity | | | -91 |
| 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/18.36 MHz | 3 | -61.66 | | -67.12 | -67.12 | -67.12 | -67.12 | | | -59.33 |
|  | dBm/9.36 MHz | 4 | -64.59 | | -70.05 | -70.05 | -70.05 | -70.05 | | | -62.26 |
| Propagation Condition |  | 1, 2, 3, 4 | 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.16.3.2.1.4.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *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.16.3.2.1.5 Intra-frequency RRC Re-establishment in FR1 for 1 Rx UE without serving cell timing

A.16.3.2.1.5.1 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 6.2.1B.

The test parameters are given in table A.16.3.2.1.5.1-1, table A.16.3.2.1.5.1-2 and table A.16.3.2.1.5.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.16.3.2.1.5.1-1: 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, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

**Table A.16.3.2.1.5.1-2: 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, 4 | Cell1 |  |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell2 |  |
| Final condition | Active cell |  | 1, 2, 3, 4 | Cell2 |  |
| RF Channel Number | |  | 1, 2, 3, 4 | 1 |  |
| Time offset between cells | |  | 1 | 3 ms | Asynchronous cells |
|  | | 2 | 3 μs | Synchronous cells |
|  | | 3 | 3 μs | Synchronous cells |
|  | |  | 4 | 3 ms | Asynchronous cells |
| N310 | | - | 1, 2, 3, 4 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1, 2, 3, 4 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1, 2, 3, 4 | 6000 | Radio link failure timer configured by *RLF-TimersAndConstants* |
| T311 | | ms | 1, 2, 3, 4 | 3000 | RRC re-establishment timer |
| Access Barring Information | | - | 1, 2, 3, 4 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR1 |  |
|  | | 2 | SSB.1 FR1 |  |
|  | | 3 | SSB.1 RedCap FR1 |  |
|  | |  | 4 | SSB.1 FR1 |  |
| SMTC configuration | |  | 1 | SMTC.2 |  |
|  | | 2 | SMTC.1 |  |
|  | | 3 | SMTC.1 |  |
|  | |  | 4 | SMTC.2 |  |
| DRX cycle length | | s | 1, 2, 3, 4 | OFF |  |
| PRACH configuration | |  | 1, 2, 3, 4 | FR1 PRACH configuration 1 | Table A.3.8.2.1-1 |
| T1 | | s | 1, 2, 3, 4 | 5 |  |
| T2 | | s | 1, 2, 3, 4 | 6.24 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1B in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1B.5 in TS 38.133 ) |
| T3 | | s | 1, 2, 3, 4 | 3 |  |

Table A.16.3.2.1.5.1-3: 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 | | |
|  |  | 4 | N/A | | | N/A | | |
| 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 | | |
|  |  | 4 | SR.1.1 FDD | | | SR.1.1 FDD | | |
| 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 | | |
|  |  | 4 | CR.1.1 FDD | | | CR.1.1 FDD | | |
| 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 | | |
|  |  | 4 | CCR.1.1 FDD | | | CCR.1.1 FDD | | |
| OCNG Pattern |  | 1, 2, 3, 4 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| 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 | | |
|  |  | 4 |  | | |  | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | | SSB | | |
|  | dB | 1 | 4 | -infinity | -infinity | -infinity | -infinity | 4 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
|  |  | 4 |  |  |  |  |  |  |
| Note2 | dBm/SCS | 1 | -98 | | | | | |
|  |  | 2 | -98 | | | | | |
|  |  | 3 | -95 | | | | | |
|  |  | 4 | -98 | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | |
|  |  | 2 |  | | | | | |
|  |  | 3 |  | | | | | |
|  |  | 4 |  | | | | | |
|  | dB | 1 | 4 | -infinity | -infinity | -infinity | -infinity | 4 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
|  |  | 4 |  |  |  |  |  |  |
| 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 |
|  |  | 4 | -94 | -infinity | -infinity | -infinity | -infinity | -94 |
| 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/18.36 MHz | 3 | -61.66 | -infinity | -infinity | -infinity | -infinity | -61.66 |
|  | dBm/9.36 MHz | 2 | -64.59 | -infinity | -infinity | -infinity | -infinity | -64.59 |
| Propagation Condition |  | 1, 2, 3, 4 | 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.16.3.2.1.5.2 Test Requirements

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

The RRC re-establishment delay to an unknown NR 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.

##### A.16.3.2.1.6 Intra-frequency RRC Re-establishment in FR1 for 2 Rx UE without serving cell timing

A.16.3.2.1.6.1 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 6.2.1B.

The test parameters are given in table A.16.3.2.1.6.1-1, table A.16.3.2.1.6.1-2 and table A.16.3.2.1.6.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.16.3.2.1.6.1-1: 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, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

**Table A.16.3.2.1.6.1-2: 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, 4 | Cell1 |  |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell2 |  |
| Final condition | Active cell |  | 1, 2, 3, 4 | Cell2 |  |
| RF Channel Number | |  | 1, 2, 3, 4 | 1 |  |
| Time offset between cells | |  | 1 | 3 ms | Asynchronous cells |
|  | | 2 | 3 μs | Synchronous cells |
|  | | 3 | 3 μs | Synchronous cells |
|  | |  | 4 | 3 ms | Asynchronous cells |
| N310 | | - | 1, 2, 3, 4 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1, 2, 3, 4 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1, 2, 3, 4 | 6000 | Radio link failure timer configured by *RLF-TimersAndConstants* |
| T311 | | ms | 1, 2, 3, 4 | 3000 | RRC re-establishment timer |
| Access Barring Information | | - | 1, 2, 3, 4 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR1 |  |
|  | | 2 | SSB.1 FR1 |  |
|  | | 3 | SSB.1 RedCap FR1 |  |
|  | |  | 4 | SSB.1 FR1 |  |
| SMTC configuration | |  | 1 | SMTC.2 |  |
|  | | 2 | SMTC.1 |  |
|  | | 3 | SMTC.1 |  |
|  | |  | 4 | SMTC.2 |  |
| DRX cycle length | | s | 1, 2, 3, 4 | OFF |  |
| PRACH configuration | |  | 1, 2, 3, 4 | FR1 PRACH configuration 1 | Table A.3.8.2.1-1 |
| T1 | | s | 1, 2, 3, 4 | 5 |  |
| T2 | | s | 1, 2, 3, 4 | 6.24 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1B in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1B.5 in TS 38.133 ) |
| T3 | | s | 1, 2, 3, 4 | 3 |  |

Table A.16.3.2.1.6.1-3: 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 | | |
|  |  | 4 | N/A | | | N/A | | |
| 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 | | |
|  |  | 4 | SR.1.1 FDD | | | SR.1.1 FDD | | |
| 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 | | |
|  |  | 4 | CR.1.1 FDD | | | CR.1.1 FDD | | |
| 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 | | |
|  |  | 4 | CCR.1.1 FDD | | | CCR.1.1 FDD | | |
| OCNG Pattern |  | 1, 2, 3, 4 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| 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 | | |
|  |  | 4 | TRS.1.1.FDD | | | TRS.1.1.FDD | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | | SSB | | |
|  | dB | 1 | 4 | -infinity | -infinity | -infinity | -infinity | 4 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
|  |  | 4 |  |  |  |  |  |  |
| Note2 | dBm/SCS | 1 | -98 | | | | | |
|  |  | 2 | -98 | | | | | |
|  |  | 3 | -95 | | | | | |
|  |  | 4 |  | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | |
|  |  | 2 |  | | | | | |
|  |  | 3 |  | | | | | |
|  |  | 4 |  | | | | | |
|  | dB | 1 | 4 | -infinity | -infinity | -infinity | -infinity | 4 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
|  |  | 4 |  |  |  |  |  |  |
| 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 |
|  |  | 4 | -94 | -infinity | -infinity | -infinity | -infinity | -94 |
| 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/18.36 MHz | 3 | -61.66 | -infinity | -infinity | -infinity | -infinity | -61.66 |
|  | dBm/9.36 MHz | 2 | -64.59 | -infinity | -infinity | -infinity | -infinity | -64.59 |
| Propagation Condition |  | 1, 2, 3, 4 | 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.16.3.2.1.6.2 Test Requirements

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

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

#### A.16.3.2.2 Random Access

##### A.16.3.2.2.1 4-step RA type contention based random access test in FR1 for NR standalone for 1 Rx UE

A.16.3.2.2.1.1 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 6.2.2B.2 and Clause 7.1A.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.16.3.2.2.1.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.16.3.2.2.1.1-2.

**Table A.16.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR1 for NR standalone**

|  |  |
| --- | --- |
| **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 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

**Table A.16.3.2.2.1.1-2: General test parameters for contention based random access test in FR1 for NR Standalone**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test-1** | **Comments** |
| SSB Configuration | | Config 1,4 |  | SSB pattern 1 in FR1 | As defined in A.3.10 and A.3.10B, except for number of SSBs per SS-burst and SS/PBCH block index as below |
|  | | Config 2 |  | SSB pattern 1 in FR1 |
|  | | Config 3 |  | SSB pattern 1 for RedCap in FR1 |
| Number of SSBs per SS-burst | | |  | 2 | Different from the definition in A.3.10 and A.3.10B |
| SS/PBCH block index | | |  | 0,1 | Different from the definition in A.3.10 and A.3.10B |
| Duplex Mode for Cell 1 | | Config 1 |  | FDD |  |
|  | | Config 2,3 |  | TDD |  |
|  | | Config 4 |  | HD-FDD |  |
| TDD Configuration | | Config 2 |  | TDDConf.1.1 |  |
|  | | Config 3 |  | TDDConf.2.1 |  |
| CSI-RS for tracking | | Config 1,4 |  | TRS.1.1 FDD |  |
| Config 2 |  | TRS.1.1 TDD |  |
|  | | Config 3 |  | TRS.1.2 TDD |  |
| OCNG Pattern Note 1 | | |  | OP.1 | As defined in A.3.2.1. |
| PDSCH parameters Note 4 | | Config 1,4 |  | SR.1.1 FDD | As defined in A.3.1.1. |
|  | | Config 2 |  | SR.1.1 TDD |  |
|  | | Config 3 |  | SR.2.1 TDD |  |
| RMSI CORESET Reference Channel | | Config 1,4 |  | CR.1.1 FDD |  |
| Config 2 |  | CR.1.1 TDD |  |
|  | | Config 3 |  | CR.2.1 TDD |  |
| Dedicated CORESET Reference Channel | | Config 1,4 |  | CCR.1.1 FDD |  |
| Config 2 |  | CCR.1.1 TDD |  |
|  | | Config 3 |  | CCR.2.1 TDD |  |
| 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 |  |  |
| SSB with index 0 |  | | dB | 3 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB*+[offset] |
|  |  | Config 1,4 | dBm/15kHz | -98 |  |
|  |  | Config 2 |  | -98 |  |
|  |  | Config 3 |  | -95 |  |
|  |  | | 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*+[offset] |
|  |  | Config 1,4 | dBm/15kHz | -98 |  |
|  | Config 2 |  | -98 |  |
|  |  | Config 3 |  | -95 |  |
|  |  | | dB | -17 |  |
|  | SS-RSRP Note 3 | | dBm/ SCS | -115 |  |
| Io Note 2 | | Config 1,4 | dBm | -65.3/9.36MHz | For symbols without SSB index 1 |
|  | | Config 2 |  | -65.3/9.36MHz |  |
|  | | Config 3 |  | -62.2/38.16 MHz |  |
| 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. |
| 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.16.3.2.2.1.2 Test Requirements

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

A.16.3.2.2.1.2.1 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+*[offset].

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 7.1A.2.

A.16.3.2.2.1.2.2 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 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 7.1A.2.

A.16.3.2.2.1.2.3 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 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 7.1A.2.

A.16.3.2.2.1.2.4 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.16.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

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

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

A. .16.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

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

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

A.16.3.2.2.1.2.7 Contention Resolution Timer expiry

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

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

A.16.3.2.2.2 4-step RA type contention based random access test in FR1 for NR standalone for 2 Rx UE

A.16.3.2.2.2.1 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 6.2.2B.2 and Clause 7.1A.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.16.3.2.2.2.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.16.3.2.2.2.1-2.

**Table A.16.3.2.2.2.1-1: Supported test configurations for contention based random access test in FR1 for NR standalone**

|  |  |
| --- | --- |
| **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 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

**Table A.16.3.2.2.2.1-2: General test parameters for contention based random access test in FR1 for NR Standalone**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test-1** | **Comments** |
| SSB Configuration | | Config 1,4 |  | SSB pattern 1 in FR1 | As defined in A.3.10 and A.3.10B, except for number of SSBs per SS-burst and SS/PBCH block index as below |
|  | | Config 2 |  | SSB pattern 1 in FR1 |
|  | | Config 3 |  | SSB pattern 1 for RedCap in FR1 |
| Number of SSBs per SS-burst | | |  | 2 | Different from the definition in A.3.10 and A.3.10B |
| SS/PBCH block index | | |  | 0,1 | Different from the definition in A.3.10 and A.3.10B |
| Duplex Mode for Cell 1 | | Config 1,4 |  | FDD |  |
|  | | Config 2,3 |  | TDD |  |
| TDD Configuration | | Config 2 |  | TDDConf.1.1 |  |
|  | | Config 3 |  | TDDConf.2.1 |  |
| CSI-RS for tracking | | Config 1,4 |  | TRS.1.1 FDD |  |
| Config 2 |  | TRS.1.1 TDD |  |
|  | | Config 3 |  | TRS.1.2 TDD |  |
| OCNG Pattern Note 1 | | |  | OP.1 | As defined in A.3.2.1. |
| PDSCH parameters Note 4 | | Config 1,4 |  | SR.1.1 FDD | As defined in A.3.1.1. |
|  | | Config 2 |  | SR.1.1 TDD |  |
|  | | Config 3 |  | SR.2.1 TDD |  |
| RMSI CORESET Reference Channel | | Config 1,4 |  | CR.1.1 FDD |  |
| Config 2 |  | CR.1.1 TDD |  |
|  | | Config 3 |  | CR.2.1 TDD |  |
| Dedicated CORESET Reference Channel | | Config 1,4 |  | CCR.1.1 FDD |  |
| Config 2 |  | CCR.1.1 TDD |  |
|  | | Config 3 |  | CCR.2.1 TDD |  |
| 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 |  |  |
| SSB with index 0 |  | | dB | 3 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
|  |  | Config 1,4 | dBm/15kHz | -98 |  |
|  |  | Config 2 |  | -98 |  |
|  |  | Config 3 |  | -95 |  |
|  |  | | 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 1,4 | dBm/15kHz | -98 |  |
|  | Config 2 |  | -98 |  |
|  |  | Config 3 |  | -95 |  |
|  |  | | dB | -17 |  |
|  | SS-RSRP Note 3 | | dBm/ SCS | -115 |  |
| Io Note 2 | | Config 1,4 | dBm | -65.3/9.36MHz | For symbols without SSB index 1 |
|  | | Config 2 |  | -65.3/9.36MHz |  |
|  | | Config 3 |  | -62.2/38.16 MHz |  |
| 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. |
| 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.16.3.2.2.2.2 Test Requirements

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

A.16.3.2.2.2.2.1 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 7.1A.2.

A.16.3.2.2.2.2.2 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 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 7.1A.2.

A.16.3.2.2.2.2.3 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 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 7.1A.2.

A.16.3.2.2.2.2.4 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.16.3.2.2.2.2.5 Reception of an Incorrect Message over Temporary C-RNTI

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

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

A. .16.3.2.2.2.2.6 Reception of a Correct Message over Temporary C-RNTI

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

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

A.16.3.2.2.2.2.7 Contention Resolution Timer expiry

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

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

A.16.3.2.2.3 4-step RA type non-contention based random access test in FR1 for NR standalone for 1 Rx UE

A.16.3.2.2.3 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 6.2.2.2B and Clause 7.1A.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.16.3.2.2.3-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.16.3.2.2.3-2 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.16.3.2.2.3-1: Supported test configurations for non-contention based random access test in FR1 for NR standalone**

|  |  |
| --- | --- |
| **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 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

**Table A.16.3.2.2.3-2: General test parameters for non-contention based random access test in FR1 for NR Standalone**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test-1** | **Test-2** | **Comments** |
| SSB Configuration | | Config 1, 2,4 |  | SSB pattern 1 in FR1 | SSB pattern 1 in FR1 | As defined in A.3.10B, except for number of SSBs per SS-burst and SS/PBCH block index as below |
|  | | Config 3 |  | SSB pattern 1 for RedCap in FR1 | SSB pattern 1 for RedCap in FR1 |
| Number of SSBs per SS-burst | | |  | 2 | 2 | Different from the definition in A.3.10B |
| SS/PBCH block index | | |  | 0,1 | 0,1 | Different from the definition in A.3.10B |
| CSI-RS Configuration | | Config 1, 2, 4 |  | N/A | CSI-RS.1.1 FDD | As defined in A.3.14 |
|  | | Config 3 |  |  | CSI-RS.2.1 TDD |  |
| Duplex Mode for Cell 1 | | Config 1 |  | FDD | FDD |  |
|  | | Config 2, 3 |  | TDD | TDD |  |
|  | | Config 4 |  | HD-FDD | HD-FDD |  |
| TDD Configuration | | Config 2 |  | TDDConf.1.1 | TDDConf.1.1 |  |
|  | | Config 3 |  | TDDConf.2.1 | TDDConf.2.1 |  |
| CSI-RS for tracking | | Config 1,4 |  | TRS.1.1 FDD | TRS.1.1 FDD |  |
| Config 2 |  | TRS.1.1 TDD | TRS.1.1 TDD |  |
|  | | Config 3 |  | TRS.1.2 TDD | TRS.1.2 TDD |  |
| OCNG Pattern Note 1 | | |  | OP.1 | OP.1 | As defined in A.3.2.1. |
| PDSCH parameters Note 4 | | Config 1,4 |  | SR.1.1 FDD | SR.1.1 FDD | As defined in A.3.1B.1. |
|  | | Config 2 |  | SR.1.1 TDD | SR.1.1 TDD |  |
|  | | Config 3 |  | CR.2.1 TDD | CR.2.1 TDD |  |
| RMSI CORESET Reference Channel | | Config 1, 4 |  | CR.1.1 TDD | CR.1.1 TDD |  |
| Config 2 |  | CR.1.1 TDD | CR.1.1 TDD |  |
|  | | Config 3 |  | CR.2.1 TDD | CR.2.1 TDD |  |
| Dedicated CORESET Reference Channel | | Config 1, 4 |  | CCR.1.1 TDD | CCR.1.1 TDD |  |
| Config 2 |  | CCR.1.1 TDD | CCR.1.1 TDD |  |
|  | | Config 3 |  | CCR.2.1 TDD | CCR.2.1 TDD |  |
| NR RF Channel Number | | |  | 1 | 1 |  |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | dB |  |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | dB |  |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | dB |  |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | dB |  |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | dB |  |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | dB |  |  |  |
| SSB with index 0 |  | | dB | 3 | 3 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB*+[offset] |
|  |  | Config 1 | dBm/15kHz | -98 | -98 |  |
|  |  | Config 2 |  | -98 | -98 |  |
|  |  | Config 3 |  | -95 | -95 |  |
|  |  | | 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*+[offset] |
|  |  | Config 1 | dBm/15kHz | -98 | -98 |  |
|  |  | Config 2 |  | -98 | -98 |  |
|  |  | Config 3 |  | -95 | -95 |  |
|  |  | | dB | -17 | -17 |  |
|  | SS-RSRP Note 3 | | dBm/ SCS | -115 | -115 |  |
| Io Note 2 | | Config 1 | dBm | -65.3/9.36MHz | -65.3/9.36MHz | For symbols without SSB index 1 |
|  | | Config 2 |  | -65.3/9.36MHz | -65.3/9.36MHz |  |
|  | | Config 3 |  | -62.2/38.16 MHz | -62.2/38.16 MHz |  |
| 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.3.8B.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.6.3.2.2.2.2 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.6.3.2.2.2.2.1 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 7.1A.2.

A.6.3.2.2.2.2.2 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 7.1A.2.

A.6.3.2.2.2.2.3 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 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 7.1A.2.

A.6.3.2.2.2.2.4 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 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 7.1A.2.

A.16.3.2.2.4 4-step RA type non-contention based random access test in FR1 for NR standalone for 2 Rx UE

A.16.3.2.2.4 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 6.2.2.2B and Clause 7.1A.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.16.3.2.2.4-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.16.3.2.2.4-2 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.16.3.2.2.4-1: Supported test configurations for non-contention based random access test in FR1 for NR standalone**

|  |  |
| --- | --- |
| **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 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

**Table A.16.3.2.2.4-2: General test parameters for non-contention based random access test in FR1 for NR Standalone**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test-1** | **Test-2** | **Comments** |
| SSB Configuration | | Config 1, 2,4 |  | SSB pattern 1 in FR1 | SSB pattern 1 in FR1 | As defined in A.3.10B, except for number of SSBs per SS-burst and SS/PBCH block index as below |
|  | | Config 3 |  | SSB pattern 1 for RedCap in FR1 | SSB pattern 1 for RedCap in FR1 |
| Number of SSBs per SS-burst | | |  | 2 | 2 | Different from the definition in A.3.10B |
| SS/PBCH block index | | |  | 0,1 | 0,1 | Different from the definition in A.3.10B |
| CSI-RS Configuration | | Config 1, 2, 4 |  | N/A | CSI-RS.1.1 FDD | As defined in A.3.14 |
|  | | Config 3 |  |  | CSI-RS.2.1 TDD |  |
| Duplex Mode for Cell 1 | | Config 1 |  | FDD | FDD |  |
|  | | Config 2, 3 |  | TDD | TDD |  |
|  | | Config 4 |  | HD-FDD | HD-FDD |  |
| TDD Configuration | | Config 2 |  | TDDConf.1.1 | TDDConf.1.1 |  |
|  | | Config 3 |  | TDDConf.2.1 | TDDConf.2.1 |  |
| CSI-RS for tracking | | Config 1,4 |  | TRS.1.1 FDD | TRS.1.1 FDD |  |
| Config 2 |  | TRS.1.1 TDD | TRS.1.1 TDD |  |
|  | | Config 3 |  | TRS.1.2 TDD | TRS.1.2 TDD |  |
| OCNG Pattern Note 1 | | |  | OP.1 | OP.1 | As defined in A.3.2.1. |
| PDSCH parameters Note 4 | | Config 1,4 |  | SR.1.1 FDD | SR.1.1 FDD | As defined in A.3.1B.1. |
|  | | Config 2 |  | SR.1.1 TDD | SR.1.1 TDD |  |
|  | | Config 3 |  | CR.2.1 TDD | CR.2.1 TDD |  |
| RMSI CORESET Reference Channel | | Config 1, 4 |  | CR.1.1 TDD | CR.1.1 TDD |  |
| Config 2 |  | CR.1.1 TDD | CR.1.1 TDD |  |
|  | | Config 3 |  | CR.2.1 TDD | CR.2.1 TDD |  |
| Dedicated CORESET Reference Channel | | Config 1, 4 |  | CCR.1.1 TDD | CCR.1.1 TDD |  |
| Config 2 |  | CCR.1.1 TDD | CCR.1.1 TDD |  |
|  | | Config 3 |  | CCR.2.1 TDD | CCR.2.1 TDD |  |
| NR RF Channel Number | | |  | 1 | 1 |  |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | dB |  |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | dB |  |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | dB |  |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | dB |  |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | dB |  |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | dB |  |  |  |
| SSB with index 0 |  | | dB | 3 | 3 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
|  |  | Config 1 | dBm/15kHz | -98 | -98 |  |
|  |  | Config 2 |  | -98 | -98 |  |
|  |  | Config 3 |  | -95 | -95 |  |
|  |  | | 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 | dBm/15kHz | -98 | -98 |  |
|  |  | Config 2 |  | -98 | -98 |  |
|  |  | Config 3 |  | -95 | -95 |  |
|  |  | | dB | -17 | -17 |  |
|  | SS-RSRP Note 3 | | dBm/ SCS | -115 | -115 |  |
| Io Note 2 | | Config 1 | dBm | -65.3/9.36MHz | -65.3/9.36MHz | For symbols without SSB index 1 |
|  | | Config 2 |  | -65.3/9.36MHz | -65.3/9.36MHz |  |
|  | | Config 3 |  | -62.2/38.16 MHz | -62.2/38.16 MHz |  |
| 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.3.8B.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.6.3.2.2.2.2 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.6.3.2.2.2.2.1 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 7.1A.2.

A.6.3.2.2.2.2.2 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 7.1A.2.

A.6.3.2.2.2.2.3 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 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 7.1A.2.

A.6.3.2.2.2.2.4 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 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 7.1A.2.

##### A.16.3.2.2.5 2-step RA type contention based random access test in FR1 for NR standalone for 1 Rx UE

A.16.3.2.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the 2-step RA type random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2B.2 and Clause 7.1A.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.16.3.2.2.5.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.16.3.2.2.5.1-2.

Table A.16.3.2.2.5.1-1: Supported test configurations for 2-step RA type contention based random access with successRAR test in FR1 for NR standalone

|  |  |
| --- | --- |
| 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 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

Table A.16.3.2.2.5.1-2: General test parameters for 2-step RA type contention based random access with successRAR test in FR1 for NR standalone

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test-1 | Comments |
| SSB Configuration | | Config 1,2,4 |  | SSB pattern 1 in FR1 | As defined in A.3.10, except for number of SSBs per SS-burst and SS/PBCH block index as below |
|  | | Config 3 |  | SSB.1 RedCap FR1 |
| Number of SSBs per SS-burst | | |  | 2 | Different from the definition in A.3.10 |
| SS/PBCH block index | | |  | 0,1 | Different from the definition in A.3.10 |
| Duplex Mode for Cell 2 | | Config 1 |  | FDD |  |
|  | | Config 2,3 |  | TDD |
| Config 4 | HD-FDD |
| TDD Configuration | | Config 2,3 |  | TDDConf.1.2 |  |
| OCNG Pattern Note 1 | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 | | Config 1,4 |  | SR.1.1 FDD | As defined in A.3.1.1. |
|  | | Config 2,3 |  | SR.2.1 TDD |
| 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 |  |  |
| SSB with index 0 |  | | dB | 3 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  |  | Config 1 | dBm/15kHz | -98 |
|  |  | Config 2 |  | -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 | dBm/15kHz | -98 |
|  |  | Config 2 |  | -101 |
|  |  | | dB | -17 |
|  | SS-RSRP | | dBm/ SCS | -115 |
| Io Note 2 | | Config 1 | dBm | -65.3/9.36MHz | For symbols without SSB index 1 |
|  | | Config 2 | -62.2/38.16MHz |
| 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.16.3.2.2.5.2 Test Requirements

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

A.16.3.2.2.5.2.1 MsgA Transmission

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

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first MsgA preamble transmission 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 7.1A.2.

A.16.3.2.2.5.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2.3.1.2 the System Simulator shall transmit a MsgB containing a 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 an ACK if the MsgB with a successRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble and if the Contention Resolution is successful.

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 transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first 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 7.1A.2.

A.16.3.2.2.5.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.1.3 the System Simulator shall transmit a MsgB containing a 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 transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first 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 7.1A.2.

##### A.16.3.2.2.6 2-step RA type contention based random access test in FR1 for NR standalone for 2 Rx UE

A.16.3.2.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the 2-step RA type random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2B.2 and Clause 7.1A.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.16.3.2.2.6.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.16.3.2.2.6.1-2.

Table A.16.3.2.2.6.1-1: Supported test configurations for 2-step RA type contention based random access with successRAR test in FR1 for NR standalone

|  |  |
| --- | --- |
| 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 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

Table A.16.3.2.2.6.1-2: General test parameters for 2-step RA type contention based random access with successRAR test in FR1 for NR standalone

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test-1 | Comments |
| SSB Configuration | | Config 1,2,4 |  | SSB.1 FR1 | As defined in A.3.10, except for number of SSBs per SS-burst and SS/PBCH block index as below |
|  | | Config 3 |  | SSB.1 RedCap FR1 |
| Number of SSBs per SS-burst | | |  | 2 | Different from the definition in A.3.10 |
| SS/PBCH block index | | |  | 0,1 | Different from the definition in A.3.10 |
| Duplex Mode for Cell 2 | | Config 1 |  | FDD |  |
|  | | Config 2,3 |  | TDD |
| Config 4 | HD-FDD |
| TDD Configuration | | Config 2,3 |  | TDDConf.1.2 |  |
| OCNG Pattern Note 1 | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 | | Config 1,4 |  | SR.1.1 FDD | As defined in A.3.1.1. |
|  | | Config 2,3 |  | SR.2.1 TDD |
| 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 |  |  |
| SSB with index 0 |  | | dB | 3 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  |  | Config 1 | dBm/15kHz | -98 |
|  |  | Config 2 |  | -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 | dBm/15kHz | -98 |
|  |  | Config 2 |  | -101 |
|  |  | | dB | -17 |
|  | SS-RSRP | | dBm/ SCS | -115 |
| Io Note 2 | | Config 1 | dBm | -65.3/9.36MHz | For symbols without SSB index 1 |
|  | | Config 2 | -62.2/38.16MHz |
| 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.16.3.2.2.6.2 Test Requirements

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

A.16.3.2.2.6.2.1 MsgA Transmission

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

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first MsgA preamble transmission 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 7.1A.2.

A.16.3.2.2.6.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2.3.1.2 the System Simulator shall transmit a MsgB containing a 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 an ACK if the MsgB with a successRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble and if the Contention Resolution is successful.

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 transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first 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 7.1A.2.

A.16.3.2.2.6.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.1.3 the System Simulator shall transmit a MsgB containing a 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 transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first 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 7.1A.2.

##### A.16.3.2.2.7 2-step RA type non-contention based test in FR1 for NR standalone for 1 RX UE

A.16.3.2.2.7.1 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 6.2.2B.2 and Clause 7.1A.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.16.3.2.2.7.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.16.3.2.2.7.1-2.

Table A.16.3.2.2.7.1-1: Supported test configurations for non-contention based random access test in FR1 for NR standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

Table A.16.3.2.2.7.1-2: General test parameters for non-contention based random access test in FR1 for NR Standalone

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test-1 | Comments |
| SSB Configuration | | Config 1 |  | SSB.1 RedCap FR1 | As defined in A.3.10, except for number of SSBs per SS-burst and SS/PBCH block index as below |
| Config 2 | SSB.1 FR1 |
| Number of SSBs per SS-burst | | |  | 2 | Different from the definition in A.3.10 |
| SS/PBCH block index | | |  | 0,1 | Different from the definition in A.3.10 |
| Duplex Mode for Cell 1 | | Config 1 |  | TDD |  |
| Config 2 | HD-FDD |
| TDD Configuration | | Config 1 |  | TDDConf.1.2 |  |
| OCNG Pattern Note 1 | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 4 | | Config 1 |  | SR.2.1 TDD | As defined in A.3.1.1. |
| Config 2 | SR.1.1 FDD |
| 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 |  |  |
| msgA-*RSRP-ThresholdSSB* | | | dBm | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
| SSB with index 0 |  | | dB | 3 | Power of SSB with index 0 is set to be above configured msgA-*RSRP-ThresholdSSB* |
|  |  | Config 1 | dBm/15kHz | -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 msgA-*RSRP-ThresholdSSB* |
|  |  | Config 1 | dBm/15kHz | -101 |
|  |  | | dB | -17 |
|  | SS-RSRP Note 3 | | dBm/ SCS | -115 |
| Io Note 2 | | Config 1 | dBm | -62.2/38.16MHz | For symbols 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 () | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | |  | FR1 MsgA configuration 2 | As defined in A.3.20.2.2. |
| 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.16.3.2.2.7.2 Test Requirements

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

A.16.3.2.2.7.2.1 MsgA Transmission

To test the UE behavior specified in Clause 6.2.2.3.2.1, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, 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.

In addition, the System Simulator shall receive the MsgA PRACH 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 preambles shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first 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 7.1A.2.

A.16.3.2.2.7.2.2 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 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 containing the payload of MsgA PUSCH if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble. The UE shall monitor contention resolution as described in clause 8.2A in TS 38.213 [3].

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 preambles shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first 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 preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA and msg3 transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.16.3.2.2.7.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.2.3 the System Simulator shall transmit a MsgB 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 transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first 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 7.1A.2.

##### A.16.3.2.2.8 2-step RA type non-contention based test in FR1 for NR standalone for 2 RX UE

A.16.3.2.2.8.1 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 6.2.2B.2 and Clause 7.1A.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.16.3.2.2.8.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.16.3.2.2.8.1-2.

Table A.16.3.2.2.8.1-1: Supported test configurations for non-contention based random access test in FR1 for NR standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

Table A.16.3.2.2.8.1-2: General test parameters for non-contention based random access test in FR1 for NR Standalone

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test-1 | Comments |
| SSB Configuration | | Config 1 |  | SSB pattern 2 in FR1 | As defined in A.3.10, except for number of SSBs per SS-burst and SS/PBCH block index as below |
| Config 2 | SSB.1 FR1 |
| Number of SSBs per SS-burst | | |  | 2 | Different from the definition in A.3.10 |
| SS/PBCH block index | | |  | 0,1 | Different from the definition in A.3.10 |
| Duplex Mode for Cell 1 | | Config 1 |  | TDD |  |
| Config 2 | HD-FDD |
| TDD Configuration | | Config 1 |  | TDDConf.1.2 |  |
| OCNG Pattern Note 1 | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 4 | | Config 1 |  | SR.2.1 TDD | As defined in A.3.1.1. |
| Config 2 | SR.1.1 FDD |
| 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 |  |  |
| msgA-*RSRP-ThresholdSSB* | | | dBm | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
| SSB with index 0 |  | | dB | 3 | Power of SSB with index 0 is set to be above configured msgA-*RSRP-ThresholdSSB* |
|  |  | Config 1 | dBm/15kHz | -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 msgA-*RSRP-ThresholdSSB* |
|  |  | Config 1 | dBm/15kHz | -101 |
|  |  | | dB | -17 |
|  | SS-RSRP Note 3 | | dBm/ SCS | -115 |
| Io Note 2 | | Config 1 | dBm | -62.2/38.16MHz | For symbols 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 () | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | |  | FR1 MsgA configuration 2 | As defined in A.3.20.2.2. |
| 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.16.3.2.2.8.2 Test Requirements

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

A.16.3.2.2.8.2.1 MsgA Transmission

To test the UE behavior specified in Clause 6.2.2.3.2.1, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, 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.

In addition, the System Simulator shall receive the MsgA PRACH 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 preambles shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first 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 7.1A.2.

A.16.3.2.2.8.2.2 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 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 containing the payload of MsgA PUSCH if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble. The UE shall monitor contention resolution as described in clause 8.2A in TS 38.213 [3].

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 preambles shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first 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 preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA and msg3 transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.16.3.2.2.8.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.2.3 the System Simulator shall transmit a MsgB 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 transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first 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 7.1A.2.

#### A.16.3.2.3 SA: RRC Connection Release with Redirection

##### A.16.3.2.3.1 Redirection from NR in FR1 to NR in FR1 for 1 Rx UE

A.16.3.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3A.2.1.

A.16.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.16.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.16.3.2.3.1.2-2, and A.16.3.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2. Cell 1 and Cell 2 belong to different tracking areas.

Table A.16.3.2.3.1.2-1: Redirection from NR to NR test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | Source cell: NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode  Target cell: NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
|  | Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.16.3.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | 2.3 |  |

Table A.16.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 2 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| NR RF Channel Number | | |  | 1 | | | | 2 | | |
| Duplex mode | | Config 1 |  | FDD | | | | | | |
|  | | Config 2, 3 |  | TDD | | | | | | |
|  | | Config 4 |  | HD-FDD | | | | | | |
| SSB Configuration | | Config 1 |  | SSB.1 FR1 | | | | | | |
| Config 2 |  | SSB.1 FR1 | | | | | | |
| Config 3 |  | SSB.1 RedCap FR1 | | | | | | |
|  | | Config 4 |  | SSB.1 FR1 | | | | | | |
| CSI-RS for tracking | | Config 1 |  | TRS.1.1 FDD | | | | | | |
| Config 2 |  | TRS.1.1 TDD | | | | | | |
| Config 3 |  | TRS.1.2 TDD | | | | | | |
|  | | Config 4 |  | TRS.1.1 FDD | | | | | | |
| TDD configuration | | Config 1 |  | Not Applicable | | | | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | | | | |
|  | | Config 4 |  | Not Applicable | | | | | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | | | |
|  | | Config 3 |  | 20: NRB,c = 51 | | | | | | |
|  | | Config 4 |  | 10: NRB,c = 52 | | | | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | | | |
|  | | Config 3 |  | 20: NRB,c = 51 | | | | | | |
|  | | Config 4 |  | 10: NRB,c = 52 | | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | | | | | | |
|  | | Config 2 |  | SR.1.1 TDD | | | | | | |
|  | | Config 3 |  | SR2.1 TDD | | | | | | |
|  | | Config 4 |  | TBD | | | | | | |
| CORESET Reference Channel | | Config 1 |  | TBD | | | | | | |
|  | | Config 2 |  | TBD | | | | | | |
|  | | Config 3 |  | TBD | | | | | | |
|  | | Config 4 |  | TBD | | | | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | | | |
| SMTC configuration | | Config 1, 2, 4 |  | SMTC.1 FR1 | | | | | | |
|  | | Config 3 |  | SMTC.2 FR1 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2, 4 | kHz | 15 kHz | | | | | | |
|  | | Config 3 |  | 30 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2,4 | kHz | 15 kHz | | | | | | |
|  | | Config 3 |  | 30 kHz | | | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | | | | |
| EPRE ratio of PBCH DMRS to SSS | | |  |  | | | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  | | | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  | | | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  | | | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  | | | | | | |
| EPRE ratio of PDSCH to PDSCH | | |  |  | | | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  | | | | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  | | | | | | |
| Note2 | | | dBm/15kHz | -98 | | | | | | |
| Note2 | Config 1, 2, 4 | | dBm/SCS | -98 | | | | | | |
|  | Config 3 | |  | -95 | | | | | | |
|  | | | dB | 4 | 4 | | -infinity | | 4 | |
|  | | | dB | 4 | 4 | | -infinity | | 4 | |
| IoNote3 | Config 1,2, 4 | | dBm/  9.36MHz | -64.59 | -64.59 | | -70.05 | | -64.59 | |
|  | Config 3 | | dBm/  18.36MHz | -61.66 | -61.66 | | -67.12 | | -61.66 | |
| 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. | | | | | | | | | | |

A.16.3.2.3.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 2240 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

Tconnection\_release\_redirect\_NR = TRRC\_procedure\_delay + Tidentify-NR + TSI-NR + TRACH,

where:

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

Tidentify-NR = 680 ms in the test.

