**3GPP TSG-RAN WG4 Meeting # 113 *R4-2417708***

**Orlando , US, Nov 18 – 22, 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **4991** | **rev** | **-** | **Current version:** | **18.7.0** |  |
|  |
| *For* ***HE******LP*** *on using this form: comprehensive instructions can be found at 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:***  | (NR\_redcap-Perf) CR to TS 38.133 on test cases for RedCap UE |
|  |  |
| ***Source to WG:*** | CATT |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_redcap-Perf |  | ***Date:*** | 2024-11-20 |
|  |  |  |  |  |
| ***Category:*** | **A** |  | ***Release:*** | Rel-18 |
|  | *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 canbe found in 3GPP TR 21.900. | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | The following test cases for RedCap UE should be further revised:* A.16.1.1.1 Cell reselection to FR1 intra-frequency NR case for 1 Rx UE
* A.16.1.1.2 Cell reselection to FR1 intra-frequency NR case for 2 Rx UE
* A.16.1.1.4 Cell reselection to FR1 inter-frequency NR case for 2 Rx UE
* A.16.2.1.1 NR UE CG-SDT Test in FR1 for 1Rx RedCap UE
* A.16.2.1.2 NR UE CG-SDT Test in FR1 for 2Rx RedCap UE
* A.17.2.1.1 TA validation for CG-SDT in FR2 for RedCap
 |
|  |  |
| ***Summary of change:*** | * Delete some redundant words in Table A.16.1.1.1.2-3 and Table A.16.1.1.2.2-2 in clauses A.16.1.1.1 and A.16.1.1.2.
* Add missed test configuration 4 in Table A.16.1.1.4.2-2 in clause A.16.1.1.4.
* Revise the numbering of clause from ‘5.2B.2.1’ to ‘5.2B.3’ in clauses A.16.2.1.1 and A.17.2.1.1.
* Revise the FR from ‘FR1’ to ‘FR2’ in clause A.17.2.1.1.
* Correct some typos.
 |
|  |  |
| ***Consequences if not approved:*** | The related test cases for RedCap UE would still be unclear. |
|  |  |
| ***Clauses affected:*** | A.16.1.1.1, A.16.1.1.2, A.16.1.1.4, A.16.2.1.1, A.16.2.1.2, A.17.2.1.1 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

<Start of Change 1>

#### 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 | Cell 1 |  |
| T2 end condition | Active cell |  | 1, 2, 3, 4 | Cell 2 |  |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell 1 |  |
| Final condition | Active cell |  | 1, 2, 3, 4 | Cell 1 |  |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell 2  |  |
| 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, 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, 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/18.36 MHz | 3 | -51.02 | -49.30 | -49.30 |  |
| 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 | Cell 1 |  |
| T2 end condition | Active cell |  | 1, 2, 3, 4 | Cell 2 |  |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell 1 |  |
| Final condition | Active cell |  | 1, 2, 3, 4 | Cell 1 |  |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell 2  |  |
| 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/18.36 MHz | 3 | -51.01 | -49.30 | -49.30 |  |
| 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.16.1.1.4 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, 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.16.1.1.4.2-2: 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 | Cell 2 | 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 | Cell 1 | The UE shall perform reselection to cell 1 during T1 |
|  | Neighbour cells |  | 1, 2, 3, 4 | Cell 2 |  |
| T3 end condition | Active cell |  | 1, 2, 3, 4 | Cell 2 | 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.16.1.1.4.2-3: 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/18.36 MHz | 3 | -52.95 | -52.95 | -52.95 | -65.67 | -67.12 | -54.85 |
| 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.

<End of Change 1>

<Start of Change 2>

#### A.16.2.1.1 NR UE CG-SDT Test in FR1 for 1Rx RedCap UE

##### A.16.2.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE properly perform TA validation for CG-SDT transmission in clause 5.2B.3. The test includes two sub-tests, Sub-test#1 for testing valid TA where UE can initiate CG-SDT transmission, and Sub-test#2 for testing invalid TA where UE does not initiate CG-SDT transmission. Subtest#2 is only tested if Sub-test#1 is passed. For each sub-test, UE is configured with CG-SDT configurations when entering RRC Inactive state. Sub-test#1 consists of four successive time periods, with time duration of T1, T2, T3 and T4 respectively. Sub-test#2 consists of two successive time periods, with time duration of T5 and T6 respectively. There is one cell, which is the active NR cell in FR1. Figure A.16.2.1.1.1-1 shows the variation of the RSRP over the duration of Sub-test#1 and Figure A.16.2.1.1.1-2 shows the variation of the RSRP over the duration of Sub-test#2.