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

TRACH = 170 ms in the test.

This gives a total of 2240 ms.

##### A.16.3.2.3.2 Redirection from NR in FR1 to NR in FR1 for 2 Rx UE

A.16.3.2.3.2.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3A.2.1.

A.16.3.2.3.2.2 Test Parameters

Supported test configurations are shown in table A.16.3.2.3.2.2-1. The time delay is tested by using the parameters in table A.16.3.2.3.2.2-2, and A.16.3.2.3.2.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2. Cell 1 and Cell 2 belong to different tracking areas.

Table A.16.3.2.3.2.2-1: Redirection from NR to NR test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | Source cell: NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode  Target cell: NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
|  | Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.16.3.2.3.2.2-2: General test parameters for Redirection from NR to NR test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | 2.3 |  |

Table A.16.3.2.3.2.2-3: Cell specific test parameters for Redirection from NR to NR test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 2 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| NR RF Channel Number | | |  | 1 | | | | 2 | | |
| Duplex mode | | Config 1 |  | FDD | | | | | | |
|  | | Config 2, 3 |  | TDD | | | | | | |
|  | | Config 4 |  | HD-FDD | | | | | | |
| SSB Configuration | | Config 1 |  | SSB.1 FR1 | | | | | | |
| Config 2 |  | SSB.1 FR1 | | | | | | |
| Config 3 |  | SSB.1 RedCap FR1 | | | | | | |
|  | | Config 4 |  | SSB.1 FR1 | | | | | | |
| CSI-RS for tracking | | Config 1 |  | TRS.1.1 FDD | | | | | | |
| Config 2 |  | TRS.1.1 TDD | | | | | | |
| Config 3 |  | TRS.1.2 TDD | | | | | | |
|  | | Config 4 |  | TRS.1.1 FDD | | | | | | |
| TDD configuration | | Config 1 |  | Not Applicable | | | | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | | | | |
|  | | Config 4 |  | Not Applicable | | | | | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | | | |
|  | | Config 3 |  | 20: NRB,c = 51 | | | | | | |
|  | | Config 4 |  | 10: NRB,c = 52 | | | | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | | | |
|  | | Config 3 |  | 20: NRB,c = 51 | | | | | | |
|  | | Config 4 |  | 10: NRB,c = 52 | | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | | | | | | |
|  | | Config 2 |  | SR.1.1 TDD | | | | | | |
|  | | Config 3 |  | SR2.1 TDD | | | | | | |
|  | | Config 4 |  | SR.1.1 FDD | | | | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD | | | | | | |
|  | | Config 2 |  | CR.1.1 TDD | | | | | | |
|  | | Config 3 |  | CR2.1 TDD | | | | | | |
|  | | Config 4 |  | CR.1.1 FDD | | | | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | | | |
| SMTC configuration | | Config 1, 2, 4 |  | SMTC.1 FR1 | | | | | | |
|  | | Config 3 |  | SMTC.2 FR1 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2, 4 | kHz | 15 kHz | | | | | | |
|  | | Config 3 |  | 30 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2,4 | kHz | 15 kHz | | | | | | |
|  | | Config 3 |  | 30 kHz | | | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | | | | |
| EPRE ratio of PBCH DMRS to SSS | | |  |  | | | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  | | | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  | | | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  | | | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  | | | | | | |
| EPRE ratio of PDSCH to PDSCH | | |  |  | | | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  | | | | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  | | | | | | |
| Note2 | | | dBm/15kHz | -98 | | | | | | |
| Note2 | Config 1, 2, 4 | | dBm/SCS | -98 | | | | | | |
|  | Config 3 | |  | -95 | | | | | | |
|  | | | dB | 4 | 4 | | -infinity | | 4 | |
|  | | | dB | 4 | 4 | | -infinity | | 4 | |
| IoNote3 | Config 1,2, 4 | | dBm/  9.36MHz | -64.59 | -64.59 | | -70.05 | | -64.59 | |
|  | Config 3 | | dBm/  18.36MHz | -61.66 | -61.66 | | -67.12 | | -61.66 | |
| 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. | | | | | | | | | | |

A.16.3.2.3.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 2240 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

Tconnection\_release\_redirect\_NR = TRRC\_procedure\_delay + Tidentify-NR + TSI-NR + TRACH,

where:

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

Tidentify-NR = 680 ms in the test.

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

TRACH = 170 ms in the test.

This gives a total of 2240 ms.

##### A.16.3.2.3.3 Redirection from NR in FR1 to E-UTRAN for 1 Rx UE

A.16.3.2.3.3.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to E-UTRAN requirements specified in clause 6.2.3A.2.2.

A.16.3.2.3.3.2 Test Parameters

Supported test configurations are shown in table A.16.3.2.3.3.2-1. The time delay is tested by using the parameters in table A.16.3.2.3.3.2-2, A.16.3.2.3.3.2-3 and A.16.3.2.3.3.2-4.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.16.3.2.3.3.2-1: Redirection from NR to E-UTRAN test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD |
| 3 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE FDD |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD |
| 6 | NR 30kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE TDD |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode, LTE FDD |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode, LTE TDD |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.16.3.2.3.3.2-2: General test parameters for Redirection from NR to E-UTRAN test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | 2.3 |  |

Table A.16.3.2.3.3.2-3: Cell specific test parameters for Redirection from NR to E-UTRAN (cell 1)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | |
|  | | |  | T1 | | T2 |
| RF Channel Number | | |  | 1 | | |
| Duplex mode | | Config 1,4 |  | FDD | | |
|  | | Config 2,3,5,6 |  | TDD | | |
|  | | Config 7, 8 |  | HD-FDD | | |
| SSB Configuration | | Config 1,2,4,5,7,8 |  | SSB.1 FR1 | | |
| Config 3,6 |  | SSB.1 RedCap FR1 | | |
| 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 | | |
|  | | Config 7,8 |  | TRS.1.1 FDD | | |
| TDD configuration | | Config 1,4, 7, 8 |  | 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 |  | 20: NRB,c = 51 | | |
|  | | Config 7,8 |  | 10: NRB,c = 52 | | |
| BWP BW | | Config 1,4 | MHz | 10: NRB,c = 52 | | |
|  | | Config 2,5 |  | 10: NRB,c = 52 | | |
|  | | Config 3,6 |  | 20: NRB,c = 51 | | |
|  | | Config 7,8 |  | 10: NRB,c = 52 | | |
| DRX Cycle | | | ms | Not Applicable | | |
| PDSCH Reference measurement channel | | Config 1,4 |  | SR.1.1 FDD | | |
|  | | Config 2,5 |  | SR.1.1 TDD | | |
|  | | Config 3,6 |  | SR2.1 TDD | | |
|  | | Config 7,8 |  | SR.1.1 FDD | | |
| CORESET Reference Channel | | Config 1,4 |  | CR.1.1 FDD | | |
|  | | Config 2,5 |  | CR.1.1 TDD | | |
|  | | Config 3,6 |  | CR2.1 TDD | | |
|  | | Config 7,8 |  | CR.1.1 FDD | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | |
| SMTC configuration | | Config 1,2,4,5,7,8 |  | SMTC.1 FR1 | | |
|  | | Config 3,6 |  | SMTC.2 FR1 | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2,4,5,7,8 | kHz | 15 kHz | | |
|  | | Config 3,6 |  | 30 kHz | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2,4,5,7,8 | kHz | 15 kHz | | |
|  | | Config 3,6 |  | 30 kHz | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | |  |  | | |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  | | |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  | | |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  | | |
| EPRE ratio of PDSCH to PDSCH | | |  |  | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  | | |
| Note2 | | | dBm/15kHz | -98 | | |
| Note2 | Config 1,2,4,5,7,8 | | dBm/SCS | -98 | | |
|  | Config 3,6 | |  | -95 | | |
|  | | | dB | 4 | 4 | |
|  | | | dB | 4 | 4 | |
| IoNote3 | Config 1,2,4,5,7,8 | | dBm/  9.36MHz | -64.59 | -64.59 | |
|  | Config 3,6 | | dBm/  18.36MHz | -62.66 | -62.66 | |
| 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.16.3.2.3.3.2-4: Cell specific test parameters for Redirection from NR to E-UTRAN (cell 2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 2 | |
|  |  |  | T1 | T2 |
| RF channel number |  | 1, 2, 3, 4, 5, 6, 7, 8 | 2 | |
| Duplex mode |  | 1, 2, 3, 7 | FDD | |
|  |  | 4, 5, 6, 8 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6, 8 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6, 8 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6, 7, 8 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PRACH ConfigurationNote2 |  | 1, 2, 3, 7 | 4 | |
|  | 4, 5, 6, 8 | 53 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3, 7 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  | 4, 5, 6, 8 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3, 7 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  | 4, 5, 6, 8 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote3 |  | 1, 2, 3, 7 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  | 4, 5, 6, 8 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote4 |  |  |  | |
| OCNG\_RBNote4 |  |  |  | |
| NocNote5 | dBm/15kHz | 1,2,3,4,5,6,7,8 | -98 | |
| Ês/Noc | dB | 1,2,3,4,5,6,7,8 | -Infinity | 4 |
| Ês/IotNote6 | dB | 1,2,3,4,5,6,7,8 | -Infinity | 4 |
| RSRPNote6 | dBm/15kHz | 1,2,3,4,5,6,7,8 | -Infinity | -94 |
| SCH\_RPNote6 | dBm/15kHz | 1,2,3,4,5,6,7,8 | -Infinity | -94 |
| IoNote6 | dBm/9MHz | 1,2,3,4,5,6,7,8 | -70.22 | -64.76 |
| Propagation Condition |  | 1,2,3,4,5,6,7,8 | AWGN | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].  Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 6: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | |

A.16.3.2.3.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 2205 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to E-UTRAN observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

Tconnection\_release\_redirect\_E-UTRA = TRRC\_procedure\_delay + Tidentify-E-UTRA + TSI-E-UTRA + TRACH,

where:

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

Tidentify-E-UTRA = 800 ms in the test.

TSI-E-UTRA = 1280 ms, it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRA cell.

TRACH = 15 ms in the test.

This gives a total of 2205 ms.

##### A.16.3.2.3.4 Redirection from NR in FR1 to E-UTRAN for 2 Rx UE

A.16.3.2.3.4.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to E-UTRAN requirements specified in clause 6.2.3A.2.2.

A.16.3.2.3.4.2 Test Parameters

Supported test configurations are shown in table A.16.3.2.3.4.2-1. The time delay is tested by using the parameters in table A.16.3.2.3.4.2-2, A.16.3.2.3.4.2-3 and A.16.3.2.3.4.2-4.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.16.3.2.3.4.2-1: Redirection from NR to E-UTRAN test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD |
| 3 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE FDD |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD |
| 6 | NR 30kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE TDD |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode, LTE FDD |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode, LTE TDD |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.16.3.2.3.4.2-2: General test parameters for Redirection from NR to E-UTRAN test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | 2.3 |  |

Table A.16.3.2.3.4.2-3: Cell specific test parameters for Redirection from NR to E-UTRAN (cell 1)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | |
|  | | |  | T1 | | T2 |
| RF Channel Number | | |  | 1 | | |
| Duplex mode | | Config 1,4 |  | FDD | | |
|  | | Config 2,3,5,6 |  | TDD | | |
|  | | Config 7, 8 |  | HD-FDD | | |
| SSB Configuration | | Config 1,2,4,5,7,8 |  | SSB.1 FR1 | | |
| Config 3,6 |  | SSB.1 RedCap FR1 | | |
| 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 | | |
|  | | Config 7,8 |  | TBD | | |
| TDD configuration | | Config 1,4, 7, 8 |  | 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 |  | 20: NRB,c = 51 | | |
|  | | Config 7,8 |  | 10: NRB,c = 52 | | |
| BWP BW | | Config 1,4 | MHz | 10: NRB,c = 52 | | |
|  | | Config 2,5 |  | 10: NRB,c = 52 | | |
|  | | Config 3,6 |  | 20: NRB,c = 51 | | |
|  | | Config 7,8 |  | 10: NRB,c = 52 | | |
| DRX Cycle | | | ms | Not Applicable | | |
| PDSCH Reference measurement channel | | Config 1,4 |  | SR.1.1 FDD | | |
|  | | Config 2,5 |  | SR.1.1 TDD | | |
|  | | Config 3,6 |  | SR.2.1 TDD | | |
|  | | Config 7,8 |  | SR.1.1 FDD | | |
| CORESET Reference Channel | | Config 1,4 |  | CR.1.1 FDD | | |
|  | | Config 2,5 |  | CR.1.1 TDD | | |
|  | | Config 3,6 |  | CR.2.1 TDD | | |
|  | | Config 7,8 |  | CR.1.1 FDD | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | |
| SMTC configuration | | Config 1,2,4,5,7,8 |  | SMTC.1 FR1 | | |
|  | | Config 3,6 |  | SMTC.2 FR1 | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2,4,5,7,8 | kHz | 15 kHz | | |
|  | | Config 3,6 |  | 30 kHz | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2,4,5,7,8 | kHz | 15 kHz | | |
|  | | Config 3,6 |  | 30 kHz | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | |  |  | | |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  | | |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  | | |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  | | |
| EPRE ratio of PDSCH to PDSCH | | |  |  | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  | | |
| Note2 | | | dBm/15kHz | -98 | | |
| Note2 | Config 1,2,4,5,7,8 | | dBm/SCS | -98 | | |
|  | Config 3,6 | |  | -95 | | |
|  | | | dB | 4 | 4 | |
|  | | | dB | 4 | 4 | |
| IoNote3 | Config 1,2,4,5,7,8 | | dBm/  9.36MHz | -64.59 | -64.59 | |
|  | Config 3,6 | | dBm/  18.36MHz | -62.66 | -62.66 | |
| 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.16.3.2.3.4.2-4: Cell specific test parameters for Redirection from NR to E-UTRAN (cell 2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 2 | |
|  |  |  | T1 | T2 |
| RF channel number |  | 1, 2, 3, 4, 5, 6, 7, 8 | 2 | |
| Duplex mode |  | 1, 2, 3, 7 | FDD | |
|  |  | 4, 5, 6, 8 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6, 8 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6, 8 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6, 7, 8 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PRACH ConfigurationNote2 |  | 1, 2, 3, 7 | 4 | |
|  | 4, 5, 6, 8 | 53 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3, 7 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  | 4, 5, 6, 8 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3, 7 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  | 4, 5, 6, 8 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote3 |  | 1, 2, 3, 7 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  | 4, 5, 6, 8 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote4 |  |  |  | |
| OCNG\_RBNote4 |  |  |  | |
| NocNote5 | dBm/15kHz | 1,2,3,4,5,6,7,8 | -98 | |
| Ês/Noc | dB | 1,2,3,4,5,6,7,8 | -Infinity | 4 |
| Ês/IotNote6 | dB | 1,2,3,4,5,6,7,8 | -Infinity | 4 |
| RSRPNote6 | dBm/15kHz | 1,2,3,4,5,6,7,8 | -Infinity | -94 |
| SCH\_RPNote6 | dBm/15kHz | 1,2,3,4,5,6,7,8 | -Infinity | -94 |
| IoNote6 | dBm/9MHz | 1,2,3,4,5,6,7,8 | -70.22 | -64.76 |
| Propagation Condition |  | 1,2,3,4,5,6,7,8 | AWGN | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].  Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 6: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | |

A.16.3.2.3.4.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 2205 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to E-UTRAN observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

Tconnection\_release\_redirect\_E-UTRA = TRRC\_procedure\_delay + Tidentify-E-UTRA + TSI-E-UTRA + TRACH,

where:

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

Tidentify-E-UTRA = 800 ms in the test.

TSI-E-UTRA = 1280 ms, it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRA cell.

TRACH = 15 ms in the test.

This gives a total of 2205 ms.

## A.16.4 Timing for RedCap

### A.16.4.1 UE transmit timing

#### A.16.4.1.1 NR UE Transmit Timing Test for FR1 for 1Rx RedCap UE

##### A.16.4.1.1.1 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 7.1A.2.

Supported test configurations are shown in Table A.16.4.1.1.1-1.

Table A.16.4.1.1.1-1: Supported test configurations for FR1 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 2 | NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 3 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 20 MHz |
| 4 | NR HD-FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

For this test a single NR cell is used. Table A.16.4.1.1.1-2 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.6.4.1.1.1-3.

Table A.16.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test1 | | Test2 | |
| SSB ARFCN |  | 1,2,3 | 1 | | 1 | |
| TDD configuration |  | 1 | Not Applicable | | | |
|  | 2 | TDDConf.1.1 | | | |
|  | 3 | TDDConf.2.1 | | | |
| 4 | Not Applicable | | | |
| BWchannel | MHz | 1 | 10: NRB,c = 52 | | | |
|  | 2 | 10: NRB,c = 52 | | | |
| 3 | 20: NRB,c = 52 | | | |
| 4 | 10: NRB,c = 52 | | | |
| Initial BWP Configuration |  | 1,2,3,4 | DLBWP.0.1  ULBWP.0.1 | | | |
| Dedicated BWP Configuration |  | 1,2,3,4 | DLBWP.1.1  ULBWP.1.1 | | | |
| DRx Cycle | ms | 1,2,3,4 | N/A | | | DRX.8Note5 |
| PDSCH Reference measurement channel |  | 1 | SR.1.1 FDD | | | |
| 2 | SR.1.1 TDD | | | |
| 3 | SR.2.1 TDD | | | |
| 4 | SR.x.x HD-FDD | | | |
| RMSI CORESET Reference Channel |  | 1 | CR.1.1 FDD | | | |
|  | 2 | CR.1.1 TDD | | | |
| 3 | CR.2.1 TDD | | | |
| 4 | CR.x.x HD-FDD | | | |
| Dedicated CORESET Reference Channel |  | 1 | CCR.1.1 FDD | | | |
|  | 2 | CCR.1.1 TDD | | | |
|  | 3 | CCR.2.1 TDD | | | |
| 4 | CCR.x.x HD-FDD | | | |
| OCNG Patterns |  | 1,2,3,4 | OP.1 | | | |
|  |  |
| SSB configuration |  | 1,2,4 | SSB.1 FR1 | | | |
|  |  | 3 | SSB.x1 FR1 | | | |
| SMTC Configuration |  | 1,2,4 | SMTC.1 | | | |
|  |  | 3 | SMTC.2 | | | |
| TRS configuration |  | 1 | TRS.1.1 FDD | | | |
|  |  | 2 | TRS.1.1 TDD | | | |
|  |  | 3 | TRS.1.2 TDD | | | |
|  | 4 | TRS.x.x HD-FDD | | | |
| EPRE ratio of PSS to SSS | dB | 1,2,3,4 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |
| Note2 | dBm/15 kHz | 1,2,3,4 | -98 | | -98 | |
| Note2 | dBm/SCS | 1,2,4 | -98 | | -98 | |
|  |  | 3 | -95 | | -95 | |
|  |  | 1,2,3,4 | 3 | | 3 | |
|  |  | 1,2,3,4 | 3 | | 3 | |
| SS-RSRPNote3 | dBm/SCS | 1,2,4 | -95 | | -95 | |
|  |  | 3 | -92 | | -92 | |
| IoNote3 | dBm/9.36MHz | 1,2,4 | -65.2 | | -65.2 | |
|  | dBm/18.72MHz | 3 | -62.28 | | -62.28 | |
| Propagation condition |  | 1,2,3,4 | AWGN | | | |
| SRS Config |  | 1,2,4 | SRSConf.1Note6 | SRSConf.3Note6 | | |
|  |  | 3 | 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.6.4.1.1.1-3 | | | | | | |

##### A.16.4.1.1.2 Test requirements

The test requirements are the same as in clause A.6.4.1.1.2.

#### A.16.4.1.2 NR UE Transmit Timing Test for FR1 for 2Rx RedCap UE

##### A.16.4.1.2.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1A.2.

Supported test configurations are shown in Table A.16.4.1.2.1-1.

Table A.16.4.1.2.1-1: Supported test configurations for FR1 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 2 | NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 3 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 20 MHz |
| 4 | NR HD-FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

For this test a single NR cell is used. Table A.16.4.1.2.1-2 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.6.4.1.1.1-3.

Table A.16.4.1.2.1-2: Cell Specific Test Parameters for UL Transmit Timing test

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test1 | | Test2 | |
| SSB ARFCN |  | 1,2,3 | 1 | | 1 | |
| TDD configuration |  | 1 | Not Applicable | | | |
|  | 2 | TDDConf.1.1 | | | |
|  | 3 | TDDConf.2.1 | | | |
| 4 | Not Applicable | | | |
| BWchannel | MHz | 1 | 10: NRB,c = 52 | | | |
|  | 2 | 10: NRB,c = 52 | | | |
| 3 | 20: NRB,c = 52 | | | |
| 4 | 10: NRB,c = 52 | | | |
| Initial BWP Configuration |  | 1,2,3,4 | DLBWP.0.1  ULBWP.0.1 | | | |
| Dedicated BWP Configuration |  | 1,2,3,4 | DLBWP.1.1  ULBWP.1.1 | | | |
| DRx Cycle | ms | 1,2,3,4 | N/A | | | DRX.8Note5 |
| PDSCH Reference measurement channel |  | 1 | SR.1.1 FDD | | | |
| 2 | SR.1.1 TDD | | | |
| 3 | SR.2.1 TDD | | | |
| 4 | SR.x.x HD-FDD | | | |
| RMSI CORESET Reference Channel |  | 1 | CR.1.1 FDD | | | |
|  | 2 | CR.1.1 TDD | | | |
| 3 | CR.2.1 TDD | | | |
| 4 | CR.x.x HD-FDD | | | |
| Dedicated CORESET Reference Channel |  | 1 | CCR.1.1 FDD | | | |
|  | 2 | CCR.1.1 TDD | | | |
|  | 3 | CCR.2.1 TDD | | | |
| 4 | CCR.x.x HD-FDD | | | |
| OCNG Patterns |  | 1,2,3,4 | OP.1 | | | |
|  |  |
| SSB configuration |  | 1,2,4 | SSB.1 FR1 | | | |
|  |  | 3 | SSB.x1 FR1 | | | |
| SMTC Configuration |  | 1,2,4 | SMTC.1 | | | |
|  |  | 3 | SMTC.2 | | | |
| TRS configuration |  | 1 | TRS.1.1 FDD | | | |
|  |  | 2 | TRS.1.1 TDD | | | |
|  |  | 3 | TRS.1.2 TDD | | | |
|  | 4 | TRS.x.x HD-FDD | | | |
| EPRE ratio of PSS to SSS | dB | 1,2,3,4 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |
| Note2 | dBm/15 kHz | 1,2,3,4 | -98 | | -98 | |
| Note2 | dBm/SCS | 1,2,4 | -98 | | -98 | |
|  |  | 3 | -95 | | -95 | |
|  |  | 1,2,3,4 | 3 | | 3 | |
|  |  | 1,2,3,4 | 3 | | 3 | |
| SS-RSRPNote3 | dBm/SCS | 1,2,4 | -95 | | -95 | |
|  |  | 3 | -92 | | -92 | |
| IoNote3 | dBm/9.36MHz | 1,2,4 | -65.2 | | -65.2 | |
|  | dBm/18.72MHz | 3 | -62.28 | | -62.28 | |
| Propagation condition |  | 1,2,3,4 | AWGN | | | |
| SRS Config |  | 1,2,4 | SRSConf.1Note6 | SRSConf.3Note6 | | |
|  |  | 3 | 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.6.4.1.1.1-3 | | | | | | |

##### A.16.4.1.2.2 Test requirements

The test requirements are the same as in clause A.6.4.1.1.2.

### A.16.4.2 UE timer accuracy

### A.16.4.3 Timing advance

#### A.16.4.3.1 SA FR1 timing advance adjustment accuracy for 1 Rx UE

#### A.16.4.3.2 SA FR1 timing advance adjustment accuracy for 2 Rx UE

## A.16.5 Signalling characteristics for RedCap

### A.16.5.1 Radio link Monitoring

#### A.16.5.1.1 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode for 1 Rx UE

##### A.16.5.1.1 .1 Test Purpose and Environment

The purpose of this test is to verify that the 1Rx RedCap UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell for 1Rx RedCap UE. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1B.2.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.16.5.1.1 .1-1. The test parameters are given in Tables A.16.5.1.1 .1-2, A.16.5.1.1 .1-3, and A.16.5.1.1 .1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.16.5.1.1 .1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.16.5.1.1 .1-1: Supported test configurations for FR1 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 2 | TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 3 | TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 20 MHz |
| 4 | HD-FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Table A.16.5.1.1 .1-2: General test parameters for FR1 out-of-sync testing in non-DRX mode for 1 Rx UE

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
|  | | |  | Test 1 |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1, 4 |  | FDD |
|  | | Config 2, 3 |  | TDD |
| BWchannel | | Config 1, 4 | MHz | 10: NRB,c = 52 |
|  | | Config 2 |  | 10: NRB,c = 52 |
|  | | Config 3 |  | 20: NRB,c = 51 |
| DL initial BWP configuration | | Config 1, 2, 3, 4 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2, 3, 4 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2, 3, 4 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2, 3, 4 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1 |  | Not Applicable |
|  | | Config 2 |  | TDDConf.1.1 |
|  | | Config 3 |  | TDDConf.2.1 |
| RMSI CORESET Reference Channel | | Config 1, 4 |  | CR.1.1 FDD |
|  | | Config 2 |  | CR.1.1 TDD |
|  | | Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1, 4 |  | CCR.1.3 FDD |
|  | | Config 2 |  | CCR.1.3 TDD |
|  | | Config 3 |  | CCR.2.2 TDD |
| SSB Configuration | | Config 1, 4 |  | SSB.1 FR1 |
|  | | Config 2 |  | SSB.1 FR1 |
|  | | Config 3 |  | SSB.1 RedCap FR1 |
| SMTC Configuration | | Config 1, 2, 4 |  | SMTC.1 |
|  | | Config 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2, 4 |  | 15 kHz |
|  | | Config 3 |  | 30 kHz |
| PRACH Configuration | | Config 1, 2, 4 |  | Table A.3.8.2.1-1 |
|  | | Config 3 |  | Table A.3.8.2.1-1 |
| SSB index assigned as RLM RS | | |  | 0 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | |  | 2x1 |
| Out of sync transmission parameters | DCI format | |  | 1-0 |
|  | Number of Control OFDM symbols | |  | 2 |
|  | Aggregation level | | CCE | 16 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| DRX | | |  | *OFF* |
| Gap pattern ID | | |  | *gp0* |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | *0* |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS configuration for CSI reporting | | Config 1, 4 |  | CSI-RS.1.1 FDD |
|  | | Config 2 |  | CSI-RS.1.1 TDD |
|  | | Config 3 |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1, 4 |  | TRS.1.1 FDD |
|  | | Config 2 |  | TRS.1.1 TDD |
|  | | Config 3 |  | TRS.1.2 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.96 |
| T3 | | | s | 1 |
| D1 | | | s | 0.84 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

Table A.16.5.1.1 .1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode for 1 Rx UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | |
|  | |  | T1 | T2 | T3 |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | dB | 0 | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | |
| EPRE ratio of PSS to SSS | | dB |  | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |
| SNR on RLM-RS | Config 1, 4 | dB | 1 | -7 | -15 |
|  | Config 2 |  | 1 | -7 | -15 |
|  | Config 3 |  | 1 | -7 | -15 |
|  | Config 1, 4 | dBm/15kHz | -98 | | |
|  | Config 2 |  | -98 | | |
|  | Config 3 |  | -98 | | |
|  | Config 1, 4 | 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 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.16.5.1.1 .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 is A.3.6. | | | | | |

Table A.16.5.1.1 .1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode for 1 Rx UE

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

****

**Figure A.16.5.1.1 .1-1: SNR variation for out-of-sync testing**

##### A.16.5.1.1 .2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

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

#### A.16.5.1.2 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode for 2 Rx UE

##### A.16.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell for 2Rx RedCap UE. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1B.2.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.16.5.1.2.1-1. The test parameters are given in Tables A.16.5.1.2.1-2, A.16.5.1.2.1-3, and A.16.5.1.2.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.16.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.16.5.1.2.1-1: Supported test configurations for FR1 PCell for 2 Rx Redcap UE

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 2 | TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 3 | TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 20 MHz |
| 4 | HD-FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Table A.16.5.1.2.1-2: General test parameters for FR1 out-of-sync testing in non-DRX mode for 2 Rx Redcap UE

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
|  | | |  | Test 1 |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | FDD |
| Config 2, 3 |  | TDD |
| Config 1 |  | HD-FDD |
| BWchannel | | Config 1, 4 | MHz | 10: NRB,c = 52 |
|  | | Config 2 |  | 10: NRB,c = 52 |
|  | | Config 3 |  | 20: NRB,c = 51 |
| DL initial BWP configuration | | Config 1, 2, 3, 4 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2, 3, 4 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2, 3, 4 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2, 3, 4 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1, 4 |  | Not Applicable |
|  | | Config 2 |  | TDDConf.1.1 |
|  | | Config 3 |  | TDDConf.2.1 |
| RMSI CORESET Reference Channel | | Config 1, 4 |  | CR.1.1 FDD |
|  | | Config 2 |  | CR.1.1 TDD |
|  | | Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1, 4 |  | CCR.1.3 FDD |
|  | | Config 2 |  | CCR.1.3 TDD |
|  | | Config 3 |  | CCR.2.2 TDD |
| SSB Configuration | | Config 1, 4 |  | SSB.1 FR1 |
|  | | Config 2 |  | SSB.1 FR1 |
|  | | Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | | Config 1, 2, 4 |  | SMTC.1 |
|  | | Config 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2, 4 |  | 15 kHz |
|  | | Config 3 |  | 30 kHz |
| PRACH Configuration | | Config 1, 2 |  | Table A.3.8.2.1-1 |
|  | | Config 3 |  | Table A.3.8.2.1-1 |
| SSB index assigned as RLM RS | | |  | 0 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |
| Out of sync transmission parameters | DCI format | |  | 1-0 |
|  | Number of Control OFDM symbols | |  | 2 |
|  | Aggregation level | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| DRX | | |  | *OFF* |
| Gap pattern ID | | |  | *gp0* |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | *0* |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS configuration for CSI reporting | | Config 1, 4 |  | CSI-RS.1.1 FDD |
|  | | Config 2 |  | CSI-RS.1.1 TDD |
|  | | Config 3 |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1, 4 |  | TRS.1.1 FDD |
|  | | Config 2 |  | TRS.1.1 TDD |
|  | | Config 3 |  | TRS.1.2 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.48 |
| T3 | | | s | 0.48 |
| D1 | | | s | 0.44 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

Table A.16.5.1.2.1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode for 2 Rx Redcap UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | |
|  | |  | T1 | T2 | T3 |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | dB | 0 | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | |
| EPRE ratio of PSS to SSS | | dB |  | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |
| SNR on RLM-RS | Config 1, 4 | dB | 1 | -7 | -15 |
|  | Config 2 |  | 1 | -7 | -15 |
|  | Config 3 |  | 1 | -7 | -15 |
|  | Config 1, 4 | dBm/15kHz | -98 | | |
|  | Config 2 |  | -98 | | |
|  | Config 3 |  | -98 | | |
|  | Config 1, 4 | 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 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.16.5.1.2.1-1.  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 is A.3.6. | | | | | |

Table A.16.5.1.2.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

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

****

**Figure A.16.5.1.2.1-1: SNR variation for out-of-sync testing**

##### A.16.5.1.2.2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

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

A.16.5.1.3 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode for 1 Rx UE

##### A.16.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1B.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.16.5.1.3.1-1. The test parameters are given in Tables A.16.5.1.3.1-2, and A.16.5.1.3.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.16.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.16.5.1.3.1-1: Supported test configurations for FR1 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 2 | TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 3 | TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 20 MHz |
| 4 | HD-FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Table A.16.5.1.3.1-2: General test parameters for FR1 in-sync testing in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Value |
|  | | | |  | Test 1 |
| Active PCell | | | |  | Cell 1 |
| RF Channel Number | | | |  | 1 |
| Duplex mode | | | Config 1,4 |  | FDD |
|  | | | Config 2,3 |  | TDD |
| BWchannel | | | Config 1,4 | MHz | 10: NRB,c = 52 |
|  | | | Config 2 |  | 10: NRB,c = 52 |
|  | | | Config 3 |  | 20: NRB,c = 51 |
| DL initial BWP configuration | | | Config 1, 2, 3, 4 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | | Config 1, 2, 3, 4 |  | DLBWP.1.1 |
| UL initial BWP configuration | | | Config 1, 2, 3, 4 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | | Config 1, 2, 3, 4 |  | ULBWP.1.1 |
| TDD Configuration | | | Config 1 |  | Not Applicable |
|  | | | Config 2 |  | TDDConf.1.1 |
|  | | | Config 3 |  | TDDConf.2.1 |
| RMSI CORESET Reference Channel | | | Config 1,4 |  | CR.1.1 FDD |
|  | | | Config 2 |  | CR.1.1 TDD |
|  | | | Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | | | Config 1,4 |  | CCR.1.1 FDD |
|  | | | Config 2 |  | CCR.1.1 TDD |
|  | | | Config 3 |  | CCR.2.1 TDD |
| SSB Configuration | | | Config 1,4 |  | SSB.1 FR1 |
|  | | | Config 2 |  | SSB.1 FR1 |
|  | | | Config 3 |  | SSB.1 RedCap FR1 |
| SMTC Configuration | | | Config 1, 2, 3, 4 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | | Config 1, 2, 4 |  | 15 kHz |
|  | | | Config 3 |  | 30 kHz |
| PRACH Configuration | | | Config 1, 2, 3, 4 |  | Table A.3.8.2.1-1 |
| SSB index assigned as RLM RS | | | |  | 0 |
| OCNG parameters | | | |  | OP.1 |
| CP length | | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | | |  | 1x1 |
| In sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 0 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| Out of sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 16 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 4 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| DRX | | | |  | *OFF* |
| Gap pattern ID | | | |  | N.A. |
| Layer 3 filtering | | | |  | *Enabled* |
| T310 timer | | | | ms | 1000 |
| T311 timer | | | | ms | 1000 |
| N310 | | | |  | 1 |
| N311 | | | |  | 1 |
| CSI-RS configuration for CSI reporting | | Config 1, 4 | |  | CSI-RS.1.1 FDD |
|  | | Config 2 | |  | CSI-RS.1.1 TDD |
|  | | Config 3 | |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1, 4 | |  | TRS.1.1 FDD |
|  | | Config 2 | |  | TRS.1.1 TDD |
|  | | Config 3 | |  | TRS.1.2 TDD |
| T1 | | | | s | 0.2 |
| T2 | | | | s | 0.2 |
| T3 | | | | s | 0.24 |
| T4 | | | | s | 0.2 |
| T5 | | | | s | 0.88 |
| D1 | | | | s | 0.84 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.16.5.1.3.1-3: 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 1,4 | dB | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 2 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3 |  |  |  |  |  |  |
|  | Config 1, 4 | dBm/15 kHz | -98 | | | | |
|  | Config 2 |  | -98 | | | | |
|  | Config 3 |  | -98 | | | | |
|  | Config 1, 4 | 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.16.5.1.3.1-1.  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. | | | | | | | |

**Table A.16.5.1.3.1-4: Void**

****

**Figure A.16.5.1.3.1-1: SNR variation for in-sync testing**

##### A.16.5.1.3.2 Test Requirements

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

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

A.16.5.1.4 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode for 2 Rx UE

A.16.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.16.5.1.4.1-1. The test parameters are given in Tables A.16.5.1.4.1-2, and A.16.5.1.4.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.16.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

**Table A.16.5.1.4.1-1: Supported test configurations for FR1 PCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 2 | TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 3 | TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 20 MHz |
| 4 | HD-FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

**Table A.16.5.1.4.1-2: General test parameters for FR1 in-sync testing in non-DRX mode**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Value** |
|  | | | |  | **Test 1** |
| Active PCell | | | |  | Cell 1 |
| RF Channel Number | | | |  | 1 |
| Duplex mode | | | Config 1 |  | FDD |
|  | | | Config 2, 3 |  | TDD |
|  | | | Config 4 |  | HD-FDD |
| BWchannel | | | Config 1, 4 | MHz | 10: NRB,c = 52 |
|  | | | Config 2 |  | 10: NRB,c = 52 |
|  | | | Config 3 |  | 20: NRB,c = 51 |
| DL initial BWP configuration | | | Config 1, 2, 3, 4 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | | Config 1, 2, 3, 4 |  | DLBWP.1.1 |
| UL initial BWP configuration | | | Config 1, 2, 3, 4 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | | Config 1, 2, 3, 4 |  | ULBWP.1.1 |
| TDD Configuration | | | Config 1, 4 |  | Not Applicable |
|  | | | Config 2 |  | TDDConf.1.1 |
|  | | | Config 3 |  | TDDConf.2.1 |
| RMSI CORESET Reference Channel | | | Config 1, 4 |  | CR.1.1 FDD |
|  | | | Config 2 |  | CR.1.1 TDD |
|  | | | Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | | | Config 1, 4 |  | CCR.1.1 FDD |
|  | | | Config 2 |  | CCR.1.1 TDD |
|  | | | Config 3 |  | CCR.2.1 TDD |
| SSB Configuration | | | Config 1,4 |  | SSB.1 FR1 |
|  | | | Config 2 |  | SSB.1 FR1 |
|  | | | Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | | | Config 1, 2, 3, 4 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | | Config 1, 2, 4 |  | 15 kHz |
|  | | | Config 3 |  | 30 kHz |
| PRACH Configuration | | | Config 1, 2, 3 ,4 |  | Table A.3.8.2.1-1 |
| SSB index assigned as RLM RS | | | |  | 0 |
| OCNG parameters | | | |  | OP.1 |
| CP length | | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |
| In sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 0 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| Out of sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 4 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| DRX | | | |  | *OFF* |
| Gap pattern ID | | | |  | N.A. |
| Layer 3 filtering | | | |  | *Enabled* |
| T310 timer | | | | ms | 1000 |
| T311 timer | | | | ms | 1000 |
| N310 | | | |  | 1 |
| N311 | | | |  | 1 |
| CSI-RS configuration for CSI reporting | | Config 1, 4 | |  | CSI-RS.1.1 FDD |
|  | | Config 2 | |  | CSI-RS.1.1 TDD |
|  | | Config 3 | |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1, 4 | |  | TRS.1.1 FDD |
|  | | Config 2 | |  | TRS.1.1 TDD |
|  | | Config 3 | |  | TRS.1.2 TDD |
| T1 | | | | s | 0.2 |
| T2 | | | | s | 0.2 |
| T3 | | | | s | 0.24 |
| T4 | | | | s | 0.2 |
| T5 | | | | s | 0.88 |
| D1 | | | | s | 0.84 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

**Table A.16.5.1.4.1-3: 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, 4 | dB | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 2 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 1, 4 | dBm/15 kHz | -98 | | | | |
|  | Config 2 |  | -98 | | | | |
|  | Config 3 |  | -98 | | | | |
|  | Config 1, 4 | 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.16.5.1.4.1-1.  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. | | | | | | | |

**Table A.16.5.1.4.1-4: Void**

****

**Figure A.16.5.1.4.1-1: SNR variation for in-sync testing**

A.16.5.1.4.2 Test Requirements

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

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

#### A.16.5.1.5 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode for 1 Rx UE

#### A.16.5.1.6 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode for 2 Rx UE

A.16.5.1.7 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode for 1 Rx UE

A.16.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1B.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.16.5.1.7.1-1. The test parameters are given in Tables A.16.5.1.7.1-2, and A.16.5.1.7.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.16.5.1.7.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.16.5.1.7.1-1: Supported test configurations for FR1 PCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 2 | TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 3 | TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 20 MHz |
| 4 | HD-FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

**Table A.16.5.1.7.1-2: General test parameters for FR1 in-sync testing in DRX mode**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Value** |
|  | | | |  | **Test 1** |
| Active PCell | | | |  | Cell 1 |
| RF Channel Number | | | |  | 1 |
| Duplex mode | | | Config 1 |  | FDD |
|  | | | Config 2, 3 |  | TDD |
|  | | | Config 4 |  | HD-FDD |
| BWchannel | | | Config 1, 4 | MHz | 10: NRB,c = 52 |
|  | | | Config 2 |  | 10: NRB,c = 52 |
|  | | | Config 3 |  | 20: NRB,c = 51 |
| DL initial BWP configuration | | | Config 1, 2, 3, 4 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | | Config 1, 2, 3, 4 |  | DLBWP.1.1 |
| UL initial BWP configuration | | | Config 1, 2, 3, 4 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | | Config 1, 2, 3, 4 |  | ULBWP.1.1 |
| TDD Configuration | | | Config 1, 4 |  | Not Applicable |
|  | | | Config 2 |  | TDDConf.1.1 |
|  | | | Config 3 |  | TDDConf.2.1 |
| RMSI CORESET Reference Channel | | | Config 1, 4 |  | CR.1.1 FDD |
|  | | | Config 2 |  | CR.1.1 TDD |
|  | | | Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | | | Config 1, 4 |  | CCR.1.1 FDD |
|  | | | Config 2 |  | CCR.1.1 TDD |
|  | | | Config 3 |  | CR.2.1 TDD |
| SSB Configuration | | | Config 1, 4 |  | SSB.1 FR1 |
|  | | | Config 2 |  | SSB.1 FR1 |
|  | | | Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | | | Config 1, 2, 3, 4 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | | Config 1, 2, 4 |  | 15 kHz |
|  | | | Config 3 |  | 30 kHz |
| PRACH Configuration | | | Config 1, 2, 3, 4 |  | Table A.3.8.2.1-1 |
| SSB index assigned as RLM RS | | | |  | 0 |
| OCNG parameters | | | |  | OP.1 |
| CP length | | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | | |  | 1x1 |
| In sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 0 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| Out of sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 16 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 4 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| DRX Configuration | | | |  | DRX.3 |
| Gap pattern ID | | | |  | N.A. |
| Layer 3 filtering | | | |  | *Enabled* |
| T310 timer | | | | ms | 2000 |
| T311 timer | | | | ms | 1000 |
| N310 | | | |  | 1 |
| N311 | | | |  | 1 |
| CSI-RS configuration for CSI reporting | | Config 1 | |  | CSI-RS.1.1 FDD |
|  | | Config 2 | |  | CSI-RS.1.1 TDD |
|  | | Config 3 | |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1 | |  | TRS.1.1 FDD |
|  | | Config 2 | |  | TRS.1.1 TDD |
|  | | Config 3 | |  | TRS.1.2 TDD |
| T1 | | | | s | 0.2 |
| T2 | | | | s | 0.2 |
| T3 | | | | s | 0.64 |
| T4 | | | | s | 0.2 |
| T5 | | | | s | 0.88 |
| D1 | | | | s | 0.84 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

**Table A.16.5.1.7.1-3: 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, 4 | dB | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 2 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 1, 4 | dBm/15 kHz | -98 | | | | |
|  | Config 2 |  | -98 | | | | |
|  | Config 3 |  | -98 | | | | |
|  | Config 1, 4 | 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.16.5.1.7.1-1.  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. | | | | | | | |

**Table A.16.5.1.7.1-4: Void**

**Table A.16.5.1.7.1-5: Void**

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**Figure A.16.5.1.7.1-1: SNR variation for in-sync testing.**

A.16.5.1.7.2 Test Requirements

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

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

A.16.5.1.8 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode for 2 Rx UE

A.16.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1B.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.16.5.1.8.1-1. The test parameters are given in Tables A.16.5.1.8.1-2, and A.16.5.1.8.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.16.5.1.8.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.16.5.1.8.1-1: Supported test configurations for FR1 PCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 2 | TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 3 | TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 20 MHz |
| 4 | HD-FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

**Table A.16.5.1.8.1-2: General test parameters for FR1 in-sync testing in DRX mode**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Value** |
|  | | | |  | **Test 1** |
| Active PCell | | | |  | Cell 1 |
| RF Channel Number | | | |  | 1 |
| Duplex mode | | | Config 1 |  | FDD |
|  | | | Config 2, 3 |  | TDD |
|  | | | Config 4 |  | HD-FDD |
| BWchannel | | | Config 1, 4 | MHz | 10: NRB,c = 52 |
|  | | | Config 2 |  | 10: NRB,c = 52 |
|  | | | Config 3 |  | 20: NRB,c = 51 |
| DL initial BWP configuration | | | Config 1, 2, 3, 4 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | | Config 1, 2, 3, 4 |  | DLBWP.1.1 |
| UL initial BWP configuration | | | Config 1, 2, 3, 4 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | | Config 1, 2, 3, 4 |  | ULBWP.1.1 |
| TDD Configuration | | | Config 1, 4 |  | Not Applicable |
|  | | | Config 2 |  | TDDConf.1.1 |
|  | | | Config 3 |  | TDDConf.2.1 |
| RMSI CORESET Reference Channel | | | Config 1, 4 |  | CR.1.1 FDD |
|  | | | Config 2 |  | CR.1.1 TDD |
|  | | | Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | | | Config 1, 4 |  | CCR.1.1 FDD |
|  | | | Config 2 |  | CCR.1.1 TDD |
|  | | | Config 3 |  | CCR.2.1 TDD |
| SSB Configuration | | | Config 1, 4 |  | SSB.1 FR1 |
|  | | | Config 2 |  | SSB.1 FR1 |
|  | | | Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | | | Config 1, 2, 3, 4 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | | Config 1, 2, 4 |  | 15 kHz |
|  | | | Config 3 |  | 30 kHz |
| PRACH Configuration | | | Config 1, 2, 3, 4 |  | Table A.3.8.2.1-1 |
| SSB index assigned as RLM RS | | | |  | 0 |
| OCNG parameters | | | |  | OP.1 |
| CP length | | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |
| In sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 0 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| Out of sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 4 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| DRX Configuration | | | |  | DRX.3 |
| Gap pattern ID | | | |  | N.A. |
| Layer 3 filtering | | | |  | *Enabled* |
| T310 timer | | | | ms | 2000 |
| T311 timer | | | | ms | 1000 |
| N310 | | | |  | 1 |
| N311 | | | |  | 1 |
| CSI-RS configuration for CSI reporting | | Config 1, 4 | |  | CSI-RS.1.1 FDD |
|  | | Config 2 | |  | CSI-RS.1.1 TDD |
|  | | Config 3 | |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1, 4 | |  | TRS.1.1 FDD |
|  | | Config 2 | |  | TRS.1.1 TDD |
|  | | Config 3 | |  | TRS.1.2 TDD |
| T1 | | | | s | 0.2 |
| T2 | | | | s | 0.2 |
| T3 | | | | s | 0.64 |
| T4 | | | | s | 0.2 |
| T5 | | | | s | 0.88 |
| D1 | | | | s | 0.84 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

**Table A.16.5.1.8.1-3: 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, 4 | dB | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 2 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 1, 4 | dBm/15 kHz | -98 | | | | |
|  | Config 2 |  | -98 | | | | |
|  | Config 3 |  | -98 | | | | |
|  | Config 1, 4 | 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.16.5.1.8.1-1.  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. | | | | | | | |

**Table A.16.5.1.8.1-4: Void**

**Table A.16.5.1.8.1-5: Void**

****

**Figure A.16.5.1.8.1-1: SNR variation for in-sync testing.**

A.16.5.1.8.2 Test Requirements

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

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

#### A.16.5.1.9 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode for 1 Rx UE

#### A.16.5.1.10 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode for 2 Rx UE

#### A.16.5.1.11 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode for 1 Rx UE

#### A.16.5.1.12 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode for 2 Rx UE

#### A.16.5.1.13 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode for 1 Rx UE

#### A.16.5.1.14 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode for 2 Rx UE

#### A.16.5.1.15 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode for 1 Rx UE

#### A.16.5.1.16 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode for 2 Rx UE

### A.16.5.2 Beam Failure Detection and Link recovery procedures

#### A.16.5.5.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode for 1 Rx UE

##### A.16.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5B.

The test parameters are given in Tables A.6.5.5.x1.1-1, A.16.5.5.1.1-2, A.16.5.5.1.1-3 and A.16.5.5.1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.16.5.5.1.1-1 shows the variation of the downlink SNR of the SSB in set q0 in the active cell to emulate SSB based beam failure. Figure A.16.5.5.1.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 1.

Table A.16.5.5.1.1-1: Supported test configurations for FR1 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 2 | TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 3 | TDD duplex mode, 30 kHz SSB SCS, 20 MHz bandwidth |
| 4 | HD-FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Table A.16.5.5.1.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | Unit | Value | Comment |
|  | | | | |  | Test 1 |  |
| Active PSCell | | | | |  | Cell 1 |  |
| RF Channel Number | | | | |  | 1 |  |
| Duplex mode | | | | Config 1 |  | FDD |  |
|  | | | | Config 2, 3 |  | TDD |  |
| Config 4 | HD-FDD |
| BWchannel | | | | Config 1,4 | MHz | 10: NRB,c = 52 |  |
|  | | | | Config 2 |  | 10: NRB,c = 52 |  |
|  | | | | Config 3 |  | 20: NRB,c = 51 |  |
| DL initial BWP configuration | | | | Config 1, 2, 3, 4 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | | Config 1, 2, 3,4 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | | | Config 1, 2, 3,4 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | | Config 1, 2, 3,4 |  | ULBWP.1.1 |  |
| TDD Configuration | | | | Config 1,4 |  | Not Applicable |  |
|  | | | | Config 2 |  | TDDConf.1.1 |  |
|  | | | | Config 3 |  | TDDConf.2.1 |  |
| CORESET Reference Channel | | | | Config 1,4 |  | CR.1.1 FDD |  |
|  | | | | Config 2 |  | CR.1.1 TDD |  |
|  | | | | Config 3 |  | CR.2.1 TDD |  |
| SSB Configuration | | | | Config 1,4 |  | SSB.3 FR1 |  |
|  | | | | Config 2 |  | SSB.3 FR1 |  |
|  | | | | Config 3 |  | SSB.1 RedCap FR1 |  |
| SMTC Configuration | | | | Config 1, 2.4 |  | SMTC.1 RedCap |  |
|  | | | | Config 3 |  | SMTC.1 RedCap |  |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1, 2 |  | 15 KHz |  |
|  | | | | Config 3 |  | 30 KHz |  |
| PRACH Configuration | | | | Config 1, 2 |  | Table A.3.8.2.2-1 |  |
|  | | | | Config 3 |  | Table A.3.8.2.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | | | |  | 0 |  |
| SSB Index assigned as CBD RS (q1) | | | | |  | 1 |  |
| OCNG parameters | | | | |  | OP.1 |  |
| CP length | | | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | | | |  | 2x2 Low |  |
| Beam failure detection transmission parameters | | DCI format | | |  | 1-0 |  |
|  | | Number of Control OFDM symbols | | |  | 2 |  |
|  | | Aggregation level | | | CCE | 16 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | | | dB | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | | | dB | 0 |  |
|  | | DMRS precoder granularity | | |  | REG bundle size |  |
|  | | REG bundle size | | |  | 6 |  |
| DRX | | | | |  | OFF |  |
| Gap pattern ID | | | | |  | gp0 |  |
| gapOffset | | | | |  | 0 |  |
| rlmInSyncOutOfSyncThreshold | | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1, 2,4 | | | | dBm/SCS kHz | -98 | Threshold used for Qin\_LR\_SSB |
|  | Config 3 | | | |  | -95 |  |
| powerControlOffsetSS | | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | | |  | n1 | see clause 5.17 of TS 38.321 [7] |
| beamFailureDetectionTimer | | | | |  | pbfd4 | see clause 5.17 of TS 38.321 [7] |
| CSI-RS configuration for CSI reporting | | | Config 1,4 | |  | CSI-RS.1.1 FDD |  |
|  | | | Config 2 | |  | CSI-RS.1.1 TDD |  |
|  | | | Config 3 | |  | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | | | Config 1,4 | |  | TRS.1.1 FDD |  |
|  | | | Config 2 | |  | TRS.1.1 TDD |  |
|  | | | Config 3 | |  | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS | | |  | | 0, 1 |  |  |
| T310 Timer | | | ms | | 1000 |  |  |
| N310 | | |  | | 2 |  |  |
| T1 | | | | | s | 0.2 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | | s | 0.37 |  |
| T3 | | | | | s | 0.24 |  |
| T4 | | | | | s | 0 |  |
| T5 | | | | | s | 0.17 |  |
| D1 | | | | | s | 0.13 |  |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | | | | |

Table A.16.5.5.1.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing 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 |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR\_SSB of set q0 | Config 1,4 | dB | 5 | -3 | -12 | -12 | -12 |
|  | Config 2 |  | 5 | -3 | -12 | -12 | -12 |
|  | Config 3 |  | 5 | -3 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1,4 | dB | -10 | -10 | 10 | 10 | 10 |
|  | Config 2 |  | -10 | -10 | 10 | 10 | 10 |
|  | Config 3 |  | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | Config 1,4 | dBm/SCS kHz | -108 | -108 | -88 | -88 | -88 |
|  | Config 2 |  | -108 | -108 | -88 | -88 | -88 |
|  | Config 3 |  | -105 | -105 | -85 | -85 | -85 |
|  | Config 1,4 | dBm/15 KHz | -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 and SNR3 respectively in figure A.4.5.5.1.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6. | | | | | | | |

**Table A.16.5.5.1.1-4: Void**



**Figure A.16.5.5.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode**

##### A.16.5.5.1.2 Test Requirements

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

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 240+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

#### A.16.5.5.2 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode for 2 Rx UE

##### A.16.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5B.

The test parameters are given in Tables A.16.5.5.2.1-1, A.16.5.5.2.1-2, A.16.5.5.2.1-3 and A.16.5.5.2.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.16.5.5.2.1-1 shows the variation of the downlink SNR of the SSB in set q0 in the active cell to emulate SSB based beam failure. Figure A.16.5.5.2.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 1.

Table A.16.5.5.2.1-1: Supported test configurations for FR1 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 2 | TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 3 | TDD duplex mode, 30 kHz SSB SCS, 20 MHz bandwidth |
| 4 | HD-FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Table A.16.5.5.2.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | Unit | Value | Comment |
|  | | | | |  | Test 1 |  |
| Active PSCell | | | | |  | Cell 1 |  |
| RF Channel Number | | | | |  | 1 |  |
| Duplex mode | | | | Config 1 |  | FDD |  |
|  | | | | Config 2, 3 |  | TDD |  |
| Config 4 | HD-FDD |
| BWchannel | | | | Config 1,4 | MHz | 10: NRB,c = 52 |  |
|  | | | | Config 2 |  | 10: NRB,c = 52 |  |
|  | | | | Config 3 |  | 20: NRB,c = 51 |  |
| DL initial BWP configuration | | | | Config 1, 2, 3,4 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | | Config 1, 2, 3,4 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | | | Config 1, 2, 3,4 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | | Config 1, 2, 3,4 |  | ULBWP.1.1 |  |
| TDD Configuration | | | | Config 1,4 |  | Not Applicable |  |
|  | | | | Config 2 |  | TDDConf.1.1 |  |
|  | | | | Config 3 |  | TDDConf.2.1 |  |
| CORESET Reference Channel | | | | Config 1,4 |  | CR.1.1 FDD |  |
|  | | | | Config 2 |  | CR.1.1 TDD |  |
|  | | | | Config 3 |  | CR.2.1 TDD |  |
| SSB Configuration | | | | Config 1,4 |  | SSB.3 FR1 |  |
|  | | | | Config 2 |  | SSB.3 FR1 |  |
|  | | | | Config 3 |  | SSB.1 RedCap FR1 |  |
| SMTC Configuration | | | | Config 1, 2,4 |  | SMTC.1 RedCap |  |
|  | | | | Config 3 |  | SMTC.1 RedCap |  |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1, 2 |  | 15 KHz |  |
|  | | | | Config 3 |  | 30 KHz |  |
| PRACH Configuration | | | | Config 1, 2,4 |  | Table A.3.8.2.2-1 |  |
|  | | | | Config 3 |  | Table A.3.8.2.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | | | |  | 0 |  |
| SSB Index assigned as CBD RS (q1) | | | | |  | 1 |  |
| OCNG parameters | | | | |  | OP.1 |  |
| CP length | | | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | | | |  | 2x2 Low |  |
| Beam failure detection transmission parameters | | DCI format | | |  | 1-0 |  |
|  | | Number of Control OFDM symbols | | |  | 2 |  |
|  | | Aggregation level | | | CCE | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | | | dB | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | | | dB | 0 |  |
|  | | DMRS precoder granularity | | |  | REG bundle size |  |
|  | | REG bundle size | | |  | 6 |  |
| DRX | | | | |  | OFF |  |
| Gap pattern ID | | | | |  | gp0 |  |
| gapOffset | | | | |  | 0 |  |
| rlmInSyncOutOfSyncThreshold | | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1, 2,4 | | | | dBm/SCS kHz | -98 | Threshold used for Qin\_LR\_SSB |
|  | Config 3 | | | |  | -95 |  |
| powerControlOffsetSS | | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | | |  | n1 | see clause 5.17 of TS 38.321 [7] |
| beamFailureDetectionTimer | | | | |  | pbfd4 | see clause 5.17 of TS 38.321 [7] |
| CSI-RS configuration for CSI reporting | | | Config 1,4 | |  | CSI-RS.1.1 FDD |  |
|  | | | Config 2 | |  | CSI-RS.1.1 TDD |  |
|  | | | Config 3 | |  | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | | | Config 1,4 | |  | TRS.1.1 FDD |  |
|  | | | Config 2 | |  | TRS.1.1 TDD |  |
|  | | | Config 3 | |  | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS | | |  | | 0, 1 |  |  |
| T310 Timer | | | ms | | 1000 |  |  |
| N310 | | |  | | 2 |  |  |
| T1 | | | | | s | 0.2 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | | s | 0.37 |  |
| T3 | | | | | s | 0.24 |  |
| T4 | | | | | s | 0 |  |
| T5 | | | | | s | 0.17 |  |
| D1 | | | | | s | 0.13 |  |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | | | | |

Table A.16.5.5.2.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing 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 |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR\_SSB of set q0 | Config 1,4 | dB | 5 | -3 | -12 | -12 | -12 |
|  | Config 2 |  | 5 | -3 | -12 | -12 | -12 |
|  | Config 3 |  | 5 | -3 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1,4 | dB | -10 | -10 | 10 | 10 | 10 |
|  | Config 2 |  | -10 | -10 | 10 | 10 | 10 |
|  | Config 3 |  | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | Config 1,4 | dBm/SCS kHz | -108 | -108 | -88 | -88 | -88 |
|  | Config 2 |  | -108 | -108 | -88 | -88 | -88 |
|  | Config 3 |  | -105 | -105 | -85 | -85 | -85 |
|  | Config 1,4 | dBm/15 KHz | -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 and SNR3 respectively in figure A.4.5.5.1.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6. | | | | | | | |

**Table A.16.5.5.2.1-4: Void**



**Figure A.16.5.5.2.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode**

##### A.16.5.5.2.2 Test Requirements

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

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 120+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

#### A.16.5.5.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode for 1 Rx UE

#### A.16.5.5.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode for 2 Rx UE

#### A.16.5.5.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in non-DRX mode for 1 Rx UE

#### A.16.5.5.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in non-DRX mode for 2 Rx UE

#### A.16.5.5.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in DRX mode for 1 Rx UE

#### A.16.5.5.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in DRX mode for 2 Rx UE

### A.16.5.3 Active BWP switch

#### A.16.5.3.1 DCI-based and Timer-based Active BWP Switch

##### A.16.5.3.1.1 NR FR1 DL active BWP switch with non-DRX in SA for 1 Rx UE

##### A.16.5.3.1.2 NR FR1 DL active BWP switch with non-DRX in SA for 2 Rx UE

#### A.16.5.3.2 RRC-based Active BWP Switch

##### A.16.5.3.2.1 NR FR1 DL active BWP switch of Cell with non-DRX in SA for 1 Rx UE

##### A.16.5.3.2.2 NR FR1 DL active BWP switch of Cell with non-DRX in SA for 2 Rx UE

### A.16.5.8 UE specific CBW change

#### A.16.5.8.1 UE specific CBW change on PCell in FR1 in non-DRX for 1 Rx UE

#### A.16.5.8.1 UE specific CBW change on PCell in FR1 in non-DRX for 2 Rx UE

## A.16.6 Measurement procedure for RedCap

### A.16.6.1 Intra-frequency Measurements

#### A.16.6.1.1 SA event triggered reporting tests without gap under non-DRX for 1 Rx UE

#### A.16.6.1.2 SA event triggered reporting tests without gap under non-DRX for 2 Rx UE

#### A.16.6.1.3 SA event triggered reporting tests without gap under DRX for 1 Rx UE

##### A.16.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell identification and measurement period requirements in clauses 9.2B.5.1 and 9.2B.5.2.

##### A.16.6.1.3.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.16.6.1.3.2-1, A.16.6.1.3.2-2 and A.16.6.1.3.2-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

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

Table A.16.6.1.3.2-1: Supported test configurations for NR Redcap UE

|  |  |
| --- | --- |
| 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, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode, |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.16.6.1.3.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| Active cell |  | 1, 2, 3, 4 | Cell 1 | |  |
| Neighbour cell |  | 1, 2, 3, 4 | Cell 2 | | Cell to be identified. |
| RF Channel Number |  | 1, 2, 3, 4 | 1: Cell 1 and Cell 2 | |  |
| SSB configuration |  | 1, 4 | SSB.1 FR1 | |  |
|  |  | 2 | SSB.1 FR1 | |  |
|  |  | 3 | SSB.1 RedCap FR1 | |  |
| SMTC configuration |  | 1, 4 | SMTC.1 RedCap FR1 | |  |
|  |  | 2 | SMTC.1 RedCap FR1 | |  |
|  |  | 3 | SMTC.1 RedCap FR1 | |  |
| A3-Offset | dB | 1, 2, 3, 4 | -4.5 | |  |
| CP length |  | 1, 2, 3, 4 | Normal | |  |
| Hysteresis | dB | 1, 2, 3, 4 | 0 | |  |
| Time To Trigger | s | 1, 2, 3, 4 | 0 | |  |
| Filter coefficient |  | 1, 2, 3, 4 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2, 3, 4 | DRX.1 | DRX. 7 |  |
| Time offset between serving and neighbour cells |  | 1, 4 | 3 ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | 2 | 3 μs | | Synchronous cells |
|  |  | 3 | 3 μs | | Synchronous cells |
| T1 | s | 1, 2, 3, 4 | 5 | |  |
| T2 | s | 1, 2, 3, 4 | 5 | 10 |  |

Table A.16.6.1.3.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 4 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | N/A | |
|  |  | 2 | SR.1.1 TDD | |  | |
|  |  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | | N/A | |
|  |  | 2 | CR.1.1 TDD | | N/A | |
|  |  | 3 | CR.2.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | | N/A | |
|  |  | 2 | CCR.1.1 TDD | | N/A | |
|  |  | 3 | CCR.2.1 TDD | | N/A | |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | | OP.1 | |
| TRS configuration |  | 1, 4 | TRS.1.1 FDD | | N/A | |
| 2 | TRS.1.1 TDD | | N/A | |
| 3 | TRS.1.2 TDD | | N/A | |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  |  | 2 | -98 | | | |
|  |  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  |  | 2 |  | | | |
|  |  | 3 |  | | | |
|  | dB | 1, 4 | 4 | -1.46 | -Infinity | -1.46 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
|  | dB | 1, 4 | 4 | 4 | -Infinity | 4 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -94 | -94 | -Infinity | -94 |
|  |  | 2 | -94 | -94 | -Infinity | -94 |
|  |  | 3 | -91 | -91 | -Infinity | -91 |
| Io | dBm/9.36 MHz | 1, 4 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/9.36 MHz | 2 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/38.16 MHz | 3 | -58.50 | -56.16 | -58.50 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.16.6.1.3.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 7680 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

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

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

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

#### A.16.6.1.4 SA event triggered reporting tests without gap under DRX for 2 Rx UE

##### A.16.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell identification and measurement period requirements in clauses 9.2B.5.1 and 9.2B.5.2.

##### A.16.6.1.4.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.16.6.1.4.2-1, A.16.6.1.4.2-2 and A.16.6.1.4.2-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

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

Table A.16.6.1.4.2-1: Supported test configurations for NR Redcap UE

|  |  |
| --- | --- |
| 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, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode, |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.16.6.1.3.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| Active cell |  | 1, 2, 3, 4 | Cell 1 | |  |
| Neighbour cell |  | 1, 2, 3, 4 | Cell 2 | | Cell to be identified. |
| RF Channel Number |  | 1, 2, 3, 4 | 1: Cell 1 and Cell 2 | |  |
| SSB configuration |  | 1, 4 | SSB.1 FR1 | |  |
|  |  | 2 | SSB.1 FR1 | |  |
|  |  | 3 | SSB.1 RedCap FR1 | |  |
| SMTC configuration |  | 1, 4 | SMTC.1 RedCap FR1 | |  |
|  |  | 2 | SMTC.1 RedCap FR1 | |  |
|  |  | 3 | SMTC.1 RedCap FR1 | |  |
| A3-Offset | dB | 1, 2, 3, 4 | -4.5 | |  |
| CP length |  | 1, 2, 3, 4 | Normal | |  |
| Hysteresis | dB | 1, 2, 3, 4 | 0 | |  |
| Time To Trigger | s | 1, 2, 3, 4 | 0 | |  |
| Filter coefficient |  | 1, 2, 3, 4 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2, 3, 4 | DRX.1 | DRX. 7 |  |
| Time offset between serving and neighbour cells |  | 1, 4 | 3 ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | 2 | 3 μs | | Synchronous cells |
|  |  | 3 | 3 μs | | Synchronous cells |
| T1 | s | 1, 2, 3, 4 | 5 | |  |
| T2 | s | 1, 2, 3, 4 | 5 | 10 |  |

Table A.16.6.1.4.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 4 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | N/A | |
|  |  | 2 | SR.1.1 TDD | |  | |
|  |  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | | N/A | |
|  |  | 2 | CR.1.1 TDD | | N/A | |
|  |  | 3 | CR.2.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | | N/A | |
|  |  | 2 | CCR.1.1 TDD | | N/A | |
|  |  | 3 | CCR.2.1 TDD | | N/A | |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | | OP.1 | |
| TRS configuration |  | 1, 4 | TRS.1.1 FDD | | N/A | |
| 2 | TRS.1.1 TDD | | N/A | |
| 3 | TRS.1.2 TDD | | N/A | |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3, 4 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  |  | 2 | -98 | | | |
|  |  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  |  | 2 |  | | | |
|  |  | 3 |  | | | |
|  | dB | 1, 4 | 4 | -1.46 | -Infinity | -1.46 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
|  | dB | 1, 4 | 4 | 4 | -Infinity | 4 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -94 | -94 | -Infinity | -94 |
|  |  | 2 | -94 | -94 | -Infinity | -94 |
|  |  | 3 | -91 | -91 | -Infinity | -91 |
| Io | dBm/9.36 MHz | 1, 4 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/9.36 MHz | 2 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/38.16 MHz | 3 | -58.50 | -56.16 | -58.50 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.16.6.1.4.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

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

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

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

#### A.16.6.1.5 SA event triggered reporting tests with per-UE gaps under non-DRX for 1 Rx UE

#### A.16.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX for 2 Rx UE

#### A.16.6.1.7 SA event triggered reporting tests with per-UE gaps under DRX for 1 Rx UE

##### A.16.6.1.7.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell identification and measurement period requirements in clauses 9.2B.6.1 and 9.2B.6.2.

##### A.16.6.1.7.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.16.6.1.7.2-1, A.16.6.1.7.2-2 and A.16.6.1.7.2-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

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

Table A.16.6.1.7.2-1: Supported test configurations for NR Redcap UE

|  |  |
| --- | --- |
| 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, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode, |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.16.6.1.7.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| Active cell |  | 1, 2, 3, 4 | Cell 1 | |  |
| Neighbour cell |  | 1, 2, 3, 4 | Cell 2 | | Cell to be identified. |
| RF Channel Number |  | 1, 2, 3, 4 | 1: Cell 1 and Cell 2 | |  |
| Measurement gap type |  | 1, 2, 3, 4, | Per-UE gaps | |  |
| Measurement gap repetition periodicity | ms | 1, 2, 3, 4 | 40 | |  |
| Measurement gap length | ms | 1, 2, 3, 4 | 6 | |  |
| Measurement gap offset | ms | 1, 2, 3, 4 | 39 | |  |
| SSB configuration |  | 1, 4 | SSB.1 FR1 | |  |
|  |  | 2 | SSB.1 FR1 | |  |
|  |  | 3 | SSB.1 RedCap FR1 | |  |
| SMTC configuration |  | 1, 4 | SMTC.1 RedCap FR1 | |  |
|  |  | 2 | SMTC.1 RedCap FR1 | |  |
|  |  | 3 | SMTC.1 RedCap FR1 | |  |
| A3-Offset | dB | 1, 2, 3, 4 | -4.5 | |  |
| CP length |  | 1, 2, 3, 4 | Normal | |  |
| Hysteresis | dB | 1, 2, 3, 4 | 0 | |  |
| Time To Trigger | s | 1, 2, 3, 4 | 0 | |  |
| Filter coefficient |  | 1, 2, 3, 4 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2, 3, 4 | DRX.1 | DRX. 7 |  |
| Time offset between serving and neighbour cells |  | 1, 4 | 3 ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | 2 | 3 μs | | Synchronous cells |
|  |  | 3 | 3 μs | | Synchronous cells |
| T1 | s | 1, 2, 3, 4 | 5 | |  |
| T2 | s | 1, 2, 3, 4 | 5 | 10 |  |

Table A.16.6.1.7.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gap for PCell in FR1 with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 4 | TN/A | | TN/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | N/A | |
|  |  | 2 | SR.1.1 TDD | |  | |
|  |  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | | N/A | |
|  |  | 2 | CR.1.1 TDD | | N/A | |
|  |  | 3 | CR.2.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | | N/A | |
|  |  | 2 | CCR.1.1 TDD | | N/A | |
|  |  | 3 | CCR.2.1 TDD | | N/A | |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | | OP.1 | |
| TRS configuration |  | 1, 4 | TRS.1.1 FDD | | N/A | |
| 2 | TRS.1.1 TDD | | N/A | |
| 3 | TRS.1.2 TDD | | N/A | |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3, 4 | CSI-RS | | SSB | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  |  | 2 | -98 | | | |
|  |  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  |  | 2 |  | | | |
|  |  | 3 |  | | | |
|  | dB | 1, 4 | 4 | -1.46 | -Infinity | -1.46 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
|  | dB | 1, 4 | 4 | 4 | -Infinity | 4 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -94 | -94 | -Infinity | -94 |
|  |  | 2 | -94 | -94 | -Infinity | -94 |
|  |  | 3 | -91 | -91 | -Infinity | -91 |
| Io | dBm/9.36 MHz | 1, 4 | -64.60 | -62.25 | --64.60 | -62.25 |
|  | dBm/9.36 MHz | 2 | -64.60 | -62.25 | --64.60 | -62.25 |
|  | dBm/38.16 MHz | 3 | -58.50 | -56.16 | --58.50 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.16.6.1.7.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 7680 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

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

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

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

#### A.16.6.1.8 SA event triggered reporting tests with per-UE gaps under DRX for 2 Rx UE

##### A.16.6.1.8.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell identification and measurement period requirements in clauses 9.2B.6.1 and 9.2B.6.2.

##### A.16.6.1.8.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.16.6.1.8.2-1, A.16.6.1.8.2-2 and A.16.6.1.8.2-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

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

Table A.16.6.1.8.2-1: Supported test configurations for NR Redcap UE

|  |  |
| --- | --- |
| 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, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode, |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.16.6.1.8.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| Active cell |  | 1, 2, 3, 4 | Cell 1 | |  |
| Neighbour cell |  | 1, 2, 3, 4 | Cell 2 | | Cell to be identified. |
| RF Channel Number |  | 1, 2, 3, 4 | 1: Cell 1 and Cell 2 | |  |
| Measurement gap type |  | 1, 2, 3, 4, | Per-UE gaps | |  |
| Measurement gap repetition periodicity | ms | 1, 2, 3, 4 | 40 | |  |
| Measurement gap length | ms | 1, 2, 3, 4 | 6 | |  |
| Measurement gap offset | ms | 1, 2, 3, 4 | 39 | |  |
| SSB configuration |  | 1, 4 | SSB.1 FR1 | |  |
|  |  | 2 | SSB.1 FR1 | |  |
|  |  | 3 | SSB.1 RedCap FR1 | |  |
| SMTC configuration |  | 1, 4 | SMTC.1 RedCap FR1 | |  |
|  |  | 2 | SMTC.1 RedCap FR1 | |  |
|  |  | 3 | SMTC.1 RedCap FR1 | |  |
| A3-Offset | dB | 1, 2, 3, 4 | -4.5 | |  |
| CP length |  | 1, 2, 3, 4 | Normal | |  |
| Hysteresis | dB | 1, 2, 3, 4 | 0 | |  |
| Time To Trigger | s | 1, 2, 3, 4 | 0 | |  |
| Filter coefficient |  | 1, 2, 3, 4 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2, 3, 4 | DRX.1 | DRX. 7 |  |
| Time offset between serving and neighbour cells |  | 1, 4 | 3 ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | 2 | 3 μs | | Synchronous cells |
|  |  | 3 | 3 μs | | Synchronous cells |
| T1 | s | 1, 2, 3, 4 | 5 | |  |
| T2 | s | 1, 2, 3, 4 | 5 | 10 |  |

Table A.16.6.1.8.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gap for PCell in FR1 with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 4 | TN/A | | TN/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | N/A | |
|  |  | 2 | SR.1.1 TDD | |  | |
|  |  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | | N/A | |
|  |  | 2 | CR.1.1 TDD | | N/A | |
|  |  | 3 | CR.2.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | | N/A | |
|  |  | 2 | CCR.1.1 TDD | | N/A | |
|  |  | 3 | CCR.2.1 TDD | | N/A | |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | | OP.1 | |
| TRS configuration |  | 1, 4 | TRS.1.1 FDD | | N/A | |
| 2 | TRS.1.1 TDD | | N/A | |
| 3 | TRS.1.2 TDD | | N/A | |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3, 4 | CSI-RS | | SSB | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  |  | 2 | -98 | | | |
|  |  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  |  | 2 |  | | | |
|  |  | 3 |  | | | |
|  | dB | 1, 4 | 4 | -1.46 | -Infinity | -1.46 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
|  | dB | 1, 4 | 4 | 4 | -Infinity | 4 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -94 | -94 | -Infinity | -94 |
|  |  | 2 | -94 | -94 | -Infinity | -94 |
|  |  | 3 | -91 | -91 | -Infinity | -91 |
| Io | dBm/9.36 MHz | 1, 4 | -64.60 | -62.25 | --64.60 | -62.25 |
|  | dBm/9.36 MHz | 2 | -64.60 | -62.25 | --64.60 | -62.25 |
|  | dBm/38.16 MHz | 3 | -58.50 | -56.16 | --58.50 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.16.6.1.8.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

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

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

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

#### A.16.6.1.9 SA event triggered reporting tests without gap under non-DRX with SSB index reading for 1 Rx UE

#### A.16.6.1.10 SA event triggered reporting tests without gap under non-DRX with SSB index reading for 2 Rx UE

#### A.16.6.1.11 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading for 1 Rx UE

##### A.16.6.1.11.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell identification and measurement period requirements in clauses 9.2B.6.1 and 9.2B.6.2.