In Sub-test#1:

- Prior to the time point TA, the UE shall be fully synchronized to PCell (Cell 1), be registered to the cell and have entered RRC connected mode.

- Before starting the test at time point TA, test equipment configures RSRP to P0.

- At time point TB, RSRP is changed from P0 to P1.

- At time point TC, which is W1 after time point TB, UE expect to receive RRC release with CG-SDT configuration and RRC status is changed to INACTIVE status.

- At time point TD, RSRP is changed from P1 to P0.

- At time point TE, RSRP is changed from P0 to P2. TE must be W2 before TF.

- Test equipment triggers UL data arrival at UE lower layer at time point TF. After time point TF, test equipment observes whether UE transmits with CG-SDT no later than TG which is W3 after TF.

- After time point TG, RRC status is changed from RRC INACTIVE to RRC CONNECTED.

In Sub-test#2:

- Prior to the time point TA, the UE shall pass Sub-test#1 and have entered RRC connected mode. Otherwise, Sub-test#2 shall not be executed.

- From time point TA to time point TD, RSRP is set to P2.

- At time point TC, which is W1 after time point TB, UE expect to receive RRC release with CG SDT configuration and RRC status is changed to INACTIVE status.

- At time point TD, RSRP is changed from P2 to P0.

- Test equipment triggers UL data arrival at UE lower layer at time point TF. TF is 3360ms after TD. After time point TF, test equipment observes whether UE transmits with CG-SDT no later than TG which is W3 after TF.

W1 equals to 640ms and W2 equals to 640ms based on requirements in clause 5.2B.2.1. W3 is 860ms.



Figure A.16.2.1.1.1-1: RSRP variation model for CG-SDT Sub-test#1



Figure A.16.2.1.1.1-2: RSRP variation model for CG-SDT Sub-test#2

##### A.16.2.1.1.2 Test Parameters

Supported test configurations are shown in Table A.16.2.1.1.2-1. The test parameters for the PCell are given in Table A.16.2.1.1.2-2 and Table A.16.2.1.1.2-3.

Table A.16.2.1.1.2-1: NR configuration for FR1 SSB

|  |  |
| --- | --- |
| Config | 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 |

Table A.16.2.1.1.2-2: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| Duplex mode | Config 1 |  | FDD |  |
| Config 2, 3 |  | TDD |  |
| Config 4 |  | HD-FDD |  |
| TDD Configuration | Config 1 |  | N/A |  |
| Config 2 |  | TDDConf.1.1 |  |
| Config 3 |  | TDDConf.2.1 |  |
| Config 4 |  | N/A |  |
| BWchannel | Config 1, 2, 4 | MHz | 10: NRB,c = 52 |  |
| Config 3 |  | 20: NRB,c = 51 |  |
| PDSCH Reference measurement channel | Config 1, 4 |  | SR.1.1 FDD |  |
| 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.1.3 FDD |  |
| Config 2 |  | CCR.1.3 TDD |  |
| Config 3 |  | CCR.2.2 TDD |  |
| SSB configuration | Config 1 |  | SSB.1 FR1 |  |
| Config 2, 4 |  | SSB.1 FR1 |  |
| Config 3 |  | SSB. 1 RedCap FR1 |  |
| OCNG Patterns |  |  | OP.1 |  |
| Initial BWP Configuration | Config 1, 2, 3, 4 |  | DLBWP.0.1ULBWP.0.1 |  |
| Dedicated BWP configuration | Config 1, 2, 3, 4 |  | DLBWP.1.1ULBWP.1.1 |  |
| SMTC configuration | Config 1, 2, 4 |  | SMTC.1 |  |
| Config 3 |  | SMTC.1 |  |
| DRX configuration | Config 1, 2, 3, 4 | ms | 640 |  |
| T\_delay\_modeB | Config 1, 2, 3, 4 | s | [4] |  |
| T1 | Config 1, 2, 3, 4 | s | 0.4 |  |
| T2 | Config 1, 2, 3, 4 | s | 1.28 | 2 x W1  |
| T3 | Config 1, 2, 3, 4 | s | 2.72 | T\_timer\_modeB - W1 -W2  |
| T4 | Config 1, 2, 3, 4 | s | [1.5] | W2+W3  |
| T5 | Config 1, 2, 3, 4 | s | [1.68] | T1+T2  |
| T6 | Config 1, 2, 3, 4 | s | 4.22 | T3+W2+W3 |
| cg-SDT-RSRP-ChangeThreshold | Config 1, 2, 3, 4 | dB | 8 |  |
| cg-SDT-RSRP-ThresholdSSB | Config 1, 2, 3, 4 | dBm | -110 |  |
| cg-SDT-TimeAlignmentTime | Config 1, 2, 3, 4 |  | infinity |  |
| CG-SDT resource period | Config 1, 2, 3, 4 | ms | 320ms |  |
| EPRE ratio of PSS to SSS |  | dB | 0 |  |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS |  |  |  |  |
| Propagation condition | Config 1, 2, 3, 4 |  | AWGN |  |