##### A.16.6.1.11.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.16.6.1.11.2-1, A.16.6.1.11.2-2 and A.16.6.1.11.2-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.16.6.1.11.2-1: Supported test configurations for NR Redcap UE

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |

Table A.16.6.1.11.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with SSB index reading

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1 | Cell 1 |  |
| Neighbour cell |  | 1 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1 | 1: Cell 1 and Cell 2 |  |
| Measurement gap type |  | 1 | Per-UE gaps |  |
| Measurement gap repetition periodicity | ms | 1 | 40 |  |
| Measurement gap length | ms | 1 | 6 |  |
| Measurement gap offset | ms | 1 | 39 |  |
| SSB configuration |  | 1 | SSB.1 FR1 |  |
| SMTC configuration |  | 1 | SMTC.1 RedCap FR1 |  |
| A3-Offset | dB | 1 | -4.5 |  |
| CP length |  | 1 | Normal |  |
| Hysteresis | dB | 1 | 0 |  |
| Time To Trigger | s | 1 | 0 |  |
| Filter coefficient |  | 1 | 0 | L3 filtering is not used |
| DRX |  | 1 |  | OFF |
| Time offset between serving and neighbour cells |  | 1 | 3 ms | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 5 |  |

Table A.16.6.1.11.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gap for PCell in FR1 with SSB index reading

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | N/A | | N/A | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.2 FDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| TRS configuration |  | 1 | TRS.1.1 FDD | | N/A | |
| IInitial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1 | CSI-RS | | SSB | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  | dB | 1 | 4 | -1.46 | -Infinity | -1.46 |
|  | dB | 1 | 4 | 4 | -Infinity | 4 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -94 | -94 | -Infinity | -94 |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | -64.60 | -62.25 |
| Propagation Condition |  | 1 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.16.6.1.11.3 Test Requirements

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 is not required to read the neighbour cell SSB index in this test.

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

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

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

#### A.16.6.1.12 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading for 2 Rx UE

##### A.16.6.1.12.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell identification and measurement period requirements in clauses 9.2B.6.1 and 9.2B.6.2.

##### A.16.6.1.12.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.16.6.1.12.2-1, A.16.6.1.12.2-2 and A.16.6.1.12.2-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.16.6.1.12.2-1: Supported test configurations for NR Redcap UE

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |

Table A.16.6.1.12.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with SSB index reading

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1 | Cell 1 |  |
| Neighbour cell |  | 1 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1 | 1: Cell 1 and Cell 2 |  |
| Measurement gap type |  | 1 | Per-UE gaps |  |
| Measurement gap repetition periodicity | ms | 1 | 40 |  |
| Measurement gap length | ms | 1 | 6 |  |
| Measurement gap offset | ms | 1 | 39 |  |
| SSB configuration |  | 1 | SSB.1 FR1 |  |
| SMTC configuration |  | 1 | SMTC.1 RedCap FR1 |  |
| A3-Offset | dB | 1 | -4.5 |  |
| CP length |  | 1 | Normal |  |
| Hysteresis | dB | 1 | 0 |  |
| Time To Trigger | s | 1 | 0 |  |
| Filter coefficient |  | 1 | 0 | L3 filtering is not used |
| DRX |  | 1 |  | OFF |
| Time offset between serving and neighbour cells |  | 1 | 3 ms | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 5 |  |

Table A.16.6.1.11.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gap for PCell in FR1 with SSB index reading

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | N/A | | N/A | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.2 FDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| TRS configuration |  | 1 | TRS.1.1 FDD | | N/A | |
| IInitial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1 | CSI-RS | | SSB | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  | dB | 1 | 4 | -1.46 | -Infinity | -1.46 |
|  | dB | 1 | 4 | 4 | -Infinity | 4 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -94 | -94 | -Infinity | -94 |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | -64.60 | -62.25 |
| Propagation Condition |  | 1 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.16.6.1.11.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index in this test.

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

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

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

### A.16.6.2 Inter-frequency Measurements

#### A.16.6.2.1 SA event triggered reporting tests for FR1 without SSB time index detection when DRX is used for 1 Rx UE

##### A.16.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3B.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.16A.16.6.2.12.1.1-1, A.16.6.2.12.1.1-2 and A.16.6.2.1.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.16.6.2.1.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.16.6.2.1.1-2 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 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 2.

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

Table A.16.6.2.1.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| 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 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD 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.16.6.2.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
|  |  |  | Test 1 | Test 2 | Test 3 | Test 4 |  |
| NR RF Channel Number |  | Config 1,2,3,4 | 1, 2 | | | | Two FR1 NR carrier frequencies is used. |
| Active cell |  | Config 1,2,3,4 | NR cell 1 (Pcell) | | | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4 | NR cell2 | | | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2,3,4 | -6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4 | 0 | | | |  |
| CP length |  | Config 1,2,3,4 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3,4 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3,4 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4 | DRX.1 | DRX. 7 | DRX.1 | DRX. 7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1,4 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | Config 2,3 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3,4 | 5 | | | |  |
| T2 | s | Config 1,2,3,4 | 1.1 | 11 | 1.1 | 11 |  |

Table A.16.6.2.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | | | Cell 2 | |
|  | |  |  | T1 | T2 | | | T1 | T2 | |
| NR RF Channel Number | |  | Config 1,2,3,4 | 1 | | | | 2 | | |
| Duplex mode | |  | Config 1 | FDD | | | | | | |
|  | |  | Config 2,3 | TDD | | | | | | |
| Config 4 | HD-FDD | | | | | | |
| TDD configuration | |  | Config 1 | Not Applicable | | | | | | |
|  | |  | Config 2 | TDDConf.1.1 | | | | | | |
|  | |  | Config 3 | TDDConf.2.1 | | | | | | |
| BWchannel | | MHz | Config 1,2,4 | 10: NRB,c = 52 | | | | | | |
|  | |  | Config 3 | 20: NRB,c = 51 | | | | | | |
| BWP BW | | MHz | Config 1,2,4 | 10: NRB,c = 52 | | | | | | |
|  | |  | Config 3 | 20: NRB,c = 51 | | | | | | |
| BWP configuration | Initial DL BWP |  | Config 1, 2, 3,4 | DLBWP.0.1 | | | | NA | | |
|  | Initial UL BWP |  | Config 1, 2, 3,4 | ULBWP.0.1 | | | | NA | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | | | NA | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | | | NA | | |
| TRS configuration | |  | Config 1,4 | TRS.1.1 FDD | | | | NA | | |
|  | |  | Config 2 | TRS.1.1 TDD | | | | NA | | |
|  | |  | Config 3 | TRS.1.2 TDD | | | | NA | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2,3,4 | OP.1 | | | | OP.1 | | |
| PDSCH Reference measurement channel | |  | Config 1,4 | SR.1.1 FDD | | | | NA | | |
|  | |  | Config 2 | SR.1.1 TDD | | | | NA | | |
|  | |  | Config 3 | SR2.1 TDD | | | | NA | | |
| RMSI CORESET Reference Channel | |  | Config 1,4 | CR.1.1 FDD | | | | NA | | |
|  | |  | Config 2 | CR.1.1 TDD | | | | NA | | |
|  | |  | Config 3 | CR.2.1 TDD | | | | NA | | |
| Dedicated CORESET Reference Channel | |  | Config 1,4 | CCR.1.1 FDD | | | | NA | | |
|  | Config 2 | CCR.1.1 TDD | | | | NA | | |
|  | Config 3 | CCR.2.1 TDD | | | | NA | | |
| SSB parameters | |  | Config 1,4 | SSB.1 FR1 | | | | SSB.1 FR1 | | |
|  | |  | Config 2 | SSB.1 RedCap FR1 | | | | SSB.1 RedCap FR1 | | |
|  | |  | Config 3 | SSB.1 RedCap FR1 | | | | SSB.1 RedCap FR1 | | |
| SMTC configuration defined in A.3.11 | |  | Config 1,4 | SMTC.1 RedCap | | | | SMTC.1 RedCap | | |
|  | |  | Config 2, 3 | SMTC.1 RedCap | | | | SMTC.1 RedCap | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,4 | 15 | | | | | | |
|  | |  | Config 3 | 30 | | | | | | |
| EPRE ratio of PSS to SSS | |  | Config 1,2,3,4 | 0 | | | | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | | | |  | | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | | | |  | | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | | | |  | | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  | | | |  | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | | | |  | | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | | | |  | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | | | |  | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | | | |  | | |
| Note2 | | dBm/15kHz | Config 1,2,3,4 | -98 | | -98 | | | | |
| Note2 | | dBm/SCS | Config 1,2,4 | -98 | | -98 | | | | |
|  | |  | Config 3 | -95 | | -95 | | | | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2,4 | -94 | -94 | | | -Infinity | -91 | |
|  | |  | Config 3 | -91 | -91 | | | -Infinity | -88 | |
|  | | dB | Config 1,2,3,4 | 4 | 4 | | | -Infinity | 7 | |
|  | | dB | Config 1,2,3,4 | 4 | 4 | | | -Infinity | 7 | |
| IoNote3 | | dBm/9.36MHz | Config 1,2,4 | -64.59 | -64.59 | | | -70.05 | -62.2 | |
|  | | dBm/38.16MHz | Config 3 | -58.49 | -58.49 | | | -63.94 | -56.15 | |
| Propagation Condition | |  | Config 1,2,3,4 | AWGN | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | | | | |

Table A.16.6.2.1.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
|  | Value | Value |  |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [2] |
| drx-InactivityTimer | ms1 | ms1 |  |
| drx-RetransmissionTimerDL | sl1 | sl1 |  |
| drx-RetransmissionTimerUL | sl1 | sl1 |  |
| drx-LongCycleStartOffset | ms40 | Ms640 |  |
| shortDRX | disable | disable |  |

Table A.16.6.2.1.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

##### A.16.6.2.1.2 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 1200 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 12800 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 1200 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 12800 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.16.6.2.2 SA event triggered reporting tests for FR1 without SSB time index detection when DRX is used for 2 Rx UE

##### A.16.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3B.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.16.6.2.22.2.1-1, A.16.6.2.2.1-2 and A.16.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.16.6.2.2.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.16.6.2.2.1-2 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 2.

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

Table A.16.6.2.2.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| 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 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD 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.16.6.2.2.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
|  |  |  | Test 1 | Test 2 | Test 3 | Test 4 |  |
| NR RF Channel Number |  | Config 1,2,3,4 | 1, 2 | | | | Two FR1 NR carrier frequencies is used. |
| Active cell |  | Config 1,2,3,4 | NR cell 1 (Pcell) | | | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4 | NR cell2 | | | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2,3,4 | -6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4 | 0 | | | |  |
| CP length |  | Config 1,2,3,4 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3,4 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3,4 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4 | DRX.1 | DRX. 7 | DRX.1 | DRX. 7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1,4 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | Config 2,3 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3,4 | 5 | | | |  |
| T2 | s | Config 1,2,3,4 | 1.1 | 11 | 1.1 | 11 |  |

Table A.16.6.2.2.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | | | Cell 2 | |
|  | |  |  | T1 | T2 | | | T1 | T2 | |
| NR RF Channel Number | |  | Config 1,2,3,4 | 1 | | | | 2 | | |
| Duplex mode | |  | Config 1 | FDD | | | | | | |
|  | |  | Config 2,3 | TDD | | | | | | |
| Config 4 | HD-FDD | | | | | | |
| TDD configuration | |  | Config 1 | Not Applicable | | | | | | |
|  | |  | Config 2 | TDDConf.1.1 | | | | | | |
|  | |  | Config 3 | TDDConf.2.1 | | | | | | |
| BWchannel | | MHz | Config 1,2,4 | 10: NRB,c = 52 | | | | | | |
|  | |  | Config 3 | 20: NRB,c = 51 | | | | | | |
| BWP BW | | MHz | Config 1,2,4 | 10: NRB,c = 52 | | | | | | |
|  | |  | Config 3 | 20: NRB,c = 51 | | | | | | |
| BWP configuration | Initial DL BWP |  | Config 1, 2, 3,4 | DLBWP.0.1 | | | | NA | | |
|  | Initial UL BWP |  | Config 1, 2, 3,4 | ULBWP.0.1 | | | | NA | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | | | NA | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | | | NA | | |
| TRS configuration | |  | Config 1,4 | TRS.1.1 FDD | | | | NA | | |
|  | |  | Config 2 | TRS.1.1 TDD | | | | NA | | |
|  | |  | Config 3 | TRS.1.2 TDD | | | | NA | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2,3,4 | OP.1 | | | | OP.1 | | |
| PDSCH Reference measurement channel | |  | Config 1,4 | SR.1.1 FDD | | | | NA | | |
|  | |  | Config 2 | SR.1.1 TDD | | | | NA | | |
|  | |  | Config 3 | SR2.1 TDD | | | | NA | | |
| RMSI CORESET Reference Channel | |  | Config 1,4 | CR.1.1 FDD | | | | NA | | |
|  | |  | Config 2 | CR.1.1 TDD | | | | NA | | |
|  | |  | Config 3 | CR.2.1 TDD | | | | NA | | |
| Dedicated CORESET Reference Channel | |  | Config 1,4 | CCR.1.1 FDD | | | | NA | | |
|  | Config 2 | CCR.1.1 TDD | | | | NA | | |
|  | Config 3 | CCR.2.1 TDD | | | | NA | | |
| SSB parameters | |  | Config 1,4 | SSB.1 FR1 | | | | SSB.1 FR1 | | |
|  | |  | Config 2 | SSB.1 RedCap FR1 | | | | SSB.1 RedCap FR1 | | |
|  | |  | Config 3 | SSB.1 RedCap FR1 | | | | SSB.1 RedCap FR1 | | |
| SMTC configuration defined in A.3.11 | |  | Config 1,4 | SMTC.1 RedCap | | | | SMTC.1 RedCap | | |
|  | |  | Config 2, 3 | SMTC.1 RedCap | | | | SMTC.1 RedCap | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | | | | | |
|  | |  | Config 3 | 30 | | | | | | |
| EPRE ratio of PSS to SSS | |  | Config 1,2,3 | 0 | | | | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | | | |  | | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | | | |  | | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | | | |  | | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  | | | |  | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | | | |  | | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | | | |  | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | | | |  | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | | | |  | | |
| Note2 | | dBm/15kHz | Config 1,2,3 | -98 | | -98 | | | | |
| Note2 | | dBm/SCS | Config 1,2 | -98 | | -98 | | | | |
|  | |  | Config 3 | -95 | | -95 | | | | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -94 | -94 | | | -Infinity | -91 | |
|  | |  | Config 3 | -91 | -91 | | | -Infinity | -88 | |
|  | | dB | Config 1,2,3,4,5,6 | 4 | 4 | | | -Infinity | 7 | |
|  | | dB | Config 1,2,3 | 4 | 4 | | | -Infinity | 7 | |
| IoNote3 | | dBm/9.36MHz | Config 1,2 | -64.59 | -64.59 | | | -70.05 | -62.2 | |
|  | | dBm/38.16MHz | Config 3 | -58.49 | -58.49 | | | -63.94 | -56.15 | |
| Propagation Condition | |  | Config 1,2,3 | AWGN | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | | | | |

Table A.16.6.2.2.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
|  | Value | Value |  |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [2] |
| drx-InactivityTimer | ms1 | ms1 |  |
| drx-RetransmissionTimerDL | sl1 | sl1 |  |
| drx-RetransmissionTimerUL | sl1 | sl1 |  |
| drx-LongCycleStartOffset | ms40 | Ms640 |  |
| shortDRX | disable | disable |  |

Table A.16.6.2.2.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

##### A.16.6.2.2.2 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.16.6.2.3 SA event triggered reporting tests for FR1 without SSB time index detection when DRX is used for 1 Rx UE

#### A.16.6.2.4 SA event triggered reporting tests for FR1 without SSB time index detection when DRX is used for 2 Rx UE

#### A.16.6.2.5 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is not used for 1 Rx UE

#### A.16.6.2.6 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is not used for 2 Rx UE

#### A.16.6.2.7 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is used for 1 Rx UE

#### A.16.6.2.8 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is used for 2 Rx UE

#### A.16.6.2.9 SA event triggered reporting tests with additional mandatory gap pattern for 1 Rx UE

#### A.16.6.2.10 SA event triggered reporting tests with additional mandatory gap pattern for 2 Rx UE

#### A.16.6.2.11 SA event triggered reporting tests for FR1 when DRX is used for 1 Rx UE

#### A.16.6.2.12 SA event triggered reporting tests for FR1 when DRX is used for 2 Rx UE

### A.16.6.3 Inter-RAT Measurements

#### A.16.6.3.1 SA NR - E-UTRAN event-triggered reporting in non-DRX in FR1 for 1 Rx UE

##### A.16.6.3.1.1 Test purpose and Environment

The purpose of this set of tests is to verify that the 1 Rx redcap UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1. This test shall partly verify the cell search and measurement requirements in Clauses 9.4A.2 and 9.4A.3.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. In the measurement control information from the PCell it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1 and has detected Cell 2 at least for the 3.84 seconds. Cell 2 becomes undetectable during T1, and becomes detectable again during T2.

Supported test configurations are shown in table A.16.6.3.1.1-1. General test parameters are provided in Table A.16.6.3.1.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.16.6.3.1.1-3 and A.16.6.3.1.1-4, respectively.

Table A.16.6.3.1.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD |
| 3 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE FDD |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode, LTE TDD |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD |
| 6 | NR 30kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE TDD |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.16.6.3.1.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 1 | 1 NR carrier frequency is used in the test |
| LTE RF Channel Number |  | 1 | 1 LTE carrier frequency is used in the test |
| Channel Bandwidth | MHz | As specified in Tables A.16.6.3.1.1-3 and A.16.6.3.1.1-4. |  |
| Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell |  | Cell 2 | Cell 2 is on RF channel number 1 |
| Gap Pattern Id |  | 0 | As specified in Clause Table 9.1.2-1. Per-UE gap pattern. |
| NR measurement quantity |  | SS-RSRP | Measurement quantity for Cell 1 |
| Inter-RAT E-UTRAN measurement quantity |  | RSRP | Measurement quantity for Cell 2 |
| b2-Threshold1 | dBm | Note 1 | SS-RSRP threshold for SS-RSRP measurement on cell1 for event B2 |
| b2-Threshold2EUTRA | dBm | -95 | E-UTRAN RSRP threshold for SS-RSRP measurement on cell1 for event B2 |
| Hysteresis | dB | 0 |  |
| TimeToTrigger | s | 0 |  |
| Filter coefficient |  | 0 | L3 filtering is not used |
| DRX |  | OFF | OFF |
| T1 | s | 5 |  |
| T2 | s | 3 |  |
| Note 1: Values are defined in Table A.16.6.3.1.1-3 | | | |

Table A.16.6.3.1.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in non-DRX with PCell in FR1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Configuration | Cell 1 | |
|  | | |  |  | T1 | T2 |
| RF channel number | | |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode | | |  | 1, 3 | FDD | |
|  | | |  | 2, 4, 5, 6 | TDD | |
| TDD Configuration | | SCS=15 KHz |  | 2, 5 | TDDConf.1.1 | |
|  | | SCS=30 KHz |  | 3, 6 | TDDConf.2.1 | |
| BWchannel | | | MHz | 1, 4 | 10: NRB,c = 52 (FDD) | |
|  | | |  | 2, 5 | 10: NRB,c = 52(TDD) | |
|  | | |  | 3, 6 | 20: NRB,c = 51 (TDD) | |
| PDSCH reference measurement channel | | |  | 1, 4 | SR.1.1 FDD | |
|  | | |  | 2, 5 | SR.1.1 TDD | |
|  | | |  | 3, 6 | SR.2.1 TDD | |
| RMSI CORSET reference channel | | |  | 1, 4 | CR.1.1 FDD | |
|  | | |  | 2, 5 | CR.1.1 TDD | |
|  | | |  | 3, 6 | CR.2.1 TDD | |
| Dedicated CORSET reference channel | | |  | 1, 4 | CCR.1.1 FDD | |
|  | | |  | 2, 5 | CCR.1.1 TDD | |
|  | | |  | 3, 6 | CCR.2.1 TDD | |
| BWP configurations | Initial DL BWP | |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 | |
|  | Dedicated DL BWP | |  | 1, 2, 3, 4, 5, 6 | DLBWP.1.1 | |
|  | Initial UL BWP | |  | 1, 2, 3, 4, 5, 6 | ULBWP.0.1 | |
|  | Dedicated UL BWP | |  | 1, 2, 3, 4, 5, 6 | ULBWP.1.1 | |
| OCNG patternNote1 | | |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration | | |  | 1, 2, 3, 4, 5, 6 | SMTC.1 RedCap FR1 | |
| SSB configuration | | |  | 1, 2, 4, 5 | SSB.1 FR1 | |
|  | | |  | 3, 6 | SSB.1 RedCap FR1 | |
| CSI-RS for tracking | | |  | 1, 4 | TRS.1.1 FDD | |
|  | 2, 5 | TRS.1.1 TDD | |
|  | 3, 6 | TRS.1.2 TDD | |
| b2-Threshold1 | | | dBm | 1, 2, 4, 5 | -96 | |
|  | | |  | 3, 6 | -93 | |
| EPRE ratio of PSS to SSS | | | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| EPRE ratio of PBCH\_DMRS to SSS | | |  |  |  | |
| EPRE ratio of PBCH to PBCH\_DMRS | | |  |  |  | |
| EPRE ratio of PDCCH\_DMRS to SSS | | |  |  |  | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | |  |  |  | |
| EPRE ratio of PDSCH\_DMRS to SSS | | |  |  |  | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS | | |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS | | |  |  |  | |
| *Noc*Note2 | | | dBm/15 KHz | 1, 2, 3, 4, 5, 6 | -104 | |
| *Noc*Note2 | | | dBm/SCS | 1, 2, 4, 5 | -104 | |
|  | | |  | 3, 6 | -101 | |
| Ês/Noc | | | dB | 1, 2, 3, 4, 5, 6 | 116 | 70 |
| Ês/IotNote3 | | | dB | 1, 2, 3, 4, 5, 6 | 116 | 70 |
| SS-RSRPNote3 | | | dBm/SCS | 1, 2, 4, 5 | -88 | -104 |
|  | | |  | 3, 6 | -85 | -101 |
| SSB\_RPNote3 | | | dBm/SCS | 1, 2, 4, 5 | -88 | -104 |
|  | | |  | 3, 6 | -85 | -101 |
| IoNote3 | | | dBm/9.36 MHz | 1, 2, 4, 5 | -59.94 | -73.04 |
|  | | | dBm/38.16 MHz | 3, 6 | -53.84 | -66.93 |
| Propagation condition | | |  | 1, 2, 3, 4, 5, 6 | TDL-C 300ns 100Hz | |
| Antenna Configuration and Correlation Matrix | | |  | 1, 2, 3, 4, 5, 6 | 1x1 Low | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

Table A.16.6.3.1.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 2 | |
|  |  |  | **T1** | **T2** |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
|  |  | 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -104 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 17 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -87 |
| IoNote5 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -76.22+10log (NRB,c /50) | -59.13+10log (NRB,c /50) |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | ETU70 | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x1 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

##### A.16.6.3.1.2 Test Requirements

The UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 0.96s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

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

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

#### A.16.6.3.2 SA NR - E-UTRAN event-triggered reporting in non-DRX in FR1 for 2 Rx UE

##### A.16.6.3.2.1 Test purpose and Environment

The purpose of this set of tests is to verify that the 2 Rx redcap UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1. This test shall partly verify the cell search and measurement requirements in Clauses 9.4A.2 and 9.4A.3.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. In the measurement control information from the PCell it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1 and has detected Cell 2 at least for the 3.84 seconds. Cell 2 becomes undetectable during T1, and becomes detectable again during T2.

Supported test configurations are shown in table A.16.6.3.2.1-1. General test parameters are provided in Table A.16.6.3.2.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.16.6.3.2.1-3 and A.16.6.3.2.1-4, respectively.

Table A.16.6.3.2.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1 for 1 Rx UE

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD |
| 3 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE FDD |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode, LTE TDD |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD |
| 6 | NR 30kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE TDD |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.16.6.3.2.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 1 | 1 NR carrier frequency is used in the test |
| LTE RF Channel Number |  | 1 | 1 LTE carrier frequency is used in the test |
| Channel Bandwidth | MHz | As specified in Tables A.16.6.3.2.1-3 and A.16.6.3.2.1-4. |  |
| Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell |  | Cell 2 | Cell 2 is on RF channel number 1 |
| Gap Pattern Id |  | 0 | As specified in Clause Table 9.1.2-1. Per-UE gap pattern. |
| NR measurement quantity |  | SS-RSRP | Measurement quantity for Cell 1 |
| Inter-RAT E-UTRAN measurement quantity |  | RSRP | Measurement quantity for Cell 2 |
| b2-Threshold1 | dBm | Note 1 | SS-RSRP threshold for SS-RSRP measurement on cell1 for event B2 |
| b2-Threshold2EUTRA | dBm | -95 | E-UTRAN RSRP threshold for SS-RSRP measurement on cell1 for event B2 |
| Hysteresis | dB | 0 |  |
| TimeToTrigger | s | 0 |  |
| Filter coefficient |  | 0 | L3 filtering is not used |
| DRX |  | OFF | OFF |
| T1 | s | 5 |  |
| T2 | s | 3 |  |
| Note 1: Values are defined in Table A.16.6.3.2.1-3 | | | |

Table A.16.6.3.1.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in non-DRX with PCell in FR1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Configuration | Cell 1 | |
|  | | |  |  | T1 | T2 |
| RF channel number | | |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode | | |  | 1, 3 | FDD | |
|  | | |  | 2, 4, 5, 6 | TDD | |
| TDD Configuration | | SCS=15 KHz |  | 2, 5 | TDDConf.1.1 | |
|  | | SCS=30 KHz |  | 3, 6 | TDDConf.2.1 | |
| BWchannel | | | MHz | 1, 4 | 10: NRB,c = 52 (FDD) | |
|  | | |  | 2, 5 | 10: NRB,c = 52(TDD) | |
|  | | |  | 3, 6 | 20: NRB,c = 51 (TDD) | |
| PDSCH reference measurement channel | | |  | 1, 4 | SR.1.1 FDD | |
|  | | |  | 2, 5 | SR.1.1 TDD | |
|  | | |  | 3, 6 | SR.2.1 TDD | |
| RMSI CORSET reference channel | | |  | 1, 4 | CR.1.1 FDD | |
|  | | |  | 2, 5 | CR.1.1 TDD | |
|  | | |  | 3, 6 | CR.2.1 TDD | |
| Dedicated CORSET reference channel | | |  | 1, 4 | CCR.1.1 FDD | |
|  | | |  | 2, 5 | CCR.1.1 TDD | |
|  | | |  | 3, 6 | CCR.2.1 TDD | |
| BWP configurations | Initial DL BWP | |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 | |
|  | Dedicated DL BWP | |  | 1, 2, 3, 4, 5, 6 | DLBWP.1.1 | |
|  | Initial UL BWP | |  | 1, 2, 3, 4, 5, 6 | ULBWP.0.1 | |
|  | Dedicated UL BWP | |  | 1, 2, 3, 4, 5, 6 | ULBWP.1.1 | |
| OCNG patternNote1 | | |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration | | |  | 1, 2, 3, 4, 5, 6 | SMTC.1 RedCap FR1 | |
| SSB configuration | | |  | 1, 2, 4, 5 | SSB.1 FR1 | |
|  | | |  | 3, 6 | SSB.1 RedCap FR1 | |
| CSI-RS for tracking | | |  | 1, 4 | TRS.1.1 FDD | |
|  | 2, 5 | TRS.1.1 TDD | |
|  | 3, 6 | TRS.1.2 TDD | |
| b2-Threshold1 | | | dBm | 1, 2, 4, 5 | -96 | |
|  | | |  | 3, 6 | -93 | |
| EPRE ratio of PSS to SSS | | | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| EPRE ratio of PBCH\_DMRS to SSS | | |  |  |  | |
| EPRE ratio of PBCH to PBCH\_DMRS | | |  |  |  | |
| EPRE ratio of PDCCH\_DMRS to SSS | | |  |  |  | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | |  |  |  | |
| EPRE ratio of PDSCH\_DMRS to SSS | | |  |  |  | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS | | |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS | | |  |  |  | |
| *Noc*Note2 | | | dBm/15 KHz | 1, 2, 3, 4, 5, 6 | -104 | |
| *Noc*Note2 | | | dBm/SCS | 1, 2, 4, 5 | -104 | |
|  | | |  | 3, 6 | -101 | |
| Ês/Noc | | | dB | 1, 2, 3, 4, 5, 6 | 116 | 70 |
| Ês/IotNote3 | | | dB | 1, 2, 3, 4, 5, 6 | 116 | 70 |
| SS-RSRPNote3 | | | dBm/SCS | 1, 2, 4, 5 | -88 | -104 |
|  | | |  | 3, 6 | -85 | -101 |
| SSB\_RPNote3 | | | dBm/SCS | 1, 2, 4, 5 | -88 | -104 |
|  | | |  | 3, 6 | -85 | -101 |
| IoNote3 | | | dBm/9.36 MHz | 1, 2, 4, 5 | -59.94 | -73.04 |
|  | | | dBm/38.16 MHz | 3, 6 | -53.84 | -66.93 |
| Propagation condition | | |  | 1, 2, 3, 4, 5, 6 | TDL-C 300ns 100Hz | |
| Antenna Configuration and Correlation Matrix | | |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

Table A.16.6.3.2.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 2 | |
|  |  |  | **T1** | **T2** |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
|  |  | 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -104 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 17 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -87 |
| IoNote5 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -76.22+10log (NRB,c /50) | -59.13+10log (NRB,c /50) |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | ETU70 | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

##### A.16.6.3.2.2 Test Requirements

The UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 0.48s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

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

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

#### A.16.6.3.3 SA NR - E-UTRAN event-triggered reporting in DRX in FR1 for 1 Rx UE

##### A.16.6.3.3.1 Test purpose and Environment

The purpose of this set of tests is to verify that the 1 Rx redcap UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1 when DRX is used. This test shall partly verify the cell search and measurement requirements in Clauses 9.4A.2 and 9.4A.3. There are two test cases. In test 1 the UE shall be configured with DRX cycle of 40 ms. In test 2 the UE shall be configured with DRX cycle of 640 ms.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. In the measurement control information from the PCell it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1 and has detected Cell 2 at least for the 3.84 seconds for test 1 or 12.8 seconds for test 2. Cell 2 becomes undetectable during T1, and becomes detectable again during T2.

In each test the UE shall 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 the UE shall be allocated with PUSCH resource at every DRX cycle.

Supported test configurations are shown in table A.16.6.3.3.1-1. General test parameters are provided in Table A.16.6.3.3.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.16.6.3.3.1-3 and A.16.6.3.3.1-4, respectively.

Table A.16.6.3.3.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD |
| 3 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE FDD |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode, LTE TDD |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD |
| 6 | NR 30kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE TDD |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.16.6.3.3.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | Comment |
| Test 1 | Test 2 |
| NR RF Channel Number |  | 1 | | 1 NR carrier frequency is used in the test |
| LTE RF Channel Number |  | 2 | | 1 LTE carrier frequency is used in the test |
| Channel Bandwidth | MHz | As specified in Tables A.16.6.3.3.1-3 and A.16.6.3.3.1-4. | |  |
| Active cell |  | Cell 1 | | Cell 1 is on RF channel number 1 |
| Neighbour cell |  | Cell 2 | | Cell 2 is on RF channel number 2 |
| Gap Pattern Id |  | 0 | | As specified in Clause Table 9.1.2-1. Per-UE gap pattern. |
| NR measurement quantity |  | SS-RSRP | | Measurement quantity for Cell 1 |
| Inter-RAT E-UTRAN measurement quantity |  | RSRP | | Measurement quantity for Cell 2 |
| b2-Threshold1 | dBm | Note 1 | | SS-RSRP threshold for SS-RSRP measurement on cell1 for event B2 |
| b2-Threshold2EUTRA | dBm | -95 | | E-UTRAN RSRP threshold for SS-RSRP measurement on cell1 for event B2 |
| Hysteresis | dB | 0 | |  |
| TimeToTrigger | s | 0 | |  |
| Filter coefficient |  | 0 | | L3 filtering is not used |
| DRX |  | DRX.1 | DRX.7 | DRX cycle configurations DRX.1 and DRX. 7 are defined in Table A.3.3.1-1 and Table A.3.3.7-1 respectively. |
| T1 | s | 5 | |  |
| T2 | s | 3 | 10 |  |
| Note 1: Values are defined in Table A.16.6.3.3.1-3 | | | | |

Table A.16.6.3.3.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in DRX with PCell in FR1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Configuration | Cell 1 | |
|  | | |  |  | T1 | T2 |
| RF channel number | | |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode | | |  | 1, 3 | FDD | |
|  | | |  | 2, 4, 5, 6 | TDD | |
| TDD Configuration | | SCS=15 KHz |  | 2, 5 | TDDConf.1.1 | |
|  | | SCS=30 KHz |  | 3, 6 | TDDConf.2.1 | |
| BWchannel | | | MHz | 1, 4 | 10: NRB,c = 52 (FDD) | |
|  | | |  | 2, 5 | 10: NRB,c = 52(TDD) | |
|  | | |  | 3, 6 | 20: NRB,c = 51 (TDD) | |
| PDSCH reference measurement channel | | |  | 1, 4 | SR.1.1 FDD | |
|  | | |  | 2, 5 | SR.1.1 TDD | |
|  | | |  | 3, 6 | SR.2.1 TDD | |
| RMSI CORSET reference channel | | |  | 1, 4 | CR.1.1 FDD | |
|  | | |  | 2, 5 | CR.1.1 TDD | |
|  | | |  | 3, 6 | CR.2.1 TDD | |
| Dedicated CORSET reference channel | | |  | 1, 4 | CCR.1.1 FDD | |
|  | | |  | 2, 5 | CCR.1.1 TDD | |
|  | | |  | 3, 6 | CCR.2.1 TDD | |
| BWP configurations | Initial DL BWP | |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 | |
|  | Dedicated DL BWP | |  | 1, 2, 3, 4, 5, 6 | DLBWP.1.1 | |
|  | Initial UL BWP | |  | 1, 2, 3, 4, 5, 6 | ULBWP.0.1 | |
|  | Dedicated UL BWP | |  | 1, 2, 3, 4, 5, 6 | ULBWP.1.1 | |
| OCNG patternNote1 | | |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration | | |  | 1, 2, 3, 4, 5, 6 | SMTC.1 RedCap FR1 | |
| SSB configuration | | |  | 1, 2, 4, 5 | SSB.1 FR1 | |
|  | | |  | 3, 6 | SSB.1 RedCap FR1 | |
| CSI-RS for tracking | | |  | 1, 4 | TRS.1.1 FDD | |
|  | 2, 5 | TRS.1.1 TDD | |
|  | 3, 6 | TRS.1.2 TDD | |
| b2-Threshold1 | | | dBm | 1, 2, 4, 5 | -96 | |
|  | | |  | 3, 6 | -93 | |
| EPRE ratio of PSS to SSS | | | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| EPRE ratio of PBCH\_DMRS to SSS | | |  |  |  | |
| EPRE ratio of PBCH to PBCH\_DMRS | | |  |  |  | |
| EPRE ratio of PDCCH\_DMRS to SSS | | |  |  |  | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | |  |  |  | |
| EPRE ratio of PDSCH\_DMRS to SSS | | |  |  |  | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS | | |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS | | |  |  |  | |
| *Noc*Note2 | | | dBm/15 KHz | 1, 2, 3, 4, 5, 6 | -104 | |
| *Noc*Note2 | | | dBm/SCS | 1, 2, 4, 5 | -104 | |
|  | | |  | 3, 6 | -101 | |
| Ês/Noc | | | dB | 1, 2, 3, 4, 5, 6 | 116 | 70 |
| Ês/IotNote3 | | | dB | 1, 2, 3, 4, 5, 6 | 116 | 70 |
| SS-RSRPNote3 | | | dBm/SCS | 1, 2, 4, 5 | -88 | -104 |
|  | | |  | 3, 6 | -85 | -101 |
| SSB\_RPNote3 | | | dBm/SCS | 1, 2, 4, 5 | -88 | -104 |
|  | | |  | 3, 6 | -85 | -101 |
| IoNote3 | | | dBm/9.36 MHz | 1, 2, 4, 5 | -59.94 | -73.04 |
|  | | | dBm/38.16 MHz | 3, 6 | -53.84 | -66.93 |
| Propagation condition | | |  | 1, 2, 3, 4, 5, 6 | TDL-C 300ns 100Hz | |
| Antenna Configuration and Correlation Matrix | | |  | 1, 2, 3, 4, 5, 6 | 1x1 Low | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

Table A.16.6.3.3.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 2 | |
|  |  |  | **T1** | **T2** |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 2 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
|  |  | 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -104 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 17 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -87 |
| IoNote5 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -76.22+10log (NRB,c /50) | -59.13+10log (NRB,c /50) |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | ETU70 | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x1 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

##### A.16.6.3.3.2 Test Requirements

In test 1, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 0.96s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

In test 2, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 6.4s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

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

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

#### A.16.6.3.4 SA NR - E-UTRAN event-triggered reporting in DRX in FR1 for 2 Rx UE

##### A.16.6.3.4.1 Test purpose and Environment

The purpose of this set of tests is to verify that the 2 Rx redcap UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1 when DRX is used. This test shall partly verify the cell search and measurement requirements in Clauses 9.4A.2 and 9.4A.3. There are two test cases. In test 1 the UE shall be configured with DRX cycle of 40 ms. In test 2 the UE shall be configured with DRX cycle of 640 ms.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. In the measurement control information from the PCell it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1 and has detected Cell 2 at least for the 3.84 seconds for test 1 or 12.8 seconds for test 2. Cell 2 becomes undetectable during T1, and becomes detectable again during T2.

In each test the UE shall 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 the UE shall be allocated with PUSCH resource at every DRX cycle.

Supported test configurations are shown in table A.16.6.3.4.1-1. General test parameters are provided in Table A.16.6.3.4.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.16.6.3.4.1-3 and A.16.6.3.4.1-4, respectively.

Table A.16.6.3.4.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD |
| 3 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE FDD |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode, LTE TDD |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD |
| 6 | NR 30kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE TDD |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.16.6.3.4.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | Comment |
| Test 1 | Test 2 |
| NR RF Channel Number |  | 1 | | 1 NR carrier frequency is used in the test |
| LTE RF Channel Number |  | 1 | | 1 LTE carrier frequency is used in the test |
| Channel Bandwidth | MHz | As specified in Tables A.16.6.3.4.1-3 and A.16.6.3.4.1-4. | |  |
| Active cell |  | Cell 1 | | Cell 1 is on RF channel number 1 |
| Neighbour cell |  | Cell 2 | | Cell 2 is on RF channel number 2 |
| Gap Pattern Id |  | 0 | | As specified in Clause Table 9.1.2-1. Per-UE gap pattern. |
| NR measurement quantity |  | SS-RSRP | | Measurement quantity for Cell 1 |
| Inter-RAT E-UTRAN measurement quantity |  | RSRP | | Measurement quantity for Cell 2 |
| b2-Threshold1 | dBm | Note 1 | | SS-RSRP threshold for SS-RSRP measurement on cell1 for event B2 |
| b2-Threshold2EUTRA | dBm | -95 | | E-UTRAN RSRP threshold for SS-RSRP measurement on cell1 for event B2 |
| Hysteresis | dB | 0 | |  |
| TimeToTrigger | s | 0 | |  |
| Filter coefficient |  | 0 | | L3 filtering is not used |
| DRX |  | DRX.1 | DRX.7 | DRX cycle configurations DRX.1 and DRX. 7 are defined in Table A.3.3.1-1 and Table A.3.3.7-1 respectively. |
| T1 | s | 5 | |  |
| T2 | s | 3 | 5 |  |
| Note 1: Values are defined in Table A.16.6.3.4.1-3 | | | | |

Table A.16.6.3.4.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in DRX with PCell in FR1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Configuration | Cell 1 | |
|  | | |  |  | T1 | T2 |
| RF channel number | | |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode | | |  | 1, 3 | FDD | |
|  | | |  | 2, 4, 5, 6 | TDD | |
| TDD Configuration | | SCS=15 KHz |  | 2, 5 | TDDConf.1.1 | |
|  | | SCS=30 KHz |  | 3, 6 | TDDConf.2.1 | |
| BWchannel | | | MHz | 1, 4 | 10: NRB,c = 52 (FDD) | |
|  | | |  | 2, 5 | 10: NRB,c = 52(TDD) | |
|  | | |  | 3, 6 | 20: NRB,c = 51 (TDD) | |
| PDSCH reference measurement channel | | |  | 1, 4 | SR.1.1 FDD | |
|  | | |  | 2, 5 | SR.1.1 TDD | |
|  | | |  | 3, 6 | SR.2.1 TDD | |
| RMSI CORSET reference channel | | |  | 1, 4 | CR.1.1 FDD | |
|  | | |  | 2, 5 | CR.1.1 TDD | |
|  | | |  | 3, 6 | CR.2.1 TDD | |
| Dedicated CORSET reference channel | | |  | 1, 4 | CCR.1.1 FDD | |
|  | | |  | 2, 5 | CCR.1.1 TDD | |
|  | | |  | 3, 6 | CCR.2.1 TDD | |
| BWP configurations | Initial DL BWP | |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 | |
|  | Dedicated DL BWP | |  | 1, 2, 3, 4, 5, 6 | DLBWP.1.1 | |
|  | Initial UL BWP | |  | 1, 2, 3, 4, 5, 6 | ULBWP.0.1 | |
|  | Dedicated UL BWP | |  | 1, 2, 3, 4, 5, 6 | ULBWP.1.1 | |
| OCNG patternNote1 | | |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration | | |  | 1, 2, 3, 4, 5, 6 | SMTC.1 RedCap FR1 | |
| SSB configuration | | |  | 1, 2, 4, 5 | SSB.1 FR1 | |
|  | | |  | 3, 6 | SSB.1 RedCap FR1 | |
| CSI-RS for tracking | | |  | 1, 4 | TRS.1.1 FDD | |
|  | 2, 5 | TRS.1.1 TDD | |
|  | 3, 6 | TRS.1.2 TDD | |
| b2-Threshold1 | | | dBm | 1, 2, 4, 5 | -96 | |
|  | | |  | 3, 6 | -93 | |
| EPRE ratio of PSS to SSS | | | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| EPRE ratio of PBCH\_DMRS to SSS | | |  |  |  | |
| EPRE ratio of PBCH to PBCH\_DMRS | | |  |  |  | |
| EPRE ratio of PDCCH\_DMRS to SSS | | |  |  |  | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | |  |  |  | |
| EPRE ratio of PDSCH\_DMRS to SSS | | |  |  |  | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS | | |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS | | |  |  |  | |
| *Noc*Note2 | | | dBm/15 KHz | 1, 2, 3, 4, 5, 6 | -104 | |
| *Noc*Note2 | | | dBm/SCS | 1, 2, 4, 5 | -104 | |
|  | | |  | 3, 6 | -101 | |
| Ês/Noc | | | dB | 1, 2, 3, 4, 5, 6 | 116 | 70 |
| Ês/IotNote3 | | | dB | 1, 2, 3, 4, 5, 6 | 116 | 70 |
| SS-RSRPNote3 | | | dBm/SCS | 1, 2, 4, 5 | -88 | -104 |
|  | | |  | 3, 6 | -85 | -101 |
| SSB\_RPNote3 | | | dBm/SCS | 1, 2, 4, 5 | -88 | -104 |
|  | | |  | 3, 6 | -85 | -101 |
| IoNote3 | | | dBm/9.36 MHz | 1, 2, 4, 5 | -59.94 | -73.04 |
|  | | | dBm/38.16 MHz | 3, 6 | -53.84 | -66.93 |
| Propagation condition | | |  | 1, 2, 3, 4, 5, 6 | TDL-C 300ns 100Hz | |
| Antenna Configuration and Correlation Matrix | | |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

Table A.16.6.3.4.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 2 | |
|  |  |  | **T1** | **T2** |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 2 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
|  |  | 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -104 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 17 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -87 |
| IoNote5 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -76.22+10log (NRB,c /50) | -59.13+10log (NRB,c /50) |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | ETU70 | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

##### A.16.6.3.4.2 Test Requirements

In test 1, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 0.48s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

In test 2, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 3.2s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

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

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

### A.16.6.4 L1-RSRP measurement for beam reporting

#### A.16.6.4.1 SSB based L1-RSRP measurement when DRX is not used for 1 Rx UE

##### A.16.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5B.4.1, with the testing configurations for NR cells in Table A.16.6.4.1.1-1.

Table A.16.6.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| 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 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

##### A.16.6.4.1.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.16.6.4.1.2-1 and Table A.16.6.4.1.2-2 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.16.6.4.1.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1~4 |  | freq1 |
| Duplex mode | 1 |  | FDD |
|  | 2 |  | TDD |
|  | 3 |  | TDD |
| 4 | HD-FDD |
| TDD Configuration | 1,4 |  | N/A |
|  | 2 |  | TDDConf.1.1 |
|  | 3 |  | TDDConf.2.1 |
| BWchannel | 1,4 | MHz | 10: NRB,c = 52 |
|  | 2 |  | 10: NRB,c = 52 |
|  | 3 |  | 20: NRB,c = 51 |
| PDSCH Reference measurement channel | 1,4 |  | SR.1.1 FDD |
|  | 2 |  | SR.1.1 TDD |
|  | 3 |  | SR.2.1 TDD |
| RMSI CORESET Reference Channel | 1,4 |  | CR.1.1 FDD |
|  | 2 |  | CR.1.1 TDD |
|  | 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | 1,4 |  | CCR.1.1 FDD |
|  | 2 |  | CCR.1.1 TDD |
|  | 3 |  | CCR.2.1 TDD |
| SSB configuration | 1,4 |  | SSB.3 FR1 |
|  | 2 |  | SSB.3 FR1 |
|  | 3 |  | SSB.1 RedCap FR1 |
| OCNG Patterns | 1~4 |  | OP.1 |
| Initial BWP Configuration | 1~4 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~4 |  | DLBWP.1.1  ULBWP.1.1 |
| SMTC configuration | 1~4 |  | SMTC.1 RedCap |
| TRS Configuration | 1,4 |  | TRS.1.1 FDD |
|  | 2 |  | TRS.1.1 TDD |
|  | 3 |  | TRS.1.2 TDD |
| DRX configuration | 1~4 |  | Off |
| reportConfigType | 1~4 |  | periodic |
| reportQuantity | 1~4 |  | ssb-Index-RSRP |
| Number of reported RS | 1~4 |  | 2 |
| L1-RSRP reporting period | 1~4 | slot | 80 |
| T1 | 1~4 | s | 5 |
| T2 | 1~4 | s | 1 |
| EPRE ratio of PSS to SSS | 1~4 | 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 | 1~4 |  | 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.16.6.4.1.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| Note2 | 1~4 | dBm/15kHz | -94.65 | | | |
| Note2 | 1,2,4 | dBm/SSB SCS | -94.65 | | | |
|  | 3 |  | -91.65 | | | |
|  | 1~4 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1,2.4 | dBm/SSB SCS | -94.65 | -94.65 | -Infinity | -91.65 |
|  | 3 |  | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1,2.4 | dBm/9.36 MHz | -63.69 | -63.69 | -66.70 | -61.93 |
|  | 3 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1~4 | dB | 0 | 0 | -Infinity | 3 |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.16.6.4.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. 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.16.6.4.2 SSB based L1-RSRP measurement when DRX is not used for 2 Rx UE

##### A.16.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5B.4.1, with the testing configurations for NR cells in Table A.16.6.4.2.1-1.

Table A.16.6.4.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| 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 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

##### A.16.6.4.2.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.16.6.4.2.2-1 and Table A.16.6.4.2.2-2 below.

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

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

Table A.16.6.4.2.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1~4 |  | freq1 |
| Duplex mode | 1 |  | FDD |
|  | 2 |  | TDD |
|  | 3 |  | TDD |
| 4 | HD-FDD |
| TDD Configuration | 1,4 |  | N/A |
|  | 2 |  | TDDConf.1.1 |
|  | 3 |  | TDDConf.2.1 |
| BWchannel | 1,4 | MHz | 10: NRB,c = 52 |
|  | 2 |  | 10: NRB,c = 52 |
|  | 3 |  | 20: NRB,c = 51 |
| PDSCH Reference measurement channel | 1,4 |  | SR.1.1 FDD |
|  | 2 |  | SR.1.1 TDD |
|  | 3 |  | SR.2.1 TDD |
| RMSI CORESET Reference Channel | 1,4 |  | CR.1.1 FDD |
|  | 2 |  | CR.1.1 TDD |
|  | 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | 1,4 |  | CCR.1.1 FDD |
|  | 2 |  | CCR.1.1 TDD |
|  | 3 |  | CCR.2.1 TDD |
| SSB configuration | 1,4 |  | SSB.3 FR1 |
|  | 2 |  | SSB.3 FR1 |
|  | 3 |  | SSB.1 RedCap FR1 |
| OCNG Patterns | 1~4 |  | OP.1 |
| Initial BWP Configuration | 1~4 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~4 |  | DLBWP.1.1  ULBWP.1.1 |
| SMTC configuration | 1~4 |  | SMTC.1 RedCap |
| TRS Configuration | 1,4 |  | TRS.1.1 FDD |
|  | 2 |  | TRS.1.1 TDD |
|  | 3 |  | TRS.1.2 TDD |
| DRX configuration | 1~4 |  | Off |
| reportConfigType | 1~4 |  | periodic |
| reportQuantity | 1~4 |  | ssb-Index-RSRP |
| Number of reported RS | 1~4 |  | 2 |
| L1-RSRP reporting period | 1~4 | slot | 80 |
| T1 | 1~4 | s | 5 |
| T2 | 1~4 | s | 1 |
| EPRE ratio of PSS to SSS | 1~4 | 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 | 1~4 |  | 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.16.6.4.2.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| Note2 | 1~4 | dBm/15kHz | -94.65 | | | |
| Note2 | 1,2,4 | dBm/SSB SCS | -94.65 | | | |
|  | 3 |  | -91.65 | | | |
|  | 1~4 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1,2 | dBm/SSB SCS | -94.65 | -94.65 | -Infinity | -91.65 |
|  | 3 |  | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1,2,4 | dBm/9.36 MHz | -63.69 | -63.69 | -66.70 | -61.93 |
|  | 3 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1~4 | dB | 0 | 0 | -Infinity | 3 |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.16.6.4.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. 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.16.6.4.3 SSB based L1-RSRP measurement when DRX is used for 1 Rx UE

##### A.16.6.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5B.4.1, with the testing configurations for NR cells in Table A.16.6.4.3.1-1.

Table A.16.6.4.3.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| 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 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

##### A.16.6.4.3.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.16.6.4.3.2-1 and Table A.16.6.4.3.2-2 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.16.6.4.3.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1~4 |  | freq1 |
| Duplex mode | 1,4 |  | FDD |
|  | 2 |  | TDD |
|  | 3 |  | TDD |
| 4 | HD-FDD |
| TDD Configuration | 1,4 |  | N/A |
|  | 2 |  | TDDConf.1.1 |
|  | 3 |  | TDDConf.2.1 |
| BWchannel | 1,4 | MHz | 10: NRB,c = 52 |
|  | 2 |  | 10: NRB,c = 52 |
|  | 3 |  | 20: NRB,c = 51 |
| PDSCH Reference measurement channel | 1,4 |  | SR.1.1 FDD |
|  | 2 |  | SR.1.1 TDD |
|  | 3 |  | SR.2.1 TDD |
| RMSI CORESET Reference Channel | 1,4 |  | CR.1.1 FDD |
|  | 2 |  | CR.1.1 TDD |
|  | 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | 1,4 |  | CCR.1.1 FDD |
|  | 2 |  | CCR.1.1 TDD |
|  | 3 |  | CCR.2.1 TDD |
| SSB configuration | 1,4 |  | SSB.3 FR1 |
|  | 2 |  | SSB.3 FR1 |
|  | 3 |  | SSB.1 RedCap FR1 |
| OCNG Patterns | 1~4 |  | OP.1 |
| Initial BWP Configuration | 1~4 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~4 |  | DLBWP.1.1  ULBWP.1.1 |
| SMTC configuration | 1~4 |  | SMTC.1 RedCap |
| TRS Configuration | 1,4 |  | TRS.1.1 FDD |
|  | 2 |  | TRS.1.1 TDD |
|  | 3 |  | TRS.1.2 TDD |
| DRX configuration | 1~4 |  | DRX.3 |
| reportConfigType | 1~4 |  | periodic |
| reportQuantity | 1~4 |  | ssb-Index-RSRP |
| Number of reported RS | 1~4 |  | 2 |
| L1-RSRP reporting period | 1~4 | slot | 80 |
| T1 | 1~4 | s | 5 |
| T2 | 1~4 | s | 1 |
| EPRE ratio of PSS to SSS | 1~4 | 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 | 1~4 |  | 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.16.6.4.3.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| Note2 | 1~4 | dBm/15kHz | -94.65 | | | |
| Note2 | 1,2,4 | dBm/SSB SCS | -94.65 | | | |
|  | 3 |  | -91.65 | | | |
|  | 1~4 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1,2,4 | dBm/SSB SCS | -94.65 | -94.65 | -Infinity | -91.65 |
|  | 3 |  | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1,2,4 | dBm/9.36 MHz | -63.69 | -63.69 | -66.70 | -61.93 |
|  | 3 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1~4 | dB | 0 | 0 | -Infinity | 3 |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.16.6.4.3.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. 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.16.6.4.34 SSB based L1-RSRP measurement when DRX is used for 2 Rx UE

##### A.16.6.4.34.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5B.4.1, with the testing configurations for NR cells in Table A.16.6.4.34.1-1.

Table A.16.6.4.34.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| 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 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

##### A.16.6.4.34.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.16.6.4.34.2-1 and Table A.16.6.4.34.2-2 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.16.6.4.34.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1~4 |  | freq1 |
| Duplex mode | 1 |  | FDD |
|  | 2 |  | TDD |
|  | 3 |  | TDD |
| 4 | HD-FDD |
| TDD Configuration | 1,4 |  | N/A |
|  | 2 |  | TDDConf.1.1 |
|  | 3 |  | TDDConf.2.1 |
| BWchannel | 1,4 | MHz | 10: NRB,c = 52 |
|  | 2 |  | 10: NRB,c = 52 |
|  | 3 |  | 20: NRB,c = 51 |
| PDSCH Reference measurement channel | 1,4 |  | SR.1.1 FDD |
|  | 2 |  | SR.1.1 TDD |
|  | 3 |  | SR.2.1 TDD |
| RMSI CORESET Reference Channel | 1,4 |  | CR.1.1 FDD |
|  | 2 |  | CR.1.1 TDD |
|  | 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | 1,4 |  | CCR.1.1 FDD |
|  | 2 |  | CCR.1.1 TDD |
|  | 3 |  | CCR.2.1 TDD |
| SSB configuration | 1,4 |  | SSB.3 FR1 |
|  | 2 |  | SSB.3 FR1 |
|  | 3 |  | SSB.1 RedCap FR1 |
| OCNG Patterns | 1~4 |  | OP.1 |
| Initial BWP Configuration | 1~4 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~4 |  | DLBWP.1.1  ULBWP.1.1 |
| SMTC configuration | 1~4 |  | SMTC.1 RedCap |
| TRS Configuration | 1,4 |  | TRS.1.1 FDD |
|  | 2 |  | TRS.1.1 TDD |
|  | 3 |  | TRS.1.2 TDD |
| DRX configuration | 1~4 |  | DRX.3 |
| reportConfigType | 1~4 |  | periodic |
| reportQuantity | 1~4 |  | ssb-Index-RSRP |
| Number of reported RS | 1~4 |  | 2 |
| L1-RSRP reporting period | 1~4 | slot | 80 |
| T1 | 1~4 | s | 5 |
| T2 | 1~4 | s | 1 |
| EPRE ratio of PSS to SSS | 1~4 | 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 | 1~4 |  | 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.16.6.4.34.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| Note2 | 1~4 | dBm/15kHz | -94.65 | | | |
| Note2 | 1,2,4 | dBm/SSB SCS | -94.65 | | | |
|  | 3 |  | -91.65 | | | |
|  | 1~4 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1,2,4 | dBm/SSB SCS | -94.65 | -94.65 | -Infinity | -91.65 |
|  | 3 |  | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1,2,4 | dBm/9.36 MHz | -63.69 | -63.69 | -66.70 | -61.93 |
|  | 3 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1~4 | dB | 0 | 0 | -Infinity | 3 |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.16.6.4.34.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. 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.16.6.4.5 CSI-RS based L1-RSRP measurement when DRX is not used for 1 Rx UE

#### A.16.6.4.6 CSI-RS based L1-RSRP measurement when DRX is not used for 2 Rx UE

#### A.16.6.4.7 CSI-RS based L1-RSRP measurement when DRX is used for 1 Rx UE

#### A.16.6.4.8 CSI-RS based L1-RSRP measurement when DRX is used for 2 Rx UE

### A.16.6.7 NR measurements with autonomous gaps

#### A.16.6.7. 1 SA intra-frequency CGI identification of NR neighbor cell in FR1 for 1 Rx UE

#### A.16.6.7. 2 SA intra-frequency CGI identification of NR neighbor cell in FR1 for 2 Rx UE

#### A.16.6.7.3 Identification of a new CGI of inter-RAT E-UTRA cell using autonomous gaps in NR SA for 1 Rx UE

#### A.16.6.7.4 Identification of a new CGI of inter-RAT E-UTRA cell using autonomous gaps in NR SA for 2 Rx UE

## A.16.7 Measurement Performance requirements for RedCap

### A.16.7.1 SS-RSRP

#### A.16.7.1.1 SA: intra-frequency case measurement accuracy with FR1 serving cell and FR1 target cell for 1 Rx UE

##### A.16.7.1.1.1 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 10.1A.2.1 and 10.1A.2.2 for intra-frequency measurements for 1RX RedCap UE.

##### A.16.7.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.16.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.16.7.1.1.2-2. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

Table A.16.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP 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, 20 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

Table A.16.7.1.1.2-2: SS-RSRP Intra frequency test parameters

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | | Unit | Test 1 | | | Test 2 | | | | | | Test 3 | | | | | |
|  | | | | | |  | Cell 1 | Cell 2 | | Cell 1 | | Cell 2 | | | | Cell 1 | | | Cell 2 | | |
| Cell ID | | | | | |  | 489 | 0 | | 489 | | 0 | | | | 489 | | 0 | | | |
| SSB ARFCN | | | | | |  | freq1 | | | freq1 | | | | | | freq1 | | | | | |
| Duplex mode | | | | Config 1 | |  | FDD | | | | | | | | | | | | | | |
| Config 2,3 | |  | TDD | | | | | | | | | | | | | | |
| Config 4 | |  | HD-FDD | | | | | | | | | | | | | | |
| TDD configuration | | | | Config 1, 4 | |  | Not Applicable | | | | | | | | | | | | | | |
|  | | | | Config 2 | |  | TDDConf.1.1 | | | | | | | | | | | | | | |
|  | | | | Config 3 | |  | TDDConf.2.1 | | | | | | | | | | | | | | |
| BWchannel | | | | Config 1, 4 | | MHz | 10: NRB,c = 52 | | | | | | | | | | | | | | |
|  | | | | Config 2 | |  | 10: NRB,c = 52 | | | | | | | | | | | | | | |
|  | | | | Config 3 | |  | 20: NRB,c = 51 | | | | | | | | | | | | | | |
| BWP BW | | | | Config 1, 4 | |  | 10: NRB,c = 52 | | | | | | | | | | | | | | |
|  | | | | Config 2 | |  | 10: NRB,c = 52 | | | | | | | | | | | | | | |
|  | | | | Config 3 | |  | 20: NRB,c = 51 | | | | | | | | | | | | | | |
| Downlink initial BWP configuration | | | | | |  | DLBWP.0.1 | | | | | | | | | | | | | | |
| Downlink dedicated BWP configuration | | | | | |  | DLBWP.1.1 | | | | | | | | | | | | | | |
| Uplink initial BWP configuration | | | | | |  | ULBWP.0.1 | | | | | | | | | | | | | | |
| Uplink dedicated BWP configuration | | | | | |  | ULBWP.1.1 | | | | | | | | | | | | | | |
| TRS configuration | | | | | Config 1, 4 |  | TRS.1.1 FDD | | NA | | TRS.1.1 FDD | | | NA | TRS.1.1 FDD | | | | | | NA |
|  | | | | | Config 2 |  | TRS.1.1 TDD | | NA | | TRS.1.1 TDD | | | NA | TRS.1.1 TDD | | | | | | NA |
|  | | | | | Config 3 |  | TRS.1.2 TDD | | NA | | TRS.1.2 TDD | | | NA | TRS.1.2 TDD | | | | | | NA |
| DRX Cycle | | | | | | ms | Not Applicable | | | | | | | | | | | | | | |
| PDSCH Reference measurement channel | | | | Config 1, 4 | |  | 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 | | | | |  |
| RMSI CORESET Reference Channel | | | | Config 1, 4 | |  | 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 | |  | CR2.1 TDD | |  | CR2.1 TDD | |  | | | | CR2.1 TDD | | | | |  |
| Control channel RMC | | | | Config 1, 4 | |  | 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 | | | | |  |
| SSB configuration | | Config 1, 4 | | | |  | SSB.1 FR1 | | SSB.1 FR1 | SSB.1 FR1 | | SSB.1 FR1 | | | | SSB.1 FR1 | | | | SSB.1 FR1 | |
|  | | Config 2 | | | |  | SSB.1 FR1 | | SSB.1 FR1 | SSB.1 FR1 | | SSB.1 FR1 | | | | SSB.1 FR1 | | | | SSB.1 FR1 | |
|  | | Config 3 | | | |  | SSB.1 RedCap FR1 | | SSB. 1 RedCap FR1 | SSB. 1 RedCap FR1 | | SSB. 1 RedCap FR1 | | | | SSB.1 RedCap FR1 | | | | SSB.1 RedCap FR1 | |
| Time offset with Cell 1 | | Config 1, 4 | | | | ms | - | | 3 | - | | 3 | | | | - | | | | 3 | |
|  | | Config 2,3 | | | | μs | - | | 3 | - | | 3 | | | | - | | | | 3 | |
| SMTC configuration | | Config 1, 4 | | | |  | SMTC.2 | | | | | | | | | | | | | | |
|  | | Config 2,3 | | | |  | SMTC.1 | | | | | | | | | | | | | | |
| OCNG Patterns | | | | | |  | OCNG pattern 1 | | | | | | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1,2,4 | | kHz | 15 kHz | | | | | | | | | | | | | | |
|  | | | | Config 3 | |  | 30kHz | | | | | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | | | | dB | 0 | | 0 | 0 | | | 0 | | | | 0 | | | | 0 |
| EPRE ratio of PBCH DMRS to SSS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDSCH to PDSCH | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| Note2 | Config 1,2,4 | | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/15KhZ | -106 | | | -88 | | | | | | | -114 | | | | |
|  |  | | | | NR\_FDD\_FR1\_B |  |  | | |  | | | | | | | -113.5 | | | | |
|  |  | | | | NR\_TDD\_FR1\_C |  |  | | |  | | | | | | | -113 | | | | |
|  |  | | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | |  | | | | | | | -112.5 | | | | |
|  |  | | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | |  | | | | | | | -112 | | | | |
|  |  | | | | NR\_FDD\_FR1\_F |  |  | | |  | | | | | | | -111.5 | | | | |
|  |  | | | | NR\_FDD\_FR1\_G |  |  | | |  | | | | | | | -111 | | | | |
|  |  | | | | NR\_FDD\_FR1\_H |  |  | | |  | | | | | | | -110.5 | | | | |
|  | Config 3 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | |  | Not applicableNote 5 | | | -94 | | | | | | | -114 | | | | |
|  |  | | | NR\_FDD\_FR1\_B | |  |  | | |  | | | | | | | -113.5 | | | | |
|  |  | | | NR\_TDD\_FR1\_C | |  |  | | |  | | | | | | | -113 | | | | |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | |  |  | | |  | | | | | | | -112.5 | | | | |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | |  |  | | |  | | | | | | | -112 | | | | |
|  |  | | | NR\_FDD\_FR1\_F | |  |  | | |  | | | | | | | -111.5 | | | | |
|  |  | | | NR\_FDD\_FR1\_G | |  |  | | |  | | | | | | | -111 | | | | |
|  |  | | | NR\_FDD\_FR1\_H | |  |  | | |  | | | | | | | -110.5 | | | | |
| Note2 | Config 1,2,4 | | | | | dBm/SCS | -106 | | | -88 | | | | | | | Same as Noc/15kHz | | | | |
|  | Config 3 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | |  | Not applicableNote 5 | | | -91 | | | | | | | -111 | | | | |
|  |  | | | NR\_FDD\_FR1\_B | |  |  | | |  | | | | | | | -110.5 | | | | |
|  |  | | | NR\_TDD\_FR1\_C | |  |  | | |  | | | | | | | -110 | | | | |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | |  |  | | |  | | | | | | | -109.5 | | | | |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | |  |  | | |  | | | | | | | -109 | | | | |
|  |  | | | NR\_FDD\_FR1\_F | |  |  | | |  | | | | | | | -108.5 | | | | |
|  |  | | | NR\_FDD\_FR1\_G | |  |  | | |  | | | | | | | -108 | | | | |
|  |  | | | NR\_FDD\_FR1\_H | |  |  | | |  | | | | | | | -107.5 | | | | |
|  | | | | | | dB | 2.46 | | -5.97 | 2.46 | | | -5.97 | | | | -0.01 | | | | -4.76 |
|  | | | | | | dB | 6 | | 1 | 6 | | | 1 | | | | 3 | | | | 0 |
| SS-RSRPNote3 | Config 1,2,4 | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | | | dBm/SCS | -100 | | -105 | -82 | | | -87 | | | | -111.00 | | | | -114.00 |
|  |  | | NR\_FDD\_FR1\_B | | |  |  | |  |  | | |  | | | | -110.50 | | | | -113.50 |
|  |  | | NR\_TDD\_FR1\_C | | |  |  | |  |  | | |  | | | | -110.00 | | | | -113.00 |
|  |  | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | | |  |  | |  |  | | |  | | | | -109.50 | | | | -112.50 |
|  |  | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | | |  |  | |  |  | | |  | | | | -109.00 | | | | -112.00 |
|  |  | | NR\_FDD\_FR1\_F | | |  |  | |  |  | | |  | | | | -108.50 | | | | -111.50 |
|  |  | | NR\_FDD\_FR1\_G | | |  |  | |  |  | | |  | | | | -108.00 | | | | -111.00 |
|  |  | | NR\_FDD\_FR1\_H | | |  |  | |  |  | | |  | | | | -107.50 | | | | -110.50 |
|  | Config 3 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | |  | Not applicableNote 5 | | Not applicableNote 5 | -85 | | | -90 | | | | -108.00 | | | | -111.00 |
|  |  | | | NR\_FDD\_FR1\_B | |  |  | |  |  | | |  | | | | -107.50 | | | | -110.50 |
|  |  | | | NR\_TDD\_FR1\_C | |  |  | |  |  | | |  | | | | -107.00 | | | | -110.00 |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | |  |  | |  |  | | |  | | | | -106.50 | | | | -109.50 |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | |  |  | |  |  | | |  | | | | -106.00 | | | | -109.00 |
|  |  | | | NR\_FDD\_FR1\_F | |  |  | |  |  | | |  | | | | -105.50 | | | | -108.50 |
|  |  | | | NR\_FDD\_FR1\_G | |  |  | |  |  | | |  | | | | -105.00 | | | | -108.00 |
|  |  | | | NR\_FDD\_FR1\_H | |  |  | |  |  | | |  | | | | -104.50 | | | | -107.50 |
| IoNote3 | Config 1,2,4 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | | dBm/  9.36MHz | -70.09 | | | -52.09 | | | | | | | -80.03 | | | | |
|  |  | | | NR\_FDD\_FR1\_B | |  |  | | |  | | | | | | | -79.53 | | | | |
|  |  | | | NR\_TDD\_FR1\_C | |  |  | | |  | | | | | | | -79.03 | | | | |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | |  |  | | |  | | | | | | | -78.53 | | | | |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | |  |  | | |  | | | | | | | -78.03 | | | | |
|  |  | | | NR\_FDD\_FR1\_F | |  |  | | |  | | | | | | | -77.53 | | | | |
|  |  | | | NR\_FDD\_FR1\_G | |  |  | | |  | | | | | | | -77.03 | | | | |
|  |  | | | NR\_FDD\_FR1\_H | |  |  | | |  | | | | | | | -76.53 | | | | |
|  | Config 3 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | | dBm/  38.16MHz | Not applicableNote 5- | | | -55.18 | | | | | | | -77.12 | | | | |
|  |  | | | NR\_FDD\_FR1\_B | |  |  | | |  | | | | | | | -76.62 | | | | |
|  |  | | | NR\_TDD\_FR1\_C | |  |  | | |  | | | | | | | -76.12 | | | | |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | |  |  | | |  | | | | | | | -75.62 | | | | |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | |  |  | | |  | | | | | | | -75.12 | | | | |
|  |  | | | NR\_FDD\_FR1\_F | |  |  | | |  | | | | | | | -74.62 | | | | |
|  |  | | | NR\_FDD\_FR1\_G | |  |  | | |  | | | | | | | 74.12 | | | | |
|  |  | | | NR\_FDD\_FR1\_H | |  |  | | |  | | | | | | | 73.62 | | | | |
| Propagation condition | | | | | | - | AWGN | | | | | | | | | | | | | | |
| Antenna configuration | | | | | |  | 1x1 | | | | | | | | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Subtest 1 is not used when testing with 30kHz SSB SCS.  Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification | | | | | | | | | | | | | | | | | | | | | |

##### A.16.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 1 and cell 2 shall fulfil absolute requirement in clause 10.1A.2.1 and relative requirement in clause 10.1A.2.2 for 1RX RedCap UE.

#### A.16.7.1.2 SA: intra-frequency case measurement accuracy with FR1 serving cell and FR1 target cell for 2Rx UE

##### A.16.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1A.2.1 and 10.1A.2.2 for intra-frequency measurements for 2RX RedCap UE.