Table A.16.2.1.1.2-3: SSB specific test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 |
|  |  |  | T1 | T2 | T3 | T4 | T5 | T6 |
| Note1 | 1, 2, 3, 4 | dBm/15kHz | -100 |
| Note1 | 1, 2, 4 | dBm/SSB SCS | -100 |
| 3 | dBm/SSB SCS | -97 |
|  | 1, 2, 3, 4 | dB | 0 | 12 | 0 | 14 | 14 | 0 |
| SS RSRP Note2 | 1, 2, 4 | dBm/SSB SCS | -100 | -88 | -100 | -86 | -86 | -100 |
| 3 | dBm/SSB SCS | -97 | -85 | -97 | -83 | -83 | -97 |
| Io Note2 | 1, 2, 4 | dBm/ 9.36 MHz | -69.04 | -59.78 | -69.04 | -57.88 | -57.88 | -69.04 |
| 3 | dBm/ 18.36 MHz | -66.11 | -56.86 | -66.11 | -54.95 | -54.95 | -66.11 |
|  | 1, 2, 3, 4 | dB | 0 | 12 | 0 | 14 | 14 | 0 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

##### A.16.2.1.1.3 Test requirements

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

During Sub-test#1, UE shall transmit PUSCH at CG-SDT resource within 860ms after time point TF.

During Sub-test#2, after passing Sub-test#1, UE shall not transmit PUSCH at CG-SDT resources after TF until the end of the test at time point TG.

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

#### A.16.2.1.2 NR UE CG-SDT Test in FR1 for 2Rx RedCap UE

##### A.16.2.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE properly perform TA validation for CG-SDT transmission in clause 5.2B.3. The test includes two sub-tests, Sub-test#1 for testing valid TA where UE can initiat CG-SDT transmission, and Sub-test#2 for testing invalid TA where UE does not initiate CG-SDT transmission. Subtest#2 is only tested if Sub-test#1 is passed. For each sub-test, UE is configured with CG-SDT configurations when entering RRC Inactive state. Sub-test#1 consists of four successive time periods, with time duration of T1, T2, T3 and T4 respectively. Sub-test#2 consists of two successive time periods, with time duration of T5 and T6 respectively. There is one cell, which is the active NR cell in FR1. Figure A.16.2.1.2.1-1 shows the variation of the RSRP over the duration of Sub-test#1 and Figure A.16.2.1.2.1-2 shows the variation of the RSRP over the duration of Sub-test#2.

In Sub-test#1:

- Prior to the time point TA, the UE shall be fully synchronized to PCell (Cell 1), be registered to the cell and have entered RRC connected mode.

- Before starting the test at time point TA, test equipment configures RSRP to P0.

- At time point TB, RSRP is changed from P0 to P1.

- At time point TC which is W1 after time point TB, UE expect to receive RRC release with CG-SDT configuration and RRC status is changed to INACTIVE status.

- At time point TD, RSRP is changed from P1 to P0.

- At time point TE, RSRP is changed from P0 to P2. TE must be W2 before TF.