##### A.16.7.1.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.16.7.1.2.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.16.7.1.2.2-2. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

Table A.16.7.1.2.2-1: SS-RSRP Intra frequency SS-RSRP 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, 20 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

Table A.16.7.1.2.2-2: SS-RSRP Intra frequency test parameters

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | | Unit | Test 1 | | | Test 2 | | | | | | Test 3 | | | | | |
|  | | | | | |  | Cell 1 | Cell 2 | | Cell 1 | | Cell 2 | | | | Cell 1 | | | Cell 2 | | |
| Cell ID | | | | | |  | 489 | 0 | | 489 | | 0 | | | | 489 | | 0 | | | |
| SSB ARFCN | | | | | |  | freq1 | | | freq1 | | | | | | freq1 | | | | | |
| Duplex mode | | | | Config 1 | |  | FDD | | | | | | | | | | | | | | |
| Config 2,3 | |  | TDD | | | | | | | | | | | | | | |
| Config 4 | |  | HD-FDD | | | | | | | | | | | | | | |
| TDD configuration | | | | Config 1,4 | |  | Not Applicable | | | | | | | | | | | | | | |
|  | | | | Config 2 | |  | TDDConf.1.1 | | | | | | | | | | | | | | |
|  | | | | Config 3 | |  | TDDConf.2.1 | | | | | | | | | | | | | | |
| BWchannel | | | | Config 1,4 | | MHz | 10: NRB,c = 52 | | | | | | | | | | | | | | |
|  | | | | Config 2 | |  | 10: NRB,c = 52 | | | | | | | | | | | | | | |
|  | | | | Config 3 | |  | 20: NRB,c = 51 | | | | | | | | | | | | | | |
| BWP BW | | | | Config 1,4 | |  | 10: NRB,c = 52 | | | | | | | | | | | | | | |
|  | | | | Config 2 | |  | 10: NRB,c = 52 | | | | | | | | | | | | | | |
|  | | | | Config 3 | |  | 20: NRB,c = 51 | | | | | | | | | | | | | | |
| Downlink initial BWP configuration | | | | | |  | DLBWP.0.1 | | | | | | | | | | | | | | |
| Downlink dedicated BWP configuration | | | | | |  | DLBWP.1.1 | | | | | | | | | | | | | | |
| Uplink initial BWP configuration | | | | | |  | ULBWP.0.1 | | | | | | | | | | | | | | |
| Uplink dedicated BWP configuration | | | | | |  | ULBWP.1.1 | | | | | | | | | | | | | | |
| TRS configuration | | | | | Config 1,4 |  | TRS.1.1 FDD | | NA | | TRS.1.1 FDD | | | NA | TRS.1.1 FDD | | | | | | NA |
|  | | | | | Config 2 |  | TRS.1.1 TDD | | NA | | TRS.1.1 TDD | | | NA | TRS.1.1 TDD | | | | | | NA |
|  | | | | | Config 3 |  | TRS.1.2 TDD | | NA | | TRS.1.2 TDD | | | NA | TRS.1.2 TDD | | | | | | NA |
| DRX Cycle | | | | | | ms | Not Applicable | | | | | | | | | | | | | | |
| PDSCH Reference measurement channel | | | | Config 1,4 | |  | 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 | | | | |  |
| RMSI CORESET Reference Channel | | | | Config 1,4 | |  | 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 | |  | CR2.1 TDD | |  | CR2.1 TDD | |  | | | | CR2.1 TDD | | | | |  |
| Control channel RMC | | | | Config 1,4 | |  | 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 | | | | |  |
| SSB configuration | | Config 1,4 | | | |  | SSB.1 FR1 | | SSB.1 FR1 | SSB.1 FR1 | | SSB.1 FR1 | | | | SSB.1 FR1 | | | | SSB.1 FR1 | |
|  | | Config 2 | | | |  | SSB.1 FR1 | | SSB.1 FR1 | SSB.1 FR1 | | SSB.1 FR1 | | | | SSB.1 FR1 | | | | SSB.1 FR1 | |
|  | | Config 3 | | | |  | SSB.1 RedCap FR1 | | SSB. 1 RedCap FR1 | SSB. 1 RedCap FR1 | | SSB. 1 RedCap FR1 | | | | SSB.1 RedCap FR1 | | | | SSB.1 RedCap FR1 | |
| Time offset with Cell 1 | | Config 1,4 | | | | ms | - | | 3 | - | | 3 | | | | - | | | | 3 | |
|  | | Config 2,3 | | | | μs | - | | 3 | - | | 3 | | | | - | | | | 3 | |
| SMTC configuration | | Config 1,4 | | | |  | SMTC.2 | | | | | | | | | | | | | | |
|  | | Config 2,3 | | | |  | SMTC.1 | | | | | | | | | | | | | | |
| OCNG Patterns | | | | | |  | OCNG pattern 1 | | | | | | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1,2,4 | | kHz | 15 kHz | | | | | | | | | | | | | | |
|  | | | | Config 3 | |  | 30kHz | | | | | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | | | | dB | 0 | | 0 | 0 | | | 0 | | | | 0 | | | | 0 |
| EPRE ratio of PBCH DMRS to SSS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDSCH to PDSCH | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| Note2 | Config 1,2,4 | | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/15KhZ | -106 | | | -88 | | | | | | | -114 | | | | |
|  |  | | | | NR\_FDD\_FR1\_B |  |  | | |  | | | | | | | -113.5 | | | | |
|  |  | | | | NR\_TDD\_FR1\_C |  |  | | |  | | | | | | | -113 | | | | |
|  |  | | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | |  | | | | | | | -112.5 | | | | |
|  |  | | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | |  | | | | | | | -112 | | | | |
|  |  | | | | NR\_FDD\_FR1\_F |  |  | | |  | | | | | | | -111.5 | | | | |
|  |  | | | | NR\_FDD\_FR1\_G |  |  | | |  | | | | | | | -111 | | | | |
|  |  | | | | NR\_FDD\_FR1\_H |  |  | | |  | | | | | | | -110.5 | | | | |
|  | Config 3 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | |  | Not applicableNote 5 | | | -94 | | | | | | | -114 | | | | |
|  |  | | | NR\_FDD\_FR1\_B | |  |  | | |  | | | | | | | -113.5 | | | | |
|  |  | | | NR\_TDD\_FR1\_C | |  |  | | |  | | | | | | | -113 | | | | |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | |  |  | | |  | | | | | | | -112.5 | | | | |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | |  |  | | |  | | | | | | | -112 | | | | |
|  |  | | | NR\_FDD\_FR1\_F | |  |  | | |  | | | | | | | -111.5 | | | | |
|  |  | | | NR\_FDD\_FR1\_G | |  |  | | |  | | | | | | | -111 | | | | |
|  |  | | | NR\_FDD\_FR1\_H | |  |  | | |  | | | | | | | -110.5 | | | | |
| Note2 | Config 1,2,4 | | | | | dBm/SCS | -106 | | | -88 | | | | | | | Same as Noc/15kHz | | | | |
|  | Config 3 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | |  | Not applicableNote 5 | | | -91 | | | | | | | -111 | | | | |
|  |  | | | NR\_FDD\_FR1\_B | |  |  | | |  | | | | | | | -110.5 | | | | |
|  |  | | | NR\_TDD\_FR1\_C | |  |  | | |  | | | | | | | -110 | | | | |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | |  |  | | |  | | | | | | | -109.5 | | | | |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | |  |  | | |  | | | | | | | -109 | | | | |
|  |  | | | NR\_FDD\_FR1\_F | |  |  | | |  | | | | | | | -108.5 | | | | |
|  |  | | | NR\_FDD\_FR1\_G | |  |  | | |  | | | | | | | -108 | | | | |
|  |  | | | NR\_FDD\_FR1\_H | |  |  | | |  | | | | | | | -107.5 | | | | |
|  | | | | | | dB | 2.46 | | -5.97 | 2.46 | | | -5.97 | | | | -0.01 | | | | -4.76 |
|  | | | | | | dB | 6 | | 1 | 6 | | | 1 | | | | 3 | | | | 0 |
| SS-RSRPNote3 | Config 1,2,4 | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | | | dBm/SCS | -100 | | -105 | -82 | | | -87 | | | | -111.00 | | | | -114.00 |
|  |  | | NR\_FDD\_FR1\_B | | |  |  | |  |  | | |  | | | | -110.50 | | | | -113.50 |
|  |  | | NR\_TDD\_FR1\_C | | |  |  | |  |  | | |  | | | | -110.00 | | | | -113.00 |
|  |  | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | | |  |  | |  |  | | |  | | | | -109.50 | | | | -112.50 |
|  |  | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | | |  |  | |  |  | | |  | | | | -109.00 | | | | -112.00 |
|  |  | | NR\_FDD\_FR1\_F | | |  |  | |  |  | | |  | | | | -108.50 | | | | -111.50 |
|  |  | | NR\_FDD\_FR1\_G | | |  |  | |  |  | | |  | | | | -108.00 | | | | -111.00 |
|  |  | | NR\_FDD\_FR1\_H | | |  |  | |  |  | | |  | | | | -107.50 | | | | -110.50 |
|  | Config 3 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | |  | Not applicableNote 5 | | Not applicableNote 5 | -85 | | | -90 | | | | -108.00 | | | | -111.00 |
|  |  | | | NR\_FDD\_FR1\_B | |  |  | |  |  | | |  | | | | -107.50 | | | | -110.50 |
|  |  | | | NR\_TDD\_FR1\_C | |  |  | |  |  | | |  | | | | -107.00 | | | | -110.00 |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | |  |  | |  |  | | |  | | | | -106.50 | | | | -109.50 |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | |  |  | |  |  | | |  | | | | -106.00 | | | | -109.00 |
|  |  | | | NR\_FDD\_FR1\_F | |  |  | |  |  | | |  | | | | -105.50 | | | | -108.50 |
|  |  | | | NR\_FDD\_FR1\_G | |  |  | |  |  | | |  | | | | -105.00 | | | | -108.00 |
|  |  | | | NR\_FDD\_FR1\_H | |  |  | |  |  | | |  | | | | -104.50 | | | | -107.50 |
| IoNote3 | Config 1,2,4 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | | dBm/  9.36MHz | -70.09 | | | -52.09 | | | | | | | -80.03 | | | | |
|  |  | | | NR\_FDD\_FR1\_B | |  |  | | |  | | | | | | | -79.53 | | | | |
|  |  | | | NR\_TDD\_FR1\_C | |  |  | | |  | | | | | | | -79.03 | | | | |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | |  |  | | |  | | | | | | | -78.53 | | | | |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | |  |  | | |  | | | | | | | -78.03 | | | | |
|  |  | | | NR\_FDD\_FR1\_F | |  |  | | |  | | | | | | | -77.53 | | | | |
|  |  | | | NR\_FDD\_FR1\_G | |  |  | | |  | | | | | | | -77.03 | | | | |
|  |  | | | NR\_FDD\_FR1\_H | |  |  | | |  | | | | | | | -76.53 | | | | |
|  | Config 3 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | | dBm/  38.16MHz | Not applicableNote 5- | | | -55.18 | | | | | | | -77.12 | | | | |
|  |  | | | NR\_FDD\_FR1\_B | |  |  | | |  | | | | | | | -76.62 | | | | |
|  |  | | | NR\_TDD\_FR1\_C | |  |  | | |  | | | | | | | -76.12 | | | | |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | |  |  | | |  | | | | | | | -75.62 | | | | |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | |  |  | | |  | | | | | | | -75.12 | | | | |
|  |  | | | NR\_FDD\_FR1\_F | |  |  | | |  | | | | | | | -74.62 | | | | |
|  |  | | | NR\_FDD\_FR1\_G | |  |  | | |  | | | | | | | 74.12 | | | | |
|  |  | | | NR\_FDD\_FR1\_H | |  |  | | |  | | | | | | | 73.62 | | | | |
| Propagation condition | | | | | | - | AWGN | | | | | | | | | | | | | | |
| Antenna configuration | | | | | |  | 1x2 | | | | | | | | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Subtest 1 is not used when testing with 30kHz SSB SCS.  Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification | | | | | | | | | | | | | | | | | | | | | |

##### A.16.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for cell 1 and cell 2 shall fulfil absolute requirement in clause 10.1A.2.1 and relative requirement in clause 10.1A.2.2 for 2RX RedCap UE.

#### A.16.7.1.3 SA inter-frequency case measurement accuracy with FR1 serving cell and FR1 target cell for 1 Rx UE

#### A.16.7.1.4 SA inter-frequency case measurement accuracy with FR1 serving cell and FR1 target cell for 2 Rx UE

### A.16.7.2 SS-RSRQ

#### A.16.7.2.1 SA: Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell for 1 Rx UE

#### A.16.7.2.2 SA: Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell for 2 Rx UE

#### A.16.7.2.3 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell for 1 Rx UE

#### A.16.7.2.4 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell for 2 Rx UE

### A.16.7.3 SS-SINR

#### A.16.7.3.1 SA intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell for 1 Rx UE

#### A.16.7.3.2 SA intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell for 2 Rx UE

#### A.16.7.3.3 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell for 1 Rx UE

#### A.16.7.3.4 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell for 2 Rx UE

### A.16.7.4 L1-RSRP measurement for beam reporting

#### A.16.7.4.1 SSB based L1-RSRP measurement for 1 Rx UE

#### A.16.7.4.2 SSB based L1-RSRP measurement for 2 Rx UE

#### A.16.7.4.3 CSI-RS based L1-RSRP measurement on resource set with repetition off for 1 Rx UE

#### A.16.7.4.4 CSI-RS based L1-RSRP measurement on resource set with repetition off for 2 Rx UE

### A.16.7.5 E-UTRAN RSRP

#### A.16.7.5.1 SA: inter-RAT measurement accuracy with FR1 serving cell for 1 Rx UE

#### A.16.7.5.2 SA: inter-RAT measurement accuracy with FR1 serving cell for 2 Rx UE

### A.16.7.6 E-UTRAN RSRQ

#### A.16.7.6.1 SA: inter-RAT measurement accuracy with FR1 serving cell for 1 Rx UE

#### A.16.7.6.2 SA: inter-RAT measurement accuracy with FR1 serving cell for 2 Rx UE

### A.16.7.7 E-UTRAN RS-SINR

#### A.16.7.7.1 SA: inter-RAT measurement accuracy with FR1 serving cell for 1 Rx UE

#### A.16.7.7.2 SA: inter-RAT measurement accuracy with FR1 serving cell for 2 Rx UE

**--- End of change 5 ---**

**--- Start of change 6 ---**

# A.17 NR standalone tests with one or more NR cells in FR2 for RedCap

## A.17.1 SA: RRC\_IDLE state mobility for RedCap

### A.17.1.1 Cell re-selection to NR

#### A.17.1.1.1 Cell reselection to FR2 intra-frequency NR case for 2 Rx

##### A.17.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2B.2.3.

##### A.17.1.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.17.1.1.1.2-1, A.17.1.1.1.2-2 and A.17.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.17.1.1.1.2-1: Supported test configurations

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

Table A.17.1.1.1.2-2: General test parameters for RedCap UE intra frequency NR cell re-selection test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell1 |  |
| T2 end condition | Active cell |  | 1, 2 | Cell2 |  |
|  | Neighbour cell |  | 1, 2 | Cell1 |  |
| Final condition | Active cell |  | 1, 2 | Cell1 |  |
|  | Neighbour cell |  | 1, 2 | Cell2 |  |
| RF Channel Number | |  | 1, 2 | 1 |  |
| Time offset between cells | |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SMTC configuration | |  | 1, 2 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2 | Not configured |  |
| T1 | | s | 1, 2 | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, the intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 1, 2 | 135 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 1, 2 | 35 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.17.1.1.1.2-3: Cell specific test parameters for RedCap UE intra frequency NR cell re-selection test case in AWGN

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | | **Cell 2** | | |
|  |  |  | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | | SR.3.1 TDD | | |
|  |  | 2 | SR.3.1 TDD | | | SR.3.1 TDD | | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | | CR.3.1 TDD | | |
|  |  | 2 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
|  |  | 2 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| SSB configuration |  | 1 | SSB.3 FR2 | | | SSB.7 FR2 | | |
|  |  | 2 | SSB.4 FR2 | | | SSB.8 FR2 | | |
| OCNG Pattern |  | 1, 2 | OP.4 | | | OP.4 | | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1, 2 | 66 | | | 66 | | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -138 | | | -138 | | |
|  |  | 2 | -135 | | | -135 | | |
| Pcompensation | dB | 1, 2 | 0 | | | 0 | | |
| Qhysts | dB | 1, 2 | 0 | | | 0 | | |
| Qoffsets, n | dB | 1, 2 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | | | SS-RSRP | | |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
|  | dB | 1 | 8 | -3 | 1.5 | -infinity | 1.5 | -3 |
|  |  | 2 |  |  |  |  |  |  |
| Beam assumptionNote 4 |  | 1,2 | Rough | | | | | |
| Note2 | dBm/SCS | 1 | -93 | | | | | |
|  |  | 2 | -90 | | | | | |
| Note2 | dBm/15 kHz | 1 | -102 | | | | | |
|  |  | 2 |  | | | | | |
|  | dB | 1 | 8 | -3 | 1.5 | -infinity | 1.5 | -3 |
|  |  | 2 |  |  |  |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -85 | -96 | -91.5 | -infinity | -91.5 | -96 |
|  |  | 2 | -82 | -93 | -88.5 | -infinity | -88.5 | -93 |
| Io on SSB symbols | dBm/95.04 MHz | 1 | -59.37 | -63.40 | -62.47 | -64.01 | -62.47 | -63.40 |
| of each cell |  | 2 | -57.18 | -62.86 | -61.67 | -64.01 | -61.67 | -62.86 |
| Treselection | s | 1, 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| SintrasearchP | dB | 1, 2 | 50 | | | 50 | | |
| Propagation Condition |  | 1, 2 | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

##### A.17.1.1.1.3 Test Requirements

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

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

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

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

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

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

Where:

Tdetect, NR\_Intra See Table 4.2B.2.3-1 in clause 4.2B.2.3

Tevaluate, NR\_ intra See Table 4.2B.2.3-1 in clause 4.2B.2.3

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

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

#### A.17.1.1.2 Cell reselection to FR2 inter-frequency NR case

##### A.17.1.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2B.2.4.

##### A.17.1.1.2.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.17.1.1.2.2-1, A.17.1.1.2.2-2 and A.17.1.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.17.1.1.2.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description for serving cell | Description for target cell |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.17.1.1.2.2-2: General test parameters for RedCap UE FR2 inter frequency NR cell re-selection test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell2 | The UE camps on cell 2 in the initial phase and during T1 period the UE reselects to cell 1 |
|  | Neighbour cell |  | 1, 2 | Cell1 |  |
| T1 end condition | Active cell |  | 1, 2 | Cell1 | The UE shall perform reselection to cell 1 during T1 |
|  | Neighbour cells |  | 1, 2 | Cell2 |  |
| T3 end condition | Active cell |  | 1, 2 | Cell2 | The UE shall perform reselection to cell 2 with higher priority during T3 |
|  | Neighbour cell |  | 1, 2 | Cell1 |  |
| RF Channel Number | |  | 1, 2 | 1, 2 |  |
| Time offset between cells | |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR2 |  |
|  | |  | 2 | SSB.2 FR2 |  |
| SMTC configuration | |  | 1, 2 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2 | Not configured |  |
| T1 | | s | 1, 2 | 35 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2 | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 1, 2 | 95 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.17.1.1.2.2-3: Cell specific test parameters for RedCap UE FR2 inter frequency NR cell re-selection test case in AWGN

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| PDSCH RMC configuration |  | 1, 2 | SR.3.1 TDD | | | SR.3.1 TDD | | |
| RMSI CORESET parameters |  | 1, 2 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| RMSI CORESET RMC configuration |  | 1, 2 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| OCNG Pattern |  | 1, 2 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -140 | | | -140 | | |
|  |  | 2 | -137 | | | -137 | | |
| Pcompensation | dB | 1, 2 | 0 | | | 0 | | |
| Qhysts | dB | 1, 2 | 0 | | | 0 | | |
| Qoffsets, n | dB | 1, 2 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | | | SS-RSRP | | |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
| Beam assumptionNote 4 |  | 1,2 | Rough | | | Rough | | |
|  | dB | 1 | 10.5 | 10.5 | 8 | -10.5 | -infinity | 8.5 |
|  |  | 2 |  |  |  |  |  |  |
| Note2 | dBm/SCS | 1 | -93 | | | -93 | | |
|  |  | 2 | -90 | | | -90 | | |
| Note2 | dBm/15 kHz | 1 | -102 | | | -102 | | |
|  |  | 2 |  | | |  | | |
|  | dB | 1 | 10.5 | 10.5 | 8 | -10.5 | -infinity | 8.5 |
|  |  | 2 |  |  |  |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -83.5- | -83.5 | -85 | -103.5 | -infinity | -84.5 |
|  |  | 2 | -80.5 | -80.5 | -82 | -100.5 | -infinity | -80.5 |
| Io | dBm/95.04 MHz | 1, 2 | -54.05 | -54.05 | -55.37 | -63.64 | -54.01 | -54.94 |
| Treselection | s | 1, 2 | -54.05 | -54.05 | -55.37 | -63.64 | -54.01 | -54.94 |
| SnonintrasearchP | dB | 1, 2 | 50 | | | 50 | | |
| Threshx, highP | dB | 1, 2 | 48 | | | 48 | | |
| Threshserving, lowP | dB | 1, 2 | 44 | | | 44 | | |
| Threshx, lowP | dB | 1, 2 | 50 | | | 50 | | |
| Propagation Condition |  | 1, 2 | AWGN | | | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

##### A.17.1.1.2.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2 and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a registration procedure for mobility and periodic registration updateon cell 2.

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

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

The cell re-selection delay to a lower priority cell shall be less than 27 s.

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

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

Where:

Thigher\_priority\_search See clause 4.2B.2.7

Tevaluate, NR\_ inter See Table 4.2B.2.4-1 in clause 4.2B.2.4

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

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

#### A.17.1.1.3 Cell reselection to FR2 intra-frequency NR case for UE fulfilling stationary relaxed measurement criterion for 2 Rx UE

##### A.17.1.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements for UE configured with stationary relaxed measurement criterion specified in clause 4.2B.2.9.2.

##### A.17.1.1.3.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.17.1.1.3.2-1, A.17.1.1.3.2-2 and A.17.1.1.3.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. During T1 and T2, only criteria *stationaryMobilityEvaluation* is configured andfulfilled.UE has not registered with network for the tracking area containing cell2.

Table A.17.1.1.3.2-1: Supported test configurations

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

Table A.17.1.1.3.2-2: General test parameters for FR2 intra-frequency NR cell re-selection test case for UE fulfilling stationary criterion for 2 Rx UE

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

Table A.17.1.1.3.2-3: Cell specific test parameters for FR2 intra-frequency NR cell re-selection test case in AWGN for UE fulfilling stationary mobility criterion for 2 Rx UE

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | | |
|  |  |  | T1 | T2 | T1 | | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | | |
| PDSCH RMC |  | 1 | SR.3.1 TDD | | SR.3.1 TDD | | |
| configuration |  | 2 | SR.3.1 TDD | | SR.3.1 TDD | | |
| RMSI CORESET |  | 1 | CR.3.1 TDD | | CR.3.1 TDD | | |
| RMC configuration |  | 2 | CR.3.1 TDD | | CR.3.1 TDD | | |
| Dedicated CORESET |  | 1 | CCR.3.1 TDD | | CCR.3.1 TDD | | |
| RMC configuration |  | 2 | CCR.3.1 TDD | | CCR.3.1 TDD | | |
| SSB configuration |  | 1 | SSB.3 FR2 | | SSB.7 FR2 | | |
|  |  | 2 | SSB.4 FR2 | | SSB.8 FR2 | | |
| OCNG Pattern |  | 1, 2 | OP.4 | | OP.4 | | |
| Initial DL BWP configuration |  | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Initial UL BWP configuration |  | 1, 2 | 66 | | 66 | | |
| RLM-RS |  | 1, 2 | SSB | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -140 | | -140 | | |
|  |  | 2 | -137 | | -137 | | |
| SSearchDeltaP-Stationary | dB | 1, 2 | 6 | | 6 | | |
| TSearchDeltaP-Stationary | s | 1,2 | 5 | | 5 | | |
| Pcompensation | dB | 1, 2 | 0 | | 0 | | |
| Qhysts | dB | 1, 2 | 0 | | 0 | | |
| Qoffsets, n | dB | 1, 2 | 0 | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | | SS-RSRP | | |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | Setup 1 defined in A.3.15.1 | | |
| Beam assumptionNote 4 |  | 1,2 | Rough | | Rough | | |
|  | dB | 1 | -3 | 1.5 | 1.5 | -3 | |
|  |  | 2 |
| Note2 | dBm/SCS | 1 | -93 | | | | |
|  |  | 2 | -90 | | | | |
| Note2 | dBm/15 kHz | 1 | -102 | | | | |
|  |  | 2 |  | | | | |
|  | dB | 1 | -3 | 1.5 | 1.5 | -3 | |
|  |  | 2 |
| SS-RSRP Note3 | dBm/SCS | 1 | 96 | 91.5 | 91.5 | 96 | |
|  |  | 2 | 93 | -88.5 | 88.5 | 93 | |
| Io on SSB symbols of each cell | dBm/95.04 MHz | 1 | 63.40 | 62.47 | -62. 47 | 63.40 | |
| 2 | 62.86 | 61.67 | -61.67 | 62.86 | |
| Treselection | s | 1, 2 | 0 | 0 | 0 | 0 | |
| SintrasearchP | dB | 1, 2 | 50 | | 50 | | |
| Propagation Condition |  | 1, 2 | AWGN | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.17.1.1.3.3 Test Requirements

The cell reselection delay to an already detected cell for UE fulfilling stationary relaxed criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected cell shall be less than 155 s.

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

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

Where:

Tevaluate,NR\_Intra\_RedCap\_Relax See Table 4.2B.2.9.2-2 in clause 4.2B.2.9.2,

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

This gives a total of 154.88 s, allow 155 s for the cell re-selection delay to an already detected cell for UE fulfilling stationary criterion in the test case.

#### A.17.1.1.4 Cell reselection to FR2 inter-frequency NR case for UE fulfilling stationary mobility relaxed measurement criterion for 2 Rx UE

##### A.17.1.1.4.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements for UE fulfilling stationary relaxed measurement criterion specified in clause 4.2B.2.10.2.

##### A.17.1.1.4.2 Test Parameters

The test scenario comprises of 2 cells (Cell 1 and Cell 2) on 2 different NR carriers respectively as given in tables A.17.1.1.4.2-1, A.17.1.1.4.2-2 and A.17.1.1.4.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2. Cell 2 is of higher priority than Cell 1. The UE is configured with *stationaryMobilityEvaluation* criterion [2].

Table A.17.1.1.4.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description for serving cell | Description for target cell |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.17.1.1.4.2-2: General test parameters for FR2 inter frequency NR cell re-selection test case for UE fulfilling stationary criterion for 2 Rx UE

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

Table A.17.1.1.4.2-3: Cell specific test parameters for FR2 inter frequency NR cell re-selection test case in AWGN for UE fulfilling stationary criterion for 2 Rx UE

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1, 2 | SR.3.1 TDD | | SR.3.1 TDD | |
| RMSI CORESET parameters |  | 1, 2 | CR.3.1 TDD | | CR.3.1 TDD | |
| RMSI CORESET RMC configuration |  | 1, 2 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| OCNG Pattern |  | 1, 2 | OP.1 defined in A.3.2.1 | | OP.1 defined in A.3.2.1 | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | | ULBWP.0.1 | |
| RLM-RS |  | 1, 2 | SSB | | SSB | |
| Qrxlevmin | dBm/SCS | 1 | -140 | | -140 | |
|  |  | 2 | -137 | | -137 | |
| Pcompensation | dB | 1, 2 | 0 | | 0 | |
| Qhysts | dB | 1, 2 | 0 | | 0 | |
| Qoffsets, n | dB | 1, 2 | 0 | | 0 | |
| Cell\_selection\_and\_reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | | SS-RSRP | |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | Setup 1 defined in A.3.15.1 | |
| Beam assumptionNote 4 |  | 1, 2 | Rough | | Rough | |
|  | dB | 1, 2 | 10.5 | 8 | -10.5 | -8.5 |
| Note2 | dBm/SCS | 1 | -93 | | -93 | |
| 2 | -90 | | -90 | |
| Note2 | dBm/15 kHz | 1, 2 | -102 | | -102 | |
|  | dB | 1, 2 | 10.5 | 8 | -10.5 | 8.5 |
| SS-RSRP Note3 | dBm/SCS | 1 | -82.5 | -85 | -103.5 | -84.5 |
|  |  | 2 | -79.5 | -82 | -100.5 | -81.5 |
| Io | dBm/95.04 MHz | 1 | -53.14 | -55.37 | -63.64 | -54.94 |
|  |  | 2 | -58.10 | -60.189 | -66.79 | -59.79 |
| TreselectionNR | s | 1, 2 | 0 | | 0 | |
| SnonintrasearchP | dB | 1, 2 | 50 | | Not sent | |
| SSearchDeltaP-Stationary | dB | 1, 2 | 6 | | 6 | |
| TSearchDeltaP-Stationary | s | 1, 2 | 5 | | 5 | |
| Threshx, highP | dB | 1, 2 | 48 | | 48 | |
| Threshserving, lowP | dB | 1, 2 | 44 | | 44 | |
| Threshx, lowP | dB | 1, 2 | 50 | | 50 | |
| Propagation Condition |  | 1, 2 | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | |

##### A.17.1.1.4.3 Test Requirements

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

The cell re-selection delay to an already detected low priority cell, Cell 1, shall be less than 155 s.

The cell reselection delay to an already detected high priority cell (Cell 2) for UE fulfilling stationary criterion is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected high priority cell, Cell 2, shall be less than 155 s.

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

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

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

Where:

Tevaluate,NR\_Inter\_RedCap\_Relax See Table 4.2B.2.10.2-2 in clause 4.2B.2.10.2

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

This gives a total of 154.88 s, allow 155 s for the cell re-selection delay to an already detected low priority cell for UE fulfilling stationary criterion in the test case.

This gives a total of 154.88 s, allow 155 s for the cell re-selection delay to an already detected high priority cell for UE fulfilling stationary criterion in the test case.

## A.17.2 SA: RRC\_INACTIVE state mobility for RedCap

## A.17.3 RRC\_CONNECTED state mobility for RedCap

### A.17.3.1 Handover for RedCap

#### A.17.3.1.1 Intra-frequency handover from FR2 to FR2; unknown target cell for 2 Rx

#### A.17.3.1.1 Inter-frequency handover from FR2 to FR2; unknown target cell for 2 Rx

### A.17.3.2 RRC Connection Mobility Control for RedCap

#### A.17.3.2.1 SA: RRC Re-establishment

##### A.17.3.2.1.1 Intra-frequency RRC Re-establishment in FR2

A.17.3.2.1.1.1 Test Purpose and Environment

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

The test parameters are given in table A.17.3.2.1.1.1-1, table A.17.3.2.1.1.1-2 and table A.17.3.2.1.1.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure.

Table A.17.3.2.1.1.1-1: Supported test configurations

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

Table A.17.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

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

Table A.17.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Assumption for UE beamsNote 4 |  |  | Rough | | | Rough | | |
| TDD configuration |  | 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1 | 24 | | | 24 | | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | | N/A | | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | | | N/A | | |
| OCNG Pattern |  | 1 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1 | SSB | | | SSB | | |
| AoA setup |  | 1 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
|  | dB | 1 | -0.12 | -infinity | -infinity | -3.46 | 2 | 2 |
| Note2 | dBm/15 kHz | 1 | -104.7 | | | | | |
| Note2 | dBm/SCS | 1 | -95.7 | | | | | |
|  | dB | 1 | 4 | -infinity | -infinity | 2 | 2 | 2 |
| SS-RSRP Note3 | dBm/SCS | 1 | -91.7 | -infinity | -infinity | -93.7 | -93.7 | -93.7 |
| Io | dBm/95.04 MHz | 1 | -59.64 | -62.59 | -62.59 | -59.94 | -62.59 | -62.59 |
| Propagation Condition |  | 1 | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

A.17.3.2.1.1.2 Test Requirements

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

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

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

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

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

Where:

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

Nfreq = 1

Tidentify\_intra\_NR = 3520 ms

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

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

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

##### A.17.3.2.1.2 Inter-frequency RRC Re-establishment in FR2

A.17.3.2.1.2.1 Test Purpose and Environment

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

The test parameters are given in table A.17.3.2.1.2.1-1, table A.17.3.2.1.2.1-2 and table A.17.3.2.1.2.1-3 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.17.3.2.1.2.1-1: Supported test configurations

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

Table A.17.3.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR2

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

Table A.17.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Assumption for UE beamsNote 4 |  |  | Rough | | | Rough | | |
| AoA setup |  | 1 | TBD | | | | | |
|  |  |  | TBD | | | TBD | | |
| TDD configuration |  | 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1 | 24 | | | 24 | | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | | N/A | | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | | | N/A | | |
| OCNG Pattern |  | 1 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1 | SSB | | | SSB | | |
| Note2 | dBm/15 kHz | 1 | -92.1 | | | -92.1 | | |
| Note2 | dBm/SCS | 1 | -83.1 | | | -83.1 | | |
|  | dB | 1 | 0 | -infinity | -infinity | -infinity | -infinity | 0 |
| BB Note 5 | dB | 1 | -1.01 | -infinity | -infinity | -infinity | -infinity | -1.01 |
| SSB\_RP Note3 | dBm/SCS | 1 | -83.1 | -infinity | -infinity | -infinity | -infinity | -83.1 |
| Io | dBm/95.04 MHz | 1 | -55.46 | -58.51 | -58.51 | -58.51 | -58.51 | -55.46 |
| Propagation Condition |  | 1 | AWGN | | | AWGN | | |
| Note 1: OCNG shall be used such that a constant total transmitted power is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 5: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | |

A.17.3.2.1.2.2 Test Requirements

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

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

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

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

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

Where:

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

Nfreq = 2

Tidentify\_intra\_NR = 1600 ms

Tidentify\_inter\_NR = 2080 ms

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

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

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

##### A.17.3.2.1.3 Intra-frequency RRC Re-establishment in FR2 without serving cell timing

###### A.17.3.2.1.3.1 Test Purpose and Environment

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

The test parameters are given in table A.17.3.2.1.3.1-1, table A.17.3.2.1.3.1-2 and table A.17.3.2.1.3.1-3 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.17.3.2.1.3.1-1: Supported test configurations

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

Table A.17.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

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

Table A.17.3.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Assumption for UE beamsNote 4 |  |  | Rough | | | Rough | | |
| TDD configuration |  | 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 FDD | | | CR.3.1 FDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 FDD | | | CCR.3.1 FDD | | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | | N/A | | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | | | N/A | | |
| OCNG Pattern |  | 1 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1 | SSB | | | SSB | | |
| AoA setup |  | 1 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
|  | dB | 1 | 5 | -infinity | -infinity | -infinity | -infinity | 5 |
| Note2 | dBm/15 kHz | 1 | -104.7 | | | | | |
| Note2 | dBm/SCS | 1 | -95.7 | | | | | |
|  | dB | 1 | 5 | -infinity | -infinity | -infinity | -infinity | 5 |
| SS-RSRP Note3 | dBm/SCS | 1 | -90.7 | -infinity | -infinity | -infinity | -infinity | -90.7 |
| Io | dBm/95.04 MHz | 1 | -60.52 | -66.71 | -60.52 | -60.52 | -66.71 | -60.52 |
| Propagation Condition |  | 1 | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

###### A.17.3.2.1.3.2 Test Requirements

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

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

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

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

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

Where:

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

Nfreq = 1

Tidentify\_intra\_NR = 3520 ms

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

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

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

#### A.17.3.2.2 Random Access

A.17.3.2.2.1 4-step RA type contention based random access test in FR2 for NR Standalone

A.17.3.2.2.1.1 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 6.2.2B.2 and Clause 7.1A.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell in FR2. Supported test parameters are shown in Table A.17.3.2.2.1.1-1. UE capable of SA with PCell in FR2 needs to be tested by using the parameters in Table A.17.3.2.2.1.1-2 and Table A.17.3.2.2.1.1-3.

**Table A.17.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR2 for NR Standalone**

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

**Table A.17.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for NR Standalone**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test-1** | **Comments** |
| SSB Configuration | Config 1 |  | SSB.1 RedCap FR2 | As defined in A.3.10B |
| CSI-RS for tracking | Config 1 |  | TRS.2.1 TDD |  |
| Duplex Mode for Cell 1 | Config 1 |  | TDD |  |
| TDD Configuration | Config 1 |  | TDDConf.3.1 | As defined in A.3.1.4 |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |  |
| Data RBs allocated | Config 1 |  | 24 |  |
| OCNG Pattern Note 1 | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH Reference Channel Note 2 | Config 1 |  | SR.3.1 TDD | As defined in A.3.1.1. |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD | As defined in A.3.1.2 |
| NR RF Channel Number | |  | 1 |  |
| EPRE ratio of PSS to SSS | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | dB |  |  |
| ss-PBCH-BlockPower | | dBm/ SCS | +20 +ΔUL | As defined in TS 38.331 [2].  ΔUL is derived from the uplink calibration process Note 3 |
| Configured UE transmitted power () | | dBm | maximum value configurable for certain power class | As defined in clause 6.2.4 in TS 38.101-2 [19] |
| PRACH Configuration | |  | FR2 PRACH configuration 1 | As defined in A.3.8B.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.17.3.2.2.1.1-3: OTA-related test parameters for contention based random access test in FR2 for NR Standalone**

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

A.17.3.2.2.1.2 Test Requirements

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

A.17.3.2.2.1.2.1 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.17.3.2.2.1.2.2 Random Access Response Reception

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

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

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

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

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

A.17.3.2.2.1.2.3 No Random Access Response Reception

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

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

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

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

A.17.3.2.2.1.2.4 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.17.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

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

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

A.17.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

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

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

A.17.3.2.2.1.2.7 Contention Resolution Timer expiry

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

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

A.17.3.2.2.2 4-step RA type non-contention based random access test in FR2 for NR Standalone

A.17.3.2.2.2.1 Test Purpose and Environment

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

For this test one cell is used, with the configuration of Cell 1 configured as PCell in FR2. Supported test parameters are shown in Table A.17.3.2.2.2.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.17.3.2.2.2.1-2 and Table A.17.3.2.2.2.1-3 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2). Test 2 is only applicable to UE which supports csi-RSRP-AndRSRQ-MeasWithSSB or csi-RSRP-AndRSRQ-MeasWithoutSSB.

**Table A.17.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR2 for NR Standalone**

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

**Table A.17.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR2 for NR Standalone**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test-1** | **Test-2** | **Comments** |
| SSB Configuration | Config 1 |  | SSB.1 FR2 | SSB.1 FR2 | As defined in A.3.10B |
| CSI-RS for tracking | Config 1 |  | TRS.2.1 TDD | TRS.2.1 TDD |  |
| CSI-RS Configuration | Config 1 |  | N/A | CSI-RS.3.1 TDD | As defined in A.3.1B.4 |
| Duplex Mode for Cell 2 | Config 1 |  | TDD | TDD |  |
| TDD Configuration | Config 1 |  | TDDConf.3.1 | TDDConf.3.1 |  |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 | 100: NRB,c = 66 |  |
| Data RBs allocated | Config 1 |  | 24 | 24 |  |
| OCNG Pattern Note 1 | |  | OP.3 | OP.3 | As defined in A.3.2.1. |
| PDSCH Reference Channel Note 2 | Config 1 |  | SR3.1 TDD | SR3.1 TDD | As defined in A.3.1B.1. |
| NR RF Channel Number | |  | 1 | 1 |  |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | dB |  |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | dB |  |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | dB |  |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | dB |  |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | dB |  |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | dB |  |  |  |
| ss-PBCH-BlockPower | | dBm/ SCS | +20 +ΔUL | +20 +ΔUL | As defined in TS 38.331 [2].  ΔUL is derived from the uplink calibration process Note 3 |
| Configured UE transmitted power () | | dBm | maximum value configurable for certain power class | maximum value configurable for certain power class | As defined in clause 6.2.4 in TS 38.101-2 [19] |
| PRACH Configuration | |  | FR2 PRACH configuration 2 | FR2 PRACH configuration 3 | As defined in A.3.8B.3, with exceptions as defined below. |
| rsrp-ThresholdSSB | | dBm | RSRP\_69 +ΔDL | RSRP\_69 +ΔDL | RSRP\_69 corresponds to -88dBm. ΔDL is derived from the downlink calibration process Note 4 |
| preambleReceivedTargetPower | | dBm | -100 | -100 | As defined in TS 38.331 [2] |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: The ΔUL value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, *preambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.  Note 4: The ΔDL value is calculated as (RSRP\_REP – RSRP\_76), where RSRP\_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP\_x, x is treated as a positive integer value. | | | | | |

**Table A.17.3.2.2.2.1-3: OTA-related test parameters for non-contention based random access test in FR2 for NR Standalone**

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

A.17.3.2.2.2.2 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.17.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

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

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

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

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

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

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

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

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

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

A.17.3.2.2.2.2.3 Random Access Response Reception

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

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

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

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

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

A.17.3.2.2.2.2.4 No Random Access Response Reception

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

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

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

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

##### A.17.3.2.2.3 2-step RA type contention based random access test in FR2 for NR Standalone

A.17.3.2.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the 2-step RA type random access procedure is according to the requirements and that the MsgA PRACH, MsgA PUSCH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2B.2 and Clause 7.1A.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.17.3.2.2.3.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.17.3.2.2.3.1-2 and Table A.17.3.2.2.3.1-3.

Table A.17.3.2.2.3.1-1: Supported test configurations for 2-step RA type contention based random access test in FR2 for NR Standalone

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

Table A.17.3.2.2.3.1-2: General test parameters for 2-step RA type contention based random access test in FR2 for NR Standalone

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

Table A.17.3.2.2.3.1-3: OTA-related test parameters for 2-step RA type contention based random access test in FR2 for NR Standalone

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Comments |
| AoA setup | |  | Setup 2b | As defined in A.3.15.2 |
| Assumption for UE beamsNote 2 | |  | Rough |  |
| SSB with index 0 | Es Note1 | dBm/SCS | -80.6 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  | SSB\_RP | dBm/SCS | -80.6 |
|  | Es/IotBB | dB | 21.09 |  |
|  | Io | dBm/95.04 MHz | -56.01 | Io in symbols containing SSB index 0 |
| SSB with index 1 | Es Note1 | dBm/SCS | -95.0 | Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB* |
|  | SSB\_RP | dBm/SCS | -95.0 |
|  | Es/IotBB | dB | 6.69 |  |
|  | Io | dBm/95.04 MHz | -70.41 | Io in symbols containing SSB index 1 |
| Propagation Condition | | - | AWGN |  |
| Note 1: No articial noise is applied in this test.  Note 2: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

A.17.3.2.2.3.2 Test Requirements

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

A.17.3.2.2.3.2.1 MsgA Transmission

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

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

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.17.3.2.2.3.2.2 MsgB Reception

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

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

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

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

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.17.3.2.2.3.2.3 No MsgB Reception

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

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

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

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

##### A.17.3.2.2.4 2-step RA type non-contention based random access test in FR2 for NR Standalone

A.17.3.2.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the MsgA PRACH, MsgA PUSCH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2B.2 and Clause 7.1A.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.17.3.2.2.4.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.17.3.2.2.4.1-2 and Table A.17.3.2.2.4.1-3.

Table A.17.3.2.2.4.1-1: Supported test configurations for non-contention based random access test for 2-step RA type in FR2 for NR Standalone

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

Table A.17.3.2.2.4.1-2: General test parameters for non-contention based random access test for 2-step RA type in FR2 for NR Standalone

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

Table A.17.3.2.2.4.1-3: OTA-related test parameters for non-contention based random access test for 2-step RA type in FR2 for NR Standalone

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

A.17.3.2.2.4.2 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.17.3.2.2.4.2.1 MsgA Transmission

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

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

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

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.17.3.2.2.4.2.2 MsgB Reception

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

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

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

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

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.17.3.2.2.4.2.3 No MsgB Reception

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

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

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

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

#### A.17.3.2.3 SA: RRC Connection Release with Redirection

##### A.17.3.2.3.1 Redirection from NR in FR2 to NR in FR2

A.17.3.2.3.1.1 Test Purpose and Environment

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

A.17.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.17.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.17.3.2.3.1.2-2, and A.17.3.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.17.3.2.3.1.2-1: Redirection from NR to NR test configurations

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

Table A.17.3.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | 3.2 |  |

Table A.17.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 2 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| Assumption for UE beamsNote 6 | | |  | Rough | | | | Rough | | |
| AoA setup | | |  | Setup 1as defined in A.3.15 | | | | | | |
| NR RF Channel Number | | |  | 1 | | | | 2 | | |
| Duplex mode | | |  | TDD | | | | | | |
| TDD configuration | | |  | TDDConf.3.1 | | | | | | |
| BWchannel | | | MHz | 100: NRB,c = 66 | | | | | | |
| BWP BW | | | MHz | 100: NRB,c = 66 | | | | | | |
| Data RBs allocated | | |  | 66 | | | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | | |  | SR3.1 TDD | | | | | | |
| RMSI CORESET Reference Channel | | |  | CR3.1 TDD | | | | | | |
| Control Channel RMC | | |  | CCR.3.1 TDD | | | | | | |
| OCNG Patterns | | |  | O P. 1 | | | | | | |
| SMTC configuration | | |  | SMTC.1 FR2 | | | | | | |
| SSB Configuration | | |  | SSB.3 FR2 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| PRACH configuration | | |  | FR2 PRACH configuration 1 | | | | | | |
| TRS configuration | | |  | TRS.2.1 TDD | | | | | | |
| PDSCH/PDCCH TCI state | | |  | TCI.State.2 | | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | | |  |  | | |  | | | |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  | | |  | | | |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  | | |  | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  | | |  | | | |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  | | |  | | | |
| EPRE ratio of PDSCH to PDSCH | | |  |  | | |  | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  | | |  | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  | | |  | | | |
| Note2 | | | dBm/15kHz | -104.7 | | | -104.7 | | | |
| Note2 |  | | dBm/SCS | -95.7 | | | -95.7 | | | |
|  | | | dB | 5 | 5 | | -Infinity | | 5 | |
|  | | | dB | 5 | 5 | | -Infinity | | 5 | |
| IoNote3 |  | | dBm/  BW | -60.5 | -60.5 | | -66.7 | | -60.5 | |
| Propagation condition | | | - | AWGN | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | | |

A.17.3.2.3.1.3 Test Requirements

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

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

Tconnection\_release\_redirect\_NR = TRRC\_procedure\_delay + Tidentify-NR + TSI-NR + TRACH,

where:

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

Tidentify-NR = 1760 ms in the test.

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

TRACH = 10 ms in the test.

This gives a total of 3160 ms.

## A.17.4 Timing

### A.17.4.1 UE transmit timing

#### A.17.4.1.1 NR UE Transmit Timing Test for FR2

### A.17.4.2 UE timer accuracy

### A.17.4.3 Timing advance

#### A.17.4.3.1 SA FR2 timing advance adjustment accuracy

## A.17.5 Signaling characteristics for RedCap

### A.17.5.1 Radio link Monitoring for RedCap

#### A.17.5.1.1 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

##### A.17.5.1.1 .1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1B.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.17.5.1.1 .1-1. The test parameters are given in Tables A.17.5.1.1 .1-2, A.17.5.1.1 .1-3, and A.17.5.1.1 .1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.17.5.1.1 .1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.17.5.1.1 .1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In addition to RLM-RS radio link monitoring using SSB index 0 and SSB index 1, the UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.17.5.1.1 .1-1: Supported test configurations for FR2 PCell

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

Table A.17.5.1.1 .1-2: General test parameters for FR2 out-of-sync testing in non-DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 |  | 100: NRB,c = 66 |
| Data RBs allocated | | Config 1 |  | 24 |
| DL initial BWP configuration | | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.3.4 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 120 KHz |
| PRACH Configuration | | Config 1 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1 |  | 0,1 |
| OCNG parameters | | |  | OP.5 |
| CP length | | |  | Normal |
| Out of sync transmission parameters | DCI format | |  | 1-0 |
| Number of Control OFDM symbols | |  | 2 |
| Aggregation level | | CCE | 8 |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
| DMRS precoder granularity | |  | REG bundle size |
| REG bundle size | |  | 6 |
| DRX | | |  | *OFF* |
| Gap pattern ID | | |  | *gp0* |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | *0* |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1 |  | CSI-RS.3.1 TDD |
| reportConfigType | | |  | periodic |
| reportQuantity | | |  | cri-RI-PMI-CQI |
| CSI reporting periodicity | | | slot | 40 |
| CSI reporting offset | | | slot | 4 |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 9.68 |
| T3 | | | s | 9.68 |
| D1 | | | s | 9.64 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

Table A.17.5.1.1 .1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | |
|  | |  | T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | |
|  | |  | AoA1 | | | AoA2 | | |
| Assumption for UE beams Note 5 | |  | Rough | | | Rough | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | | Not sent | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | |  | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | |  | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | |  | | |
| EPRE ratio of PSS to SSS | | dB |  | | |  | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | |  | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |  | | |
| ssb-Index 0 SNR | Config 1 | dB | 2Note 6 | -6Note 6 | -15 |  | | |
| ssb-Index 1 SNR | Config 1 |  | Not sent | | | 2Note 6 | -15 | -15 |
|  | Config 1 | dBm/ 15kHz | -92.1 | | | -92.1 | | |
| Time multiplexing of the downlink transmissions from each AoA | |  | Defined in Figure A.17.5.1.1 .1-2 | | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | TDL-A 30ns 75Hz | | |
| Note 1: OCNG shall be used such a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | |

Table A.17.5.1.1 .1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

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

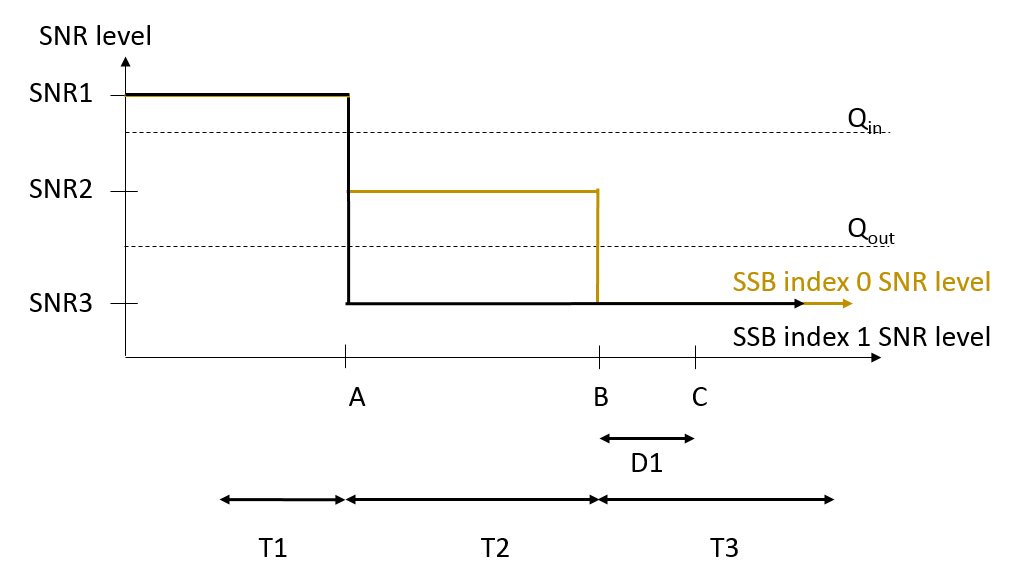


Figure A.17.5.1.1 .1-1: SNR variation for out-of-sync testing



Figure A.17.5.1.1 .1-2: Time multiplexed downlink transmissions

##### A.17.5.1.1 .2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

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

#### A.17.5.1.2 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

##### A.17.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.17.5.1.2.1-1.The test parameters are given in Tables A.17.5.1.2.1-2, and A.17.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.17.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.17.5.1.2.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.17.5.1.2.1-1: Supported test configurations for FR2 PCell

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

Table A.17.5.1.2.1-2: General test parameters for FR2 in-sync testing in non-DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 |  | 100: NRB,c = 66 |
| Data RBs allocated | | Config 1 |  | 24 |
| DL initial BWP configuration | | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.3.1 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1 |  | SMTC.3 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 120 KHz |
| PRACH Configuration | | Config 1 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1 |  | 0,1 |
| OCNG parameters | | |  | OP.5 |
| CP length | | |  | Normal |
| In sync transmission parameters | DCI format | |  | 1-0 |
| Number of Control OFDM symbols | |  | 2 |
| Aggregation level | | CCE | 4 |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 0 |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 0 |
| DMRS precoder granularity | |  | REG bundle size |
| REG bundle size | |  | 6 |
| Out of sync transmission parameters | DCI format | |  | 1-0 |
| Number of Control OFDM symbols | |  | 2 |
| Aggregation level | | CCE | 8 |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
| DMRS precoder granularity | |  | REG bundle size |
| REG bundle size | |  | 6 |
| DRX | | |  | *OFF* |
| Gap pattern ID | | |  | N.A. |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | 4000 |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1 |  | CSI-RS.3.1 TDD |
| reportConfigType | | |  | periodic |
| reportQuantity | | |  | cri-RI-PMI-CQI |
| CSI reporting periodicity | | | slot | 40 |
| CSI reporting offset | | | slot | 4 |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.2 |
| T3 | | | s | 1.88 |
| T4 | | | s | 0.2 |
| T5 | | | s | 3.84 |
| D1 | | | s | 3.8 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

Table A.17.5.1.2.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | | | | | |
|  | |  | **AoA1** | | | | | **AoA2** | | | | |
| Assumption for UE beams Note 5 | |  | Rough | | | | | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | | Not sent | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | | | |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | | | |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |  | | | | |
| ssb-Index 0 SNR | Config 1 | dB | 2Note 6 | -6Note 6 | -15 | -4.5 | 2Note 6 |  | | | | |
| ssb-Index 1 SNR | Config 1 |  | Not sent | | | | | 2Note 6 | -15 | -15 | -15 | -15 |
|  | Config 1 | dBm/ 15kHz | -92.1 | | | | | -92.1 | | | | |
| Time multiplexing of the downlink transmissions from each AoA | |  | Defined in Figure A.17.5.1.2.1-2 | | | | | | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | | | | | |

Table A.17.5.1.2.1-4: Void

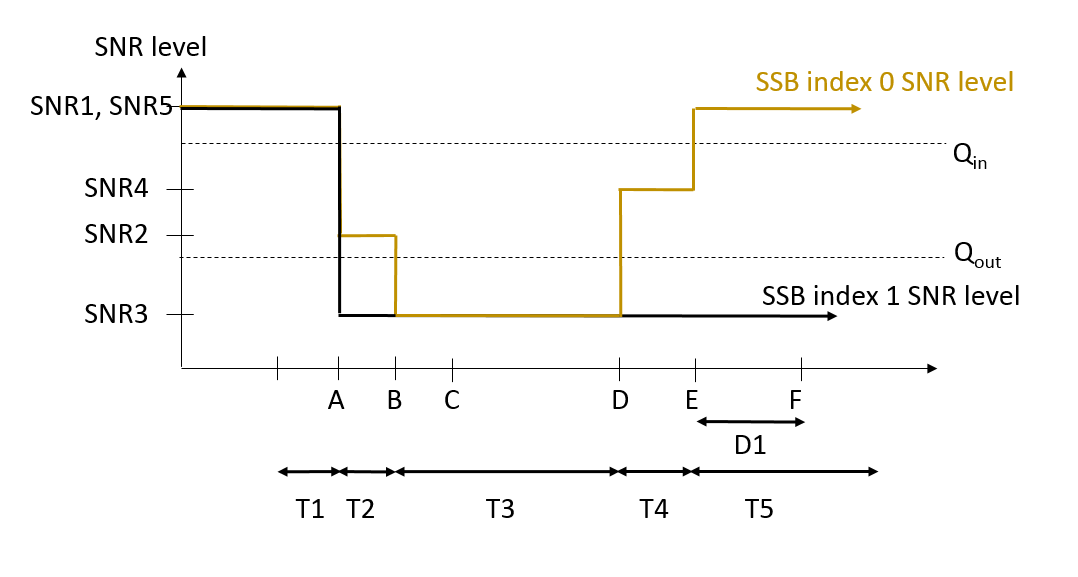


Figure A.17.5.1.2.1-1: SNR variation for in-sync testing



Figure A.17.5.1.2.1-2: Time multiplexed downlink transmissions

##### A.17.5.1.2.2 Test Requirements

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

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

#### A.17.5.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

#### A.17.5.1.4 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

##### A.17.5.1.4.1 Test Purpose and Environment

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

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.17.5.1.4.1-1. The test parameters are given in Tables A.17.5.1.4.1-2, and A.17.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.17.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.17.5.1.4.1-1: Supported test configurations for FR2 PCell

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

Table A.17.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 |  | 100: NRB,c = 66 |
| Data RBs allocated | | Config 1 |  | 66 |
| DL initial BWP configuration | | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.3.1 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1 |  | SMTC.3 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 120 KHz |
| PRACH Configuration | | Config 1 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1 |  | 0,1 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| In sync transmission parameters | DCI format | |  | 1-0 |
| Number of Control OFDM symbols | |  | 2 |
| Aggregation level | | CCE | 4 |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 0 |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 0 |
| DMRS precoder granularity | |  | REG bundle size |
| REG bundle size | |  | 6 |
| Out of sync transmission parameters | DCI format | |  | 1-0 |
| Number of Control OFDM symbols | |  | 2 |
| Aggregation level | | CCE | 8 |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
| DMRS precoder granularity | |  | REG bundle size |
| REG bundle size | |  | 6 |
| DRX Configuration | | |  | DRX.11 |
| Gap pattern ID | | |  | N.A. |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | 4000 |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1 |  | CSI-RS.3.1 TDD |
| reportConfigType | | |  | periodic |
| reportQuantity | | |  | cri-RI-PMI-CQI |
| CSI reporting periodicity | | | slot | 40 |
| CSI reporting offset | | | slot | 4 |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.2 |
| T3 | | | s | 2.8 |
| T4 | | | s | 0.2 |
| T5 | | | s | 3.88 |
| D1 | | | s | 3.84 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

Table A.17.5.1.4.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring test in DRX mode

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

Table A.17.5.1.4.1-4: Void

Table A.17.5.1.4.1-5: Void

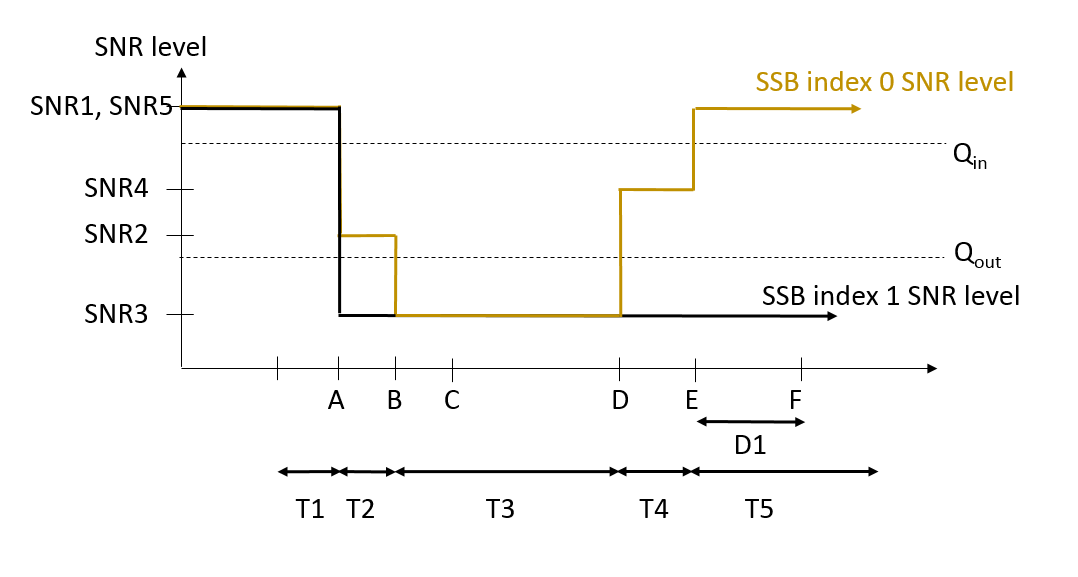


Figure A.17.5.1.4.1-1: SNR variation for in-sync testing

##### A.17.5.1.4.2 Test Requirements

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

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

#### A.17.5.1.5 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

#### A.17.5.1.6 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

#### A.17.5.1.7 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

#### A.17.5.1.8 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

#### A.17.5.1.9 UE Radio Link Monitoring Scheduling Restrictions on FR2

### A.17.5.2 Beam Failure Detection and Link recovery procedures

#### A.17.5.2.1 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

#### A.17.5.2.2 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in DRX mode

#### A.17.5.2.3 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

#### A.17.5.2.4 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in DRX mode

#### A.17.5.2.5 Scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

### A.17.5.3 Active BWP switch for RedCap

#### A.17.5.3.1 DCI-based and Timer-based Active BWP Switch

##### A.17.5.3.1.1 NR FR2 DL active BWP switch with non-DRX in SA

#### A.17.5.3.2 RRC-based Active BWP Switch

##### A.17.5.3.2.1 NR FR2 DL active BWP switch of PCell with non-DRX in SA

### A.17.5.4 Active TCI state switch delay

#### A.17.5.4.1 MAC-CE based active TCI state switch

##### A.17.5.4.1.1 NR PCell FR2 active TCI state switch for a known TCI state

#### A.17.5.4.2 RRC based active TCI state switch

##### A.17.5.4.2.1 NR PCell FR2 active TCI state switch for a known TCI state

### A.17.5.5 Uplink spatial relation switch delay

#### A.17.5.5.1 MAC-CE based Spatial Relation switch

##### A.17.5.5.1.1 NR PCell FR2 spatial relation associated with known DL-RS

#### A.17.5.5.2 RRC based spatial relation switch

##### A.17.5.5.2.1 NR PCell FR2 spatial relation switch associated with a known DL-RS

### A.17.5.6 UE specific CBW change

#### A.17.5.5.1 NR FR2 UE specific CBW change of PCell with non-DRX in SA

## A.17.6 Measurement procedure for RedCap

### A.17.6.1 Intra-frequency Measurements

A.17.6.1.1 SA event triggered reporting test without gap under non-DRX

A.17.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements for RedCap in clause 9.2B.5.1 and 9.2B.5.2. Supported test configurations are shown in table A.17.6.1.1.1-1.

**Table A.17.6.1.1.1-1: supported test configurations**

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

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.17.6.1.1.1-2, A.17.6.1.1.1-3 and A.17.6.1.1.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

**Table A.17.6.1.1.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX for RedCap**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Value** | **Comment** |
| Active cell |  | 1, 2 | PCell (Cell 1) |  |
| Neighbour cell |  | 1, 2 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1, 2 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| SMTC configuration |  | 1, 2 | SMTC.1 |  |
| A3-Offset | dB | 1, 2 | -11 |  |
| CP length |  | 1, 2 | Normal |  |
| Hysteresis | dB | 1, 2 | 0 |  |
| Time To Trigger | s | 1, 2 | 0 |  |
| Filter coefficient |  | 1, 2 | 0 | L3 filtering is not used |
| DRX |  | 1, 2 | OFF |  |
| Time offset between Cell 1 and Cell 2 |  | 1, 2 | 3 μs | Synchronous cells |
| T1 | s | 1, 2 | 5 |  |
| T2 | s | 1, 2 | 5 |  |

**Table A.17.6.1.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX for RedCap**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 1** | | **Cell 2** | |
|  |  |  | **T1** | **T2** | **T1** | **T2** |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1 | 24 | | 24 | |
| 2 | 48 | | 48 | |
| Intial BWP configuration |  | 1, 2 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2 | SSB | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| 2 | SR.3.3 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| 2 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| 2 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1, 2 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1, 2 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 120 | | 120 | |
| OCNG Patterns |  | 1, 2 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1~2 | N/A | | 16 | |
| SSB |  | 1 | SSB.1 FR2 | | SSB.7 FR2 | |
|  |  | 2 | SSB.2 FR2 | | SSB.8 FR2 | |
| Propagation Condition |  | 1, 2 | AWGN | | AWGN | |

**Table A.17.6.1.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX for RedCap**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 1** | | **Cell 2** | | |
|  |  |  | **T1** | **T2** | **T1** | | **T2** |
| AoA setup |  | 1, 2 | Setup 3 defined in A.3.15.3 | | | | |
|  |  |  | AoA1 | | AoA2 | | |
| Beam assumptionNote 4 |  | 1,2 | Rough | | Rough | | |
| Es | dBm/SCS | 1 | -89 | -89 | | -Infinity | -89 |
|  |  | 2 | -86 | -86 | | -Infinity | -86 |
| BB Note 5 | dB | 1, 2 | -0.12 | -0.12 | | -Infinity | -0.12 |
| SSB\_RP | dBm/SCS | 1 | -89 | -89 | -Infinity | | -89 |
|  |  | 2 | -86 | -86 | -Infinity | | -86 |
|  | dBm/95.04MHz | 1 | -64.41 | -64.41 | -Infinity | | -64.41 |
| 2 | -61.41 | -61.41 | -Infinity | | -61.41 |
| Time multiplexing of the downlink transmissions from each AoA | | 1, 2 | Defined in Figure A.17.6.1.1.1-1 | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Void  Note 3: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 5: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |

****

**Figure A.17.6.1.1.1-1: Time multiplexed downlink transmissions (Config 1 example)**

A.17.6.1.1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,

- 1.44s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

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

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

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

#### A.17.6.1.2 SA event triggered reporting test without gap under DRX

#### A.17.6.1.3 SA event triggered reporting test with per-UE gaps under non-DRX

#### A.17.6.1.4 SA event triggered reporting test with per-UE gaps under DRX

### A.17.6.2 Inter-frequency Measurements

#### A.17.6.2.1 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is not used (PCell in FR2)

#### A.17.6.2.2 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is used (PCell in FR2)

#### A.17.6.2.3 SA event triggered reporting tests For FR2 with SSB time index detection when DRX is not used (PCell in FR2)

#### A.17.6.2.4 SA event triggered reporting tests For FR2 with SSB time index detection when DRX is used (PCell in FR2)

### A.17.6.3 L1-RSRP measurement for beam reporting

#### A.17.6.3.1 SSB based L1-RSRP measurement when DRX is not used

#### A.17.6.3.2 SSB based L1-RSRP measurement when DRX is used

#### A.17.6.3.3 CSI-RS based L1-RSRP measurement when DRX is not used

#### A.17.6.3.4 CSI-RS based L1-RSRP measurement when DRX is used

A.17.6.4 NR Measurements with autonomous gaps

#### A.17.6.4.1 SA interfrequency CGI reporting in autonomous gaps test (PCell in FR2)

## A.17.7 Measurement Performance requirements

### A.17.7.1 SS-RSRP

#### A.17.7.1.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

##### A.17.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy for RedCap UE is within the specified limits. This test will verify the requirements in clauses 10.1.3A.3 for intra-frequency measurements.

##### A.17.7.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.17.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table A.17.7.1.1.2-2 and A.17.7.1.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1. The test consists of two time phases T1 and T2.

Table A.17.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

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

Table A.17.7.1.1.2-2: SS-RSRP Intra frequency general test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | T1 | | T2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Cell ID |  | 489 | 0 | 489 | 0 |
| SSB ARFCN |  | freq1 | | freq1 | |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 24 | | 24 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | - | DLBWP.1.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - | ULBWP.1.1 | - |
| DRX cycle configuration |  | Not applicable | - | Not applicable | - |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3. 2TDD | - | SR.3. 2 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Reference channel |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 | OP.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS |  |  |  |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS |  |  |  |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |
| Propagation conditions |  | AWGN | AWGN | AWGN | AWGN |
| Antenna configuration |  | 1x2 | 1x2 | 1x2 | 1x2 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void  Note 5: Void | | | | | |

Table A.17.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

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

##### A.17.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1A.3.1.1 and relative accuracy requirements in clause 10.1A.3.1.2. The following requirements are to be verified:

During T1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.17.7.1.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1A.3.1.2-1.

During T2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.17.7.1.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1A.3.1.2-1.

During T1 and T2:

Relative accuracy of Cell 1 during T2 compared with Cell 1 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1A.3.1.2-1

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1A.3.1.2-1.

Table A.17.7.1.1.3-1: SS-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | SSB\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ SSB\_RP1 +δ +Gmax |
| Cell 2 | SSB\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ SSB\_RP2 +δ +Gmax |
| Note 1: SSB\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.3.1.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class | |

#### A.17.7.1.2 SA inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

### A.17.7.2 SS-RSRQ

#### A.17.7.2.1 SA intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell

#### A.17.7.2.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

#### A.17.7.2.3 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

### A.17.7.3 L1-RSRP measurement for beam reporting

#### A.17.7.3.1 SSB based L1-RSRP measurement

#### A.17.7.3.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

**--- End of change 6 ---**

**--- Start of change 7 ---**

# A.18 E-UTRA standalone tests for NR RRM for RedCap

## A.18.1 RRC\_IDLE state mobility

### A.18.1.1 Inter-RAT NR Cell re-selection

#### A.18.1.1.1 E-UTRA Cell reselection to higher priority NR target Cell in FR1

##### A.18.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN to NR inter-RAT cell reselection requirements specified in clause 4.2.2.5.8 in TS 36.133 [15].

The test scenario comprises of 1 E-UTRA cell and 1 NR cell as given in tables A.18.2.1.1.1-1, A.18.2.1.1.1-2, A.18.2.1.1.1-3 and A.18.2.1.1.1-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. E-UTRA cell 1 is already identified by the UE prior to the start of the test. Cell 2 is of higher priority than cell 1.

Table A.18.2.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | 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 |
| 7 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| 8 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

**Table A.18.2.1.1.1-2: General test parameters for E-UTRA cell re-selection FR1 NR cell test case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Value** | **Comment** |
| Initial condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 | The UE camps on cell 2 in the initial phase |
| Neighbour cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 |
| T1 end condition | Active cell |  |  | Cell1 | During T1 period the UE reselects to cell 1 |
|  | Neighbour cell |  |  | Cell2 |  |
| T3 end condition | Active cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell2 | The UE shall perform reselection to cell 2 during T3 |
| Neighbour cell |  | 1, 2, 3, 4, 5, 6, 7, 8 | Cell1 |
| RF Channel Number | |  | 1, 2, 3, 4, 5, 6, 7, 8 | 1, 2 | E-UTRAN radio channel (1) and NR radio channel (2) are used for this test |
| Time offset between cells | |  | 1, 4, 7, 8 | 3 ms | Asynchronous cells |
| 2, 5 | 3 μs | Synchronous cells |
| 3, 6 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3, 4, 5, 6, 7, 8 | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 1.28 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2, 3, 4, 5, 6, 7, 8 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| T1 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 15 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 1, 2, 3, 4, 5, 6, 7, 8 | 75 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.18.2.1.1.1-3: Cell specific test parameters for NR cell 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | | |
| T1 | T2 | T3 |
| TDD configuration |  | 1, 4, 7, 8 | N/A | | |
| 2, 5 | TDDConf.1.1 | | |
| 3, 6 | TDDConf.2.1 | | |
| PDSCH Reference measurement channel |  | 1, 4, 7, 8 | SR.1.1 FDD | | |
| 2, 5 | SR.1.1 TDD | | |
| 3, 6 | SR.2.1 TDD | | |
| RMSI CORESET Reference Channel |  | 1, 4, 7, 8 | CR.1.1 FDD | | |
| 2, 5 | CR.1.1 TDD | | |
| 3, 6 | CR.2.1 TDD | | |
| RMC CORESET Reference Channel |  | 1, 4, 7, 8 | CCR.1.1 FDD | | |
| 2, 5 | CCR.1.1 TDD | | |
| 3, 6 | CCR.2.1 TDD | | |
| OCNG Patterns |  | 1, 2, 3, 4, 5, 6, 7, 8 | OP.1 | | |
| SMTC configuration |  | 1, 2, 3, 4, 5, 6, 7, 8 | SMTC.1 | | |
| SSB configuration |  | 1, 4 | SSB.1 FR1 | | |
| 2, 5 | SSB.1 FR1 | | |
| 3, 6 | SSB.1 RedCap FR1 | | |
| Initial DL BWP configuration |  | 1, 2, 3, 4, 5, 6, 7, 8 | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3, 4, 5, 6, 7, 8 | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6 | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2, 4, 5 | -140 | | |
| 3, 6 | -137 | | |
| Pcompensation | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 0 | | |
| Qhysts | dB | 1, 2, 3, 4, 5, 6 | 0 | | |
| Qoffsets, n | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3, 4, 5, 6, 7, 8 | SS-RSRP | | |
|  | dB | 1, 4, 7, 8 | -4 | -infinity | 12 |
| 2, 5 |
| 3, 6 |
| Note2 | dBm/SCS | 1, 4, 7, 8 | -98 | | |
| 2, 5 | -98 | | |
| 3, 6 | -95 | | |
| Note2 | dBm/15 kHz | 1, 4, 7, 8 | -98 | | |
| 2, 5 |
| 3, 6 |
|  | dB | 1, 4, 7, 8 | -4 | -infinity | 12 |
| 2, 5 |
| 3, 6 |
| SS-RSRP Note3 | dBm/SCS | 1, 4, 7, 8 | -102 | -infinity | -86 |
| 2, 5 | -102 | -infinity | -86 |
| 3, 6 | -99 | -infinity | -83 |
| Io | dBm/9.36 MHz | 1, 4, 7, 8 | -68.60 | -70.05 | -57.78 |
| dBm/9.36 MHz | 2, 5 | -68.60 | -70.05 | -57.78 |
| dBm/38.16 MHz | 3, 6 | -62.50 | -63.95 | -51.69 |
| Treselection | s | 1, 2, 3, 4, 5, 6, 7, 8 | 0 | 0 | 0 |
| SnonintrasearchP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 50 | | |
| Threshx, highP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 48 | | |
| Threshserving, lowP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 44 | | |
| Threshx, lowP | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 50 | | |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6, 7, 8 | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

**Table A.18.2.1.1.1-4: Cell specific test parameters for E-UTRA cell 1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | |
| **T1** | **T2** | **T3** |
| E-UTRA RF Channel number |  | 1 | | |
| BWchannel | MHz | 10 | | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | | |
| PBCH\_RA | dB | 0 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | |
| Note 2 | dBm/15 kHz | -98 | | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 |
|  | dB | 14 | 14 | 14 |
|  | dB | 14 | 14 | 14 |
| TreselectionEUTRAN | S | 0 | | |
| SnonintrasearchP | dB | 50 | | |
| Threshx, highP | dB | 48 | | |
| Threshserving, lowP | dB | 44 | | |
| Threshx, lowP | dB | 50 | | |
| Propagation Condition |  | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

##### A.18.2.1.1.2 Test Requirements

The cell reselection delay to a higher priority NR cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2 and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a registration procedure for mobility and periodic registration update on cell 2.

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

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

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

Where:

Thigher\_priority\_search See clause 4.2.2 in TS 36.133 [15]

Tevaluate, NR See Table 4.2.2.5.6-1 in clause 4.2.2.5.6 in TS 36.133 [15]

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

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

## A.18.2 RRC\_CONNECTED state mobility

### A.18.2.1 Handover

#### A.18.2.1.1 E-UTRAN - NR handover in FR1

##### A.18.2.1.1.1 Test Purpose and Environment

This test shall verify the E-UTRAN to NR FR1 handover requirements for 2RX RedCap as specified in clause 5.3.4B in TS 36.133 [15].

The test comprises of one E-UTRA carrier and one NR carrier. There are two cells and one cell on each carrier. Cell 1 is the E-UTRAN and Cell 2 is an inter-RAT NR neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 of TS 36.133 [15] is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.18.2.1.1-1. General test parameters are provided in Table A.18.2.1.1-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.18.2.1.1-3 and A.18.2.1.1-4 respectively.

Table A.18.2.1.1-1: Supported test configurations for E-UTRAN inter-RAT NR handover

|  |  |
| --- | --- |
| Configuration | 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, 20 MHz bandwidth, TDD duplex mode |
| 4 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 6 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 7 | LTE TDD, NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 8 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.18.2.1.1-2: General test parameters for E-UTRAN inter-RAT NR handover

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | 1 NR carrier frequency is used in the test |
| LTE RF Channel Number | |  | 2 | 1 E-UTRAN carrier frequency is used in the test |
| Initial conditions | Active cell |  | Cell 1 | E-UTRAN cell |
|  | Neighbouring cell |  | Cell 2 | NR cell |
| Final condition | Active cell |  | Cell 2 |  |
| NR measurement quantity | |  | SS-RSRP |  |
| E-UTRAN measurement quantity | |  | RSRP |  |
| b2-Threshold1 | | dBm | -83 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2NR | | dBm | As specified in Table A.18.2.1.1-4 | Absolute NR SS-RSRP threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | |  | 0 | As specified in Table 8.1.2.1-1 started before T2 starts [15] |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.18.2.1.1-3: Cell specific test parameters for E-UTRAN inter-RAT NR handover (Cell 1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | | |
|  |  |  | T1 | T2 | T3 |
| RF channel number |  | 1, 2, 3, 4, 5, 6,7,8 | 2 | | |
| Duplex mode |  | 1, 2, 3,4 | FDD | | |
|  |  | 5, 6,7, 8 | TDD | | |
| TDD special subframe configurationNote1 |  | 5, 6,7, 8 | 6 | | |
| TDD uplink-downlink configurationNote1 |  | 5, 6,7, 8 | 1 | | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6, 7, 8 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | | |
| PRACH ConfigurationNote2 |  | 1, 2, 3,4 | 4 | | |
|  |  | 5, 6,7, 8 | 53 | | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3,4 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | | |
|  |  | 5, 6,7, 8 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3,4 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | | |
|  |  | 5, 6,7, 8 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | | |
| OCNG PatternsNote3 |  | 1, 2, 3,4 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | | |
|  |  | 5, 6,7, 8 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 0 | | |
| PBCH\_RB |  |  |  | | |
| PSS\_RA |  |  |  | | |
| SSS\_RA |  |  |  | | |
| PCFICH\_RB |  |  |  | | |
| PHICH\_RA |  |  |  | | |
| PHICH\_RB |  |  |  | | |
| PDCCH\_RA |  |  |  | | |
| PDCCH\_RB |  |  |  | | |
| PDSCH\_RA |  |  |  | | |
| PDSCH\_RB |  |  |  | | |
| OCNG\_RANote4 |  |  |  | | |
| OCNG\_RBNote4 |  |  |  | | |
| NocNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6, 7, 8 | -98 | | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 7 | 7 | 7 |
| Ês/IotNote6 | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 7 | 7 | 7 |
| RSRPNote6 | dBm/15kHz | 1, 2, 3, 4, 5, 6, 7, 8 | -91 | -91 | -91 |
| SCH\_RPNote6 | dBm/15kHz | 1, 2, 3, 4, 5, 6, 7, 8 | -91 | -91 | -91 |
| IoNote6 | dBm/9MHz | 1, 2, 3, 4, 5, 6, 7, 8 | -62.43 | -62.43 | -62.43 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6, 7, 8 | AWGN | | |
| Antenna Configuration and Correlation Matrix Note7 |  | 1, 2, 3, 4, 5, 6, 7, 8 | 1x2 | | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].  Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 6: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | | |

Table A.18.2.1.1-4: Cell specific test parameters E-UTRAN inter-RAT NR handover (Cell 2)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Configuration | Cell 2 | | |
|  | |  |  | T1 | T2 | T3 |
| RF channel number | |  | 1, 2, 3, 4, 5, 6, 7, 8 | 1 | | |
| Duplex mode | |  | 1, 5 | FDD | | |
|  | 2, 3, 6, 7 | TDD | | |
|  | 4,8 | HD-FDD | | |
| TDD Configuration | |  | 2, 6 | TDDConf.1.1 | | |
|  | |  | 3, 7 | TDDConf.2.1 | | |
| BWchannel | | MHz | 1, 4,5,8 | 10: NRB,c = 52 (FDD) | | |
|  | |  | 2, 6 | 10: NRB,c = 52 (TDD) | | |
|  | |  | 3, 7 | 20: NRB,c = 51 (TDD) | | |
| PDSCH reference measurement channel | |  | 1, 4,5,8 | SR.1.1 FDD | | |
|  | |  | 2, 6 | SR.1.1 TDD | | |
|  | |  | 3, 7 | SR.2.1 TDD | | |
| CORSET reference channel | |  | 1, 4,5,8 | CR.1.1 FDD | | |
|  | |  | 2, 6 | CR.1.1 TDD | | |
|  | |  | 3, 7 | CR.2.1 TDD | | |
| PRACH configuration | |  |  | FR1 PRACH configuration 1 | | |
| OCNG patternNote1 | |  | 1, 2, 3, 4, 5, 6, 7, 8 | OP.1 | | |
| BWP | Initial DL BWP |  | 1, 2, 3, 4, 5, 6, 7, 8 | DLBWP.0.1 | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | |
| SMTC configuration | |  | 1, 2, 3, 4, 5, 6, 7, 8 | SMTC.1 RedCap | | |
| SSB configuration | |  | 1, 2, 4, 5 | SSB.1 RedCap FR1 | | |
|  | |  | 3, 6 | SSB.2 RedCap FR1 | | |
| b2-Threshold2NR | | dBm | 1, 2, 4, 5 | -106 | | |
|  | |  | 3, 6 | -103 | | |
| EPRE ratio of PSS to SSS | | dB | 1, 2, 3, 4, 5, 6, 7, 8 | 0 | | |
| EPRE ratio of PBCH\_DMRS to SSS | |  |  |  | | |
| EPRE ratio of PBCH to PBCH\_DMRS | |  |  |  | | |
| EPRE ratio of PDCCH\_DMRS to SSS | |  |  |  | | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |  |  |  | | |
| EPRE ratio of PDSCH\_DMRS to SSS | |  |  |  | | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |  |  |  | | |
| EPRE ratio of OCNG DMRS to SSS | |  |  |  | | |
| EPRE ratio of OCNG to OCNG DMRS | |  |  |  | | |
| *Noc*Note2 | | dBm/15 KHz | 1, 2, 3, 4, 5, 6, 7, 8 | -98 | | |
| *Noc*Note2 | | dBm/SCS | 1, 2, 4, 5 | -98 | | |
|  | |  | 3, 6 | -95 | | |
| Ês/Noc | | dB | 1, 2, 3, 4, 5, 6, 7, 8 | -inifinity | 0 | 0 |
| Ês/IotNote3 | | dB | 1, 2, 3, 4, 5, 6, 7, 8 | -inifinity | 0 | 0 |
| SS-RSRPNote3 | | dBm/SCS | 1, 2, 4, 5, 6,8 | -inifinity | -98 | -98 |
|  | | 3, 7 | -inifinity | -95 | -95 |
| IoNote3 | | dBm/9.36 MHz | 1, 2, 4, 5, 6,8 | -70.05 | -67.04 | -67.04 |
|  | | dBm/18.36 MHz | 3, 7 | -67.13 | -60.94 | -64.12 |
| Propagation condition | |  | 1, 2, 3, 4, 5, 6, 7, 8 | AWGN | | |
| Antenna Configuration and Correlation Matrix | |  | 1, 2, 3, 4, 5, 6, 7, 8 | 1x2 Low | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for *Noc* to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.18.2.1.1.2 Test Requirements

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

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

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

RRC procedure delay = 50 ms and is specified in TS36.133.

Tinterrupt = 62 ms in the test; Tinterrupt is defined in TS36.133 clause 5.3.4.3.

This gives a total of 112 ms.

### A.18.2.2 RRC connection release with redirection

#### A.18.2.2.1 Redirection from E-UTRA to NR FR1 for redcap UE

##### A.18.2.2.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from E-UTRA to NR requirements specified in clause 6.3.2.4.

##### A.18.2.2.1.2 Test Parameters

Supported test configurations are shown in table A.18.2.2.2-1. The time delay is tested by using the parameters in table A.18.2.2.2-2, and A.18.2.2.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.18.2.2.2-1: Redirection from E-UTRAN to NR test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD |
| 3 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE FDD |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode, LTE TDD |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD |
| 6 | NR 30kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode, LTE TDD |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.18.2.2.2-2: General test parameters for Redirection from E-UTRAN to NR test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 | E-UTRAN cell |
|  | Neighbouring cell |  | Cell 2 | NR cell |
| Final condition | Active cell |  | Cell 2 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | 2.3 |  |

Table A.18.2.2.2-3: Cell specific test parameters for Redirection from E-UTRAN to NR test case (cell 1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | |
|  |  |  | T1 | T2 |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 2 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
|  |  | 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PRACH ConfigurationNote2 |  | 1, 2, 3 | 4 | |
|  | 4, 5, 6 | 53 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  | 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  | 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote3 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  | 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote4 |  |  |  | |
| OCNG\_RBNote4 |  |  |  | |
| NocNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 4 |
| Ês/IotNote6 | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 4 |
| RSRPNote6 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -94 |
| SCH\_RPNote6 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -94 |
| IoNote6 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -70.22 | -64.76 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].  Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 6: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | |

Table A.18.2.2.2-4: Cell specific test parameters for Redirection from E-UTRAN to NR test case (cell 2)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 | | |
|  | | |  | T1 | | T2 |
| RF Channel Number | | |  | 1 | | |
| Duplex mode | | Config 1,4 |  | FDD | | |
|  | | Config 2,3,5,6 |  | TDD | | |
| SSB Configuration | | Config 1,2,4,5 |  | SSB.1 FR1 | | |
| Config 3,6 |  | SSB.1 RedCap FR1 | | |
| 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 |  | 20: NRB,c = 51 | | |
| BWP BW | | Config 1,4 | MHz | 10: NRB,c = 52 | | |
|  | | Config 2,5 |  | 10: NRB,c = 52 | | |
|  | | Config 3,6 |  | 20: NRB,c = 51 | | |
| DRx Cycle | | | ms | Not Applicable | | |
| PDSCH Reference measurement channel | | Config 1,4 |  | SR.1.1 FDD | | |
|  | | Config 2,5 |  | SR.1.1 TDD | | |
|  | | Config 3,6 |  | SR2.1 TDD | | |
| CORESET Reference Channel | | Config 1,4 |  | CR.1.1 FDD | | |
|  | | Config 2,5 |  | CR.1.1 TDD | | |
|  | | Config 3,6 |  | CR2.1 TDD | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | |
| SMTC configuration | | Config 1,2,4,5 |  | SMTC.1 RedCap FR1 | | |
|  | | Config 3,6 |  | SMTC.1 RedCap FR1 | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2,4,5 | kHz | 15 kHz | | |
|  | | Config 3,6 |  | 30 kHz | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2,4,5 | kHz | 15 kHz | | |
|  | | Config 3,6 |  | 30 kHz | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | |  |  | | |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  | | |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  | | |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  | | |
| EPRE ratio of PDSCH to PDSCH | | |  |  | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  | | |
| Note2 | | | dBm/15kHz | -98 | | |
| Note2 | Config 1,2,4,5 | | dBm/SCS | -98 | | |
|  | Config 3,6 | |  | -95 | | |
|  | | | dB | 4 | 4 | |
|  | | | dB | 4 | 4 | |
| IoNote3 | Config 1,2,4,5 | | dBm/  9.36MHz | -64.59 | -64.59 | |
|  | Config 3,6 | | dBm/  38.16MHz | -58.49 | -58.49 | |
| 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. | | | | | | |

##### A.18.2.2.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 2240 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

Tconnection\_release\_redirect\_NR = TRRC\_procedure\_delay + Tidentify-NR + TSI-NR + TRACH,

where:

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

Tidentify-NR = 680 ms regardless RedCap UE is capable of 2 Rx or only supports 1 Rx antenna.

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

TRACH = 170 ms in the test.

This gives a total of 2240 ms.

## A.18.3 Measurement procedure

### A.18.3.1 E-UTRA – NR Inter-RAT Measurements

#### A.18.3.1.1 NR Inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

#### A.18.3.1.2 NR Inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is used

#### A.18.3.1.3 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

#### A.18.3.1.4 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

#### A.18.3.1.5 NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when DRX is not used

#### A.18.3.1.6 NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when DRX is used

#### A.18.3.1.7 NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DRX is not used

#### A.18.3.1.8 NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DRX is used

**--- End of change 7 ---**

**--- Start of change 8 ---**

## 10.1A NR measurements for RedCap

### 10.1A.1 Introduction

The requirements in this section are applicable for RedCap UE as follows:

- intra-frequency requirements apply for PCell measurements in SA,

- inter-frequency requirements apply for non-serving cell measurements on NR carrier frequencies.

- inter-frequency requirements apply for measurements from one cell on a frequency compared to the measurement from another cell on a different frequency.

The accuracy requirements in this clause are applicable for AWGN radio propagation conditions. The accuracy requirements of RSRP, RSRQ amd SINR are applicable provided that reference SSB is not changed during measurement period.

### 10.1A.2 Intra-frequency RSRP accuracy requirements for FR1

#### 10.1A.2.1 Intra-frequency SS-RSRP accuracy requirements

##### 10.1A.2.1.1 Absolute SS-RSRP Accuracy

The accuracy requirements in clause 10.1.2.1.1 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.2.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

Table 10.1A.2.1.1-1: SS-RSRP Intra frequency absolute accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -70 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -70 |
| ±5.5 | ±10 | ≥-6 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -70 |
| ±9 | ±12 | ≥-6 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A,  NR\_FDD\_FR1\_B, NR\_TDD\_FR1\_C, NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D, NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E, NR\_FDD\_FR1\_F,  NR\_FDD\_FR1\_G, NR\_FDD\_FR1\_H | N/A | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

##### 10.1A.2.1.2 Relative SS-RSRP Accuracy

The accuracy requirements in clause 10.1.2.1.2 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.2.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

Table 10.1A.2.1.2-1: SS-RSRP Intra frequency relative accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±3 | ±4 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±4 | ±4 | ≥-6 | Note 3 | Note 3 | Note 3 | N/A | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

### 10.1A.3 Intra-frequency RSRP accuracy requirements for FR2

#### 10.1A.3.1 Intra-frequency SS-RSRP accuracy requirements

##### 10.1A.3.1.1 Absolute SS-RSRP Accuracy

The accuracy requirements in clause 10.1.3.1.1 shall apply.

##### 10.1A.3.1.2 Relative SS-RSRP Accuracy

The accuracy requirements in clause 10.1.3.1.2 shall apply.

### 10.1A.4 Inter-frequency RSRP accuracy requirements for FR1

#### 10.1A.4.1 Inter-frequency SS-RSRP accuracy requirements

##### 10.1A.4.1.1 Absolute Accuracy of SS-RSRP in FR1

The accuracy requirements in clause 10.1.4.1.1 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.4.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.

Table 10.1A.4.1.1-1: SS-RSRP Inter frequency Absolute accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -70 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -70 |
| ±5.5 | ±10 | ≥-6 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -70 |
| ±9 | ±12 | ≥-6 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A, NR\_FDD\_FR1\_B, NR\_TDD\_FR1\_C, NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D, NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E, NR\_FDD\_FR1\_F,  NR\_FDD\_FR1\_G, NR\_FDD\_FR1\_H | N/A | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: Void  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

##### 10.1A.4.1.2 Relative Accuracy of SS-RSRP in FR1

The accuracy requirements in clause 10.1.4.1.2 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.4.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] Clause 7.3 for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

- |Channel 1\_Io ‑Channel 2\_Io | ≤ 20 dB

Table 10.1A.4.1.2-1: SS-RSRP Inter frequency relative accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±5.5 | ±7 | ≥-6 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

### 10.1A.5 Inter-frequency RSRP accuracy requirements for FR2

#### 10.1A.5.1 Inter-frequency SS-RSRP accuracy requirements

##### 10.1A.5.1.1 Absolute SS-RSRP Accuracy

The accuracy requirements in clause 10.1.5.1.1 shall apply.

##### 10.1A.5.1.2 Relative SS-RSRP Accuracy

The accuracy requirements in clause 10.1.5.1.2 shall apply.

### 10.1A.6 Intra-frequency RSRQ accuracy requirements for FR1

#### 10.1A.6.1 Intra-frequency SS-RSRQ accuracy requirements in FR1

##### 10.1A.6.1.1 Absolute SS-RSRQ Accuracy in FR1

The accuracy requirements in clause 10.1.7.1.1 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.6.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

Table 10.1A.6.1.1-1: SS-RSRQ Intra frequency absolute accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±3.5 | ±5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±4.5 | ±5 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

### 10.1A.7 Intra-frequency RSRQ accuracy requirements for FR2

#### 10.1A.7.1 Intra-frequency SS-RSRQ accuracy requirements in FR2

##### 10.1A.7.1.1 Absolute SS-RSRQ Accuracy in FR2

The accuracy requirements in clause 10.1.8.1.1 shall apply.

### 10.1A.8 Inter-frequency RSRQ accuracy requirements for FR1

#### 10.1A.8.1 Inter-frequency SS-RSRQ accuracy requirements in FR1

##### 10.1A.8.1.1 Absolute Accuracy of SS-RSRQ in FR1

The accuracy requirements in clause 10.1.9.1.1 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.8.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.

Table 10.1A.8.1.1-1: SS-RSRQ Inter frequency absolute accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±3.5 | ±5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±4.5 | ±5 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

##### 10.1A.8.1.2 Relative Accuracy of SS-RSRQ in FR1

The accuracy requirements in clause 10.1.9.1.2 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.8.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

- |Channel 1\_Io ‑Channel 2\_Io | ≤ 20 dB

Table 10.1A.8.1.2-1: SS-RSRQ Inter frequency relative accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 2 | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±4 | ±5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±5 | ±5 | ≥-6 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

### 10.1A.9 Inter-frequency RSRQ accuracy requirements for FR2

#### 10.1A.9.1 Inter-frequency SS-RSRQ accuracy requirements in FR2

##### 10.1A.9.1.1 Absolute Accuracy of SS-RSRQ in FR2

The accuracy requirements in clause 10.1.10.1.1 shall apply.

##### 10.1A.9.1.2 Relative Accuracy of SS-RSRQ in FR2

The accuracy requirements in clause 10.1.10.1.2 shall apply.

### 10.1A.10 Intra-frequency SINR accuracy requirements for FR1

#### 10.1A.10.1 Intra-frequency SS-SINR accuracy requirements in FR1

##### 10.1A.10.1.1 Absolute SS-SINR Accuracy in FR1

The accuracy requirements in clause 10.1.12.1.1 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.10.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band.

Table 10.1A.10.1.1-1: SS-SINR Intra frequency absolute accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 3 | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±3.0 | ±4 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±3.5 | ±4 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: The requirements apply for SSB Ês/Iot ≤ 25 dB under non-HST scenarios.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: The requirements apply for SSB Ês/Iot ≤5 dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | |

### 10.1A.11 Intra-frequency SINR accuracy requirements for FR2

#### 10.1A.11.1 Intra-frequency SS-SINR accuracy requirements in FR2

##### 10.1A.11.1.1 Absolute SS-SINR Accuracy in FR2

The accuracy requirements in clause 10.1.13.1.1 shall apply.

### 10.1A.12 Inter-frequency SINR accuracy requirements for FR1

#### 10.1A.12.1 Inter-frequency SS-SINR accuracy requirements in FR1

##### 10.1A.12.1.1 Aboslute Accuracy of SS-SINR in FR1

The accuracy requirements in clause 10.1.14.1.1 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.12.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.

Table 10.1A.12.1.1-1: SS-SINR Inter frequency absolute accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 3 | Io Note 1 range | | | | |
|  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±4.0 | ±5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±4.5 | ±5 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: The requirements apply for SSB Ês/Iot ≤ 25 dB.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

##### 10.1A.12.1.2 Relative Accuracy of SS-SINR in FR1

The accuracy requirements in clause 10.1.14.1.2 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.12.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

- | Channel 1\_Io ‑Channel 2\_Io | ≤ 20 dB

Table 10.1A.12.1.2-1: SS-SINR Inter frequency relative accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 2,4 | NR operating band groups Note 5 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 120 kHz | SCSSSB = 240 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±4.5 | ±5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±5 | ±5 | ≥-6 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 4: The requirements apply for SSB Ês/Iot ≤ [25] dB.  NOTE 5: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

### 10.1A.13 Inter-frequency SINR accuracy requirements for FR2

#### 10.1A.13.1 Inter-frequency SS-SINR accuracy requirements in FR2

##### 10.1A.13.1.1 Aboslute Accuracy of SS-SINR in FR2

The accuracy requirements in clause 10.1.15.1.1 shall apply.

##### 10.1A.13.1.2 Relative Accuracy of SS-SINR in FR2

The accuracy requirements in clause 10.1.15.1.1 shall apply.

### 10.1A.14 L1-RSRP accuracy requirements for FR1

#### 10.1A.14.1 SSB based L1-RSRP accuracy requirements

##### 10.1A.14.1.1 Absolute Accuracy

The accuracy requirements in clause 10.1.19.1.1 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.14.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

Table 10.1A.14.1.1-1: SSB based L1-RSRP absolute accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -121 | -118 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -70 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -70 |
| ±8.0 | ±12.5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -70 |
| ±11.5 | ±14.5 | ≥-3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A, NR\_FDD\_FR1\_B, NR\_TDD\_FR1\_C, NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D, NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E, NR\_FDD\_FR1\_F, NR\_FDD\_FR1\_G, NR\_FDD\_FR1\_H, | N/A | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

##### 10.1A.14.1.2 Relative Accuracy

The accuracy requirements in clause 10.1.19.1.2 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.14.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

Table 10.1A.14.1.2-1: SSB based L1-RSRP relative accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±6 | ±7 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of SSBs to which the requirement applies.  NOTE 3: Void  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

#### 10.1A.14.2 CSI-RS based L1-RSRP accuracy requirements

##### 10.1A.14.2.1 Absolute Accuracy

The accuracy requirements in clause 10.1.19.2.2 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.14.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.

- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1A.19.2.1-1.

Table 10.1A.14.2.1-1: CSI-RS based L1-RSRP absolute accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 1 range | | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSCSI-RS | | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSCSI-RS = 15 kHz | SCSCSI-RS = 30 kHz | SCSCSI-RS = 60 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | -115 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -70 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | -114 | N/A | -70 |
| ±5.0 | ±9.5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -113.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -113 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | -112.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | -112 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | -111.5 | N/A | -70 |
| ±8.5 | ±11.5 | ≥-3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A,  NR\_FDD\_FR1\_B, NR\_TDD\_FR1\_C, NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D, NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E, NR\_FDD\_FR1\_F,  NR\_FDD\_FR1\_G, NR\_FDD\_FR1\_H | N/A | N/A | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | | |

##### 10.1A.14.2.2 Relative Accuracy

The accuracy requirements in clause 10.1.19.2.2 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.14.2.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.

- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1A.14.2.2-1.

Table 10.1A.14.2.2-1: CSI-RS based L1-RSRP relative accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot Note 2 | Io Note 1 range | | | | | |
|  |  |  | NR operating band groups Note 4 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSCSI-RS | | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSCSI-RS = 15 kHz | SCSCSI-RS = 30 kHz | SCSCSI-RS = 60 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | -114 | N/A | -50 |
| ±3 | ±4 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -113.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -113 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | -112.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | -112 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | -111.5 | N/A | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter CSI-RS Ês/Iot is the minimum CSI-RS Ês/Iot of the pair of CSI-RS resources to which the requirement applies.  NOTE 3: Void  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | | |

### 10.1A.15 L1-RSRP accuracy requirements for FR2

#### 10.1A.15.1 SSB based L1-RSRP accuracy requirements

##### 10.1A.15.1.1 Absolute Accuracy

The accuracy requirements in clause 10.1.20.1.1 shall apply.

##### 10.1A.15.1.2 Relative Accuracy

The accuracy requirements in clause 10.1.20.1.1 shall apply.

#### 10.1A.15.2 CSI-RS based L1-RSRP accuracy requirements

##### 10.1A.15.2.1 Absolute Accuracy

The accuracy requirements in clause 10.1.20.1.1 shall apply.

##### 10.1A.15.2.2 Relative Accuracy

The accuracy requirements in clause 10.1.20.1.1 shall apply.

**--- End of change 8 ---**

**--- Start of change 9 ---**

## B.1.x1 Conditions for measurements on NR intra-frequency cells for cell re-selection for RedCap

This clause defines the following conditions for RedCap NR intra-frequency measurements performed based on SSBs for cell re-selection: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.1.x1-1 and Table B.1.x1-2 for 1 Rx and 2 Rx RedCap respectively for FR1 NR cells.

The conditions are defined in Table B.1.x1-3 for FR2 NR cells.

Table B.1.x1-1: Conditions for intra-frequency cell re-selection in FR1 for RedCap for 2Rx

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | NR operating band groups Note1 | Minimum SSB\_RP | | SSB Ês/Iot |
| dBm / SCSSSB | | dB |
| SCSSSB = 15 kHz | SCSSSB = 30 kHz |
| **Conditions** | NR\_FDD\_RC\_FR1\_A, NR\_TDD\_RC\_FR1\_A | -124 | -121 | ≥ -4 |
| NR\_FDD\_RC\_FR1\_B | -123.5 | -120.5 |
| NR\_FDD\_ RC\_FR1\_C  NR\_TDD\_RC\_FR1\_C | -123 | -120 |
| NR\_FDD\_RC\_FR1\_D, NR\_TDD\_RC\_FR1\_D | -122.5 | -119.5 |
| NR\_FDD\_RC\_FR1\_E, NR\_TDD\_RC\_FR1\_E | -122 | -119 |
| NR\_FDD\_RC\_FR1\_F | -121.5 | -118.5 |
| NR\_FDD\_RC\_FR1\_G | -121 | -118 |
| NR\_FDD\_RC\_FR1\_H | -120.5 | -117.5 |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | |

Table B.1.x1-2: Conditions for intra-frequency cell re-selection in FR1 for RedCap for 1Rx

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | NR operating band groups Note1 | Minimum SSB\_RP | | SSB Ês/Iot |
| dBm / SCSSSB | | dB |
| SCSSSB = 15 kHz | SCSSSB = 30 kHz |
| **Conditions** | NR\_FDD\_RC\_FR1\_A, NR\_TDD\_RC\_FR1\_A | TBD | TBD | ≥ -4 |
| NR\_FDD\_RC\_FR1\_B | TBD | TBD |
| NR\_FDD\_ RC\_FR1\_C  NR\_TDD\_RC\_FR1\_C | TBD | TBD |
| NR\_FDD\_RC\_FR1\_D, NR\_TDD\_RC\_FR1\_D | TBD | TBD |
| NR\_FDD\_RC\_FR1\_E, NR\_TDD\_RC\_FR1\_E | TBD | TBD |
| NR\_FDD\_RC\_FR1\_F | TBD | TBD |
| NR\_FDD\_RC\_FR1\_G | TBD | TBD |
| NR\_FDD\_RC\_FR1\_H | TBD | TBD |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | |

Table B.1.x1-3: Conditions for intra-frequency cell re-selection in FR2 for RedCap

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Angle of arrival | | NR operating bands |  | | Minimum SSB\_RP Note 2, Note 3 | | | | | | SSB Ês/Iot |
|  |  | |  |  | | dBm / SCSSSB | | | | | | dB |
|  |  | |  | SCSSSB = 120 kHz | | | | | |  | SCSSSB = 240 kHz |  |
|  |  | |  | UE Power class | | | | | |  | UE Power class |  |
|  |  | |  | 1 | 2 | | 3 | 4 | 5 | 7 | 1, 2, 3, 4, 5, 7 |  |
| Conditions | Rx Beam Peak | | n257 | -125.3+Y1 | -110.8 | | -109.1 | -124.8+Y4 | -120.4+Y5 | TBD | (Value for SCSSSB = 120 kHz) +3dB | ≥-4 |
|  |  | | n258 | -125.3+Y1 | -110.8 | | -109.1 | -124.8+Y4 | -120.6+Y5 | TBD |  |  |
|  |  | | n261 | -125.3+Y1 | -110.8 | | -109.1 | -124.8+Y4 |  | TBD |  |  |
|  | Spherical coverage Note 1 | | n257 | -117.3+Z1 | -99.8 | | -98.2 | -115.8+Z4 | -112.4+Z5 | TBD | (Value for SCSSSB = 120 kHz) +3dB | ≥-4 |
|  | n258 | -117.3+Z1 | -99.8 | | -98.2 | -115.8+Z4 | -112.6+Z5 | TBD |
|  | n261 | -117.3+Z1 | -99.8 | | -98.2 | -115.8+Z4 |  | TBD |
|  | | NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.  NOTE 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise.  NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ∆MBP,n and Spherical coverage values are increased by ∆MBS,n, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19]. | | | | | | | | | | |

*Editor’s notes for Table B.1.2-2:*

*- The value of Y for Power classes 1, 4 and 5 is FFS, where Y1, Y4 and Y5 are the rough/fine beam gain differences in Rx beam peak direction for Power classes 1, 4 and 5 respectively*

*- The value of Z for Power classes 1, 4 and 5 is FFS, where Z1, Z4 and Z5 are the rough/fine beam gain differences in spherical coverage directions for Power classes 1, 4 and 5 respectively*

## B.1.x2 Conditions for measurements on NR inter-frequency cells for cell re-selection for RedCap

This clause defines the following conditions for RedCap NR inter-frequency measurements performed based on SSBs for cell re-selection: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions defined in Table B.1.x1-1 and Table B.1.x1-2 for 1 Rx and 2 Rx RedCap respectively for FR1 RedCap NR intra-frequency cell re-selection shall also apply for FR1 RedCap NR inter-frequency cells in this clause.

The conditions defined in Table B.1.x1-3 for FR2 RedCap NR intra-frequency cell re-selection shall also apply for FR2 RedCap NR inter-frequency cells in this clause.

**--- End of change 9 ---**

**--- Start of change 10 ---**

## B.2.x1 Conditions for NR intra-frequency measurements

This clause defines the following conditions for RedCap NR intra-frequency measurements and corresponding procedures performed based on SSBs: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.x1-1 and Table B.2.x1-2 for 1 Rx and 2 Rx RedCap respectively for FR1 NR cells.

The conditions are defined in Table B.2.x1-3 for FR2 NR cells.

Table B.1.x1-1: Conditions for intra-frequency cell re-selection in FR1 for RedCap for 1 Rx

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | NR operating band groups Note1 | Minimum SSB\_RP | | SSB Ês/Iot |
| dBm / SCSSSB | | dB |
| SCSSSB = 15 kHz | SCSSSB = 30 kHz |
| Conditions | NR\_FDD\_RC\_FR1\_A, NR\_TDD\_RC\_FR1\_A | TBD | TBD | ≥ -6 |
| NR\_FDD\_RC\_FR1\_B | TBD | TBD |
| NR\_TDD\_RC\_FR1\_C | TBD | TBD |
| NR\_FDD\_RC\_FR1\_D, NR\_TDD\_RC\_FR1\_D | TBD | TBD |
| NR\_FDD\_RC\_FR1\_E, NR\_TDD\_RC\_FR1\_E | TBD | TBD |
| NR\_FDD\_RC\_FR1\_F | TBD | TBD |
| NR\_FDD\_RC\_FR1\_G | TBD | TBD |
| NR\_FDD\_RC\_FR1\_H | TBD | TBD |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | |

Table B.1.x1-2: Conditions for intra-frequency cell re-selection in FR1 for RedCap for 2Rx

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | NR operating band groups Note1 | Minimum SSB\_RP | | SSB Ês/Iot |
| dBm / SCSSSB | | dB |
| SCSSSB = 15 kHz | SCSSSB = 30 kHz |
| Conditions | NR\_FDD\_RC\_FR1\_A, NR\_TDD\_RC\_FR1\_A | -127 | -124 | ≥ -6 |
| NR\_FDD\_RC\_FR1\_B | -126.5 | -123.5 |
| NR\_TDD\_RC\_FR1\_C | -126 | -123 |
| NR\_FDD\_RC\_FR1\_D, NR\_TDD\_RC\_FR1\_D | -125.5 | -122.5 |
| NR\_FDD\_RC\_FR1\_E, NR\_TDD\_RC\_FR1\_E | -125 | -122 |
| NR\_FDD\_RC\_FR1\_F | -124.5 | -121.5 |
| NR\_FDD\_RC\_FR1\_G | -124 | -121 |
| NR\_FDD\_RC\_FR1\_H | -123.5 | -120.5 |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | |

Table B.2.x1-3: Conditions for intra-frequency measurements in FR2 for RedCap

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Angle of arrival | | NR operating bands |  | | | Minimum SSB\_RP Note 2, Note 3 | | | | | SSB Ês/Iot |
|  |  | |  |  | | | dBm / SCSSSB | | | | | dB |
|  |  | |  | SCSSSB = 120 kHz | | | | | | | SCSSSB = 240 kHz |  |
|  |  | |  | UE Power class | | | | | | | UE Power class |  |
|  |  | |  | 1 | 2 | 3 | | 4 | 5 | 7 | 1, 2, 3, 4, 5 |  |
| Conditions | Rx Beam Peak | | n257 | -128.3+Y1 | -113.8 | -112.1 | | -127.8+Y4 | -123.4+Y5 | TBD | (Value for SCSSSB = 120 kHz) +3dB | ≥-6 |
|  |  | | n258 | -128.3+Y1 | -113.8 | -112.1 | | -127.8+Y4 | -123.6+Y5 | TBD |  |  |
|  |  | | n261 | -128.3+Y1 | -113.8 | -112.1 | | -127.8+Y4 |  | TBD |  |  |
|  | Spherical coverage Note 1 | | n257 | -120.3+Z1 | -102.8 | -101.2 | | -118.8+Z4 | -115.4+Z5 | TBD | (Value for SCSSSB = 120 kHz) +3dB | ≥-6 |
|  |  | | n258 | -120.3+Z1 | -102.8 | -101.2 | | -118.8+Z4 | -115.6+Z5 | TBD |  |  |
|  |  | | n261 | -120.3+Z1 | -102.8 | -101.2 | | -118.8+Z4 |  | TBD |  |  |
|  | | Note 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.  Note 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise.  Note 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ∆MBP,n and Spherical coverage values are increased by ∆MBS,n, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19]. | | | | | | | | | | |

*Editor’s notes for Table B.2.2-2:*

*- The value of Y for power classes 1, 4 and 5 is FFS, where Y1, Y4 and Y5 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1, 4 and 5 respectively*

*- The value of Z for power classes 1, 4 and 5 is FFS, where Z1, Z4 and Z5 are the rough/fine beam gain differences in spherical coverage directions for power classes 1, 4 and 5 respectively*

## B.2.x2 Conditions for NR inter-frequency measurements

This clause defines the following conditions for RedCap NR inter-frequency measurements and corresponding procedures performed based on SSBs: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.x1-1 and Table B.2.x1-2 for 1 Rx and 2 Rx RedCap for FR1 NR cells.

The conditions are defined in Table B.2.x1-3 for FR2 NR cells.

Table B.2.x2-1: Conditions for inter-frequency measurements in FR1 for 1 Rx RedCap

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | NR operating band groups Note1 | Minimum SSB\_RP | | SSB Ês/Iot |
|  |  | dBm / SCSSSB | | dB |
|  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |
| Conditions | NR\_FDD\_RC\_FR1\_A, NR\_TDD\_RC\_FR1\_A | TBD | TBD | ≥ -4 |
|  | NR\_FDD\_RC\_FR1\_B | TBD | TBD |  |
|  | NR\_TDD\_RC\_FR1\_C | TBD | TBD |  |
|  | NR\_FDD\_RC\_FR1\_D, NR\_TDD\_RC\_FR1\_D | TBD | TBD |  |
|  | NR\_FDD\_RC\_FR1\_E, NR\_TDD\_RC\_FR1\_E | TBD | TBD |  |
|  | NR\_FDD\_RC\_FR1\_F | TBD | TBD |  |
|  | NR\_FDD\_RC\_FR1\_G | TBD | TBD |  |
|  | NR\_FDD\_RC\_FR1\_H | TBD | TBD |  |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | |

Table B.2.x2-2: Conditions for inter-frequency measurements in FR1 for 2 Rx RedCap

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | NR operating band groups Note1 | Minimum SSB\_RP | | SSB Ês/Iot |
|  |  | dBm / SCSSSB | | dB |
|  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |
| Conditions | NR\_FDD\_RC\_FR1\_A, NR\_TDD\_RC\_FR1\_A | -125 | -122 | ≥ -4 |
|  | NR\_FDD\_RC\_FR1\_B | -124.5 | -121.5 |  |
|  | NR\_TDD\_RC\_FR1\_C | -124 | -121 |  |
|  | NR\_FDD\_RC\_FR1\_D, NR\_TDD\_RC\_FR1\_D | -124.5 | -120.5 |  |
|  | NR\_FDD\_RC\_FR1\_E, NR\_TDD\_RC\_FR1\_E | -123 | -120 |  |
|  | NR\_FDD\_RC\_FR1\_F | -122.5 | -119.5 |  |
|  | NR\_FDD\_RC\_FR1\_G | -122 | -119 |  |
|  | NR\_FDD\_RC\_FR1\_H | -121.5 | -118.5 |  |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | |

**Table B.2.x2-3: Conditions for inter-frequency measurements in FR2 for RedCap**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Angle of arrival | | NR operating bands |  | | | Minimum SSB\_RP Note 2, Note 3 | | | | | SSB Ês/Iot |
|  |  | |  |  | | | dBm / SCSSSB | | | | | dB |
|  |  | |  | SCSSSB = 120 kHz | | | | | | | SCSSSB = 240 kHz |  |
|  |  | |  | UE Power class | | | | | | | UE Power class |  |
|  |  | |  | 1 | 2 | 3 | | 4 | 5 | 7 | 1, 2, 3, 4, 5 |  |
| Conditions | Rx Beam Peak | | n257 | -126.3+Y1 | -111.8 | -110.1 | | -125.8+Y4 | -121.4+Y5 | TBD | (Value for SCSSSB = 120 kHz) +3dB | ≥-4 |
|  |  | | n258 | -126.3+Y1 | -111.8 | -110.1 | | -125.8+Y4 | -121.6+Y5 | TBD |  |  |
|  |  | | n261 | -126.3+Y1 | -111.8 | -110.1 | | -125.8+Y4 |  | TBD |  |  |
|  | Spherical coverage Note 1 | | n257 | -118.3+Z1 | -100.8 | -99.2 | | -116.8+Z4 | -113.4+Z5 | TBD | (Value for SCSSSB = 120 kHz) +3dB | ≥-4 |
|  |  | | n258 | -118.3+Z1 | -100.8 | -99.2 | | -116.8+Z4 | -113.6+Z5 | TBD |  |  |
|  |  | | n261 | -118.3+Z1 | -100.8 | -99.2 | | -116.8+Z4 |  | TBD |  |  |
|  | | NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.  NOTE 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise.  NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ∆MBP,n and Spherical coverage values are increased by ∆MBS,n, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19]. | | | | | | | | | | |

*Editor’s notes for Table B.2.3-2:*

*- The value of Y for power classes 1, 4 and 5 is FFS, where Y1, Y4 and Y5 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1, 4 and 5 respectively*

*- The value of Z for power classes 1, 4 and 5 is FFS, where Z1, Z4 and Z5 are the rough/fine beam gain differences in spherical coverage directions for power classes 1, 4 and 5 respectively*

**--- End of change 10 ---**