 Test equipment triggers UL data arrival at UE lower layer at time point TF. After time point TF, test equipment observes whether UE transmits with CG-SDT no later than TG which is W3 after TF.

- After time point TG, RRC status is changed from RRC INACTIVE to RRC CONNECTED.

In Sub-test#2:

- Prior to the time point TA, the UE shall pass Sub-test#1 and have entered RRC connected mode. Otherwise, Sub-test#2 shall not be executed.

- From time point TA to time point TD, RSRP is set to P2.

- At time point TC, which is W1 after time point TB, UE expect to receive RRC release with CG SDT configuration and RRC status is changed to INACTIVE status.

- At time point TD, RSRP is changed from P2 to P0.

- Test equipment triggers UL data arrival at UE lower layer at time point TF. TF is 3360ms after TD. After time point TF, test equipment observes whether UE transmits with CG-SDT no later than TG which is W3 after TF.

W1 equals to 640ms and W2 equals to 640ms based on requirements in clause 5.2B.2.1. W3 is 860ms.



Figure A.16.2.1.2.1-1: RSRP variation model for CG-SDT Sub-test#1



Figure A.16.2.1.2.1-2: RSRP variation model for CG-SDT Sub-test#2

##### A.16.2.1.2.2 Test Parameters

Supported test configurations are shown in Table A.16.2.1.2.2-1. The test parameters for the PCell are given in Table A.16.2.1.2.2-2 and Table A.16.2.1.2.2-3.

Table A.16.2.1.2.2-1: NR configuration for FR1 SSB

|  |  |
| --- | --- |
| Config | 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 |

Table A.16.2.1.2.2-2: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| Duplex mode | Config 1 |  | FDD |  |
| Config 2, 3 |  | TDD |  |
| Config 4 |  | HD-FDD |  |
| TDD Configuration | Config 1 |  | N/A |  |
| Config 2 |  | TDDConf.1.1 |  |
| Config 3 |  | TDDConf.2.1 |  |
| Config 4 |  | N/A |  |
| BWchannel | Config 1, 2, 4 | MHz | 10: NRB,c = 52 |  |
| Config 3 |  | 20: NRB,c = 51 |  |
| PDSCH Reference measurement channel | Config 1, 4 |  | SR.1.1 FDD  |  |
| 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.1.3 FDD |  |
| Config 2 |  | CCR.1.3 TDD |  |
| Config 3 |  | CCR.2.2 TDD |  |
| SSB configuration | Config 1 |  | SSB.1 FR1 |  |
| Config 2, 4 |  | SSB.1 FR1 |  |
| Config 3 |  | SSB. 1 RedCap FR1 |  |
| OCNG Patterns |  |  | OP.1 |  |
| Initial BWP Configuration | Config 1, 2, 3, 4 |  | DLBWP.0.1ULBWP.0.1 |  |
| Dedicated BWP configuration | Config 1, 2, 3, 4 |  | DLBWP.1.1ULBWP.1.1 |  |
| SMTC configuration | Config 1, 2, 4 |  | SMTC.1 |  |
| Config 3 |  | SMTC.1 |  |
| DRX configuration | Config 1, 2, 3, 4 | ms | 640 |  |
| T\_delay\_modeB | Config 1, 2, 3, 4 | s | 4 |  |
| T1 | Config 1, 2, 3, 4 | s | [0.4] |  |
| T2 | Config 1, 2, 3, 4 | s | [1.28] | 2 x W1  |
| T3 | Config 1, 2, 3, 4 | s | [2.72] | T\_timer\_modeB - W1 -W2  |
| T4 | Config 1, 2, 3, 4 | s | [1.5] | W2+W3  |
| T5 | Config 1, 2, 3, 4 | s | [1.68] | T1+T2 |
| T6 | Config 1, 2, 3, 4 | s | [4.22] | T3+W2+W3 |
| cg-SDT-RSRP-ChangeThreshold | Config 1, 2, 3, 4 | dB | [8] |  |
| cg-SDT-RSRP-ThresholdSSB | Config 1, 2, 3, 4 | dBm | [-110] |  |
| cg-SDT-TimeAlignmentTime |  |  | infinity |  |
| CG-SDT resource period |  | ms | [320ms] |  |
| EPRE ratio of PSS to SSS |  | dB | 0 |  |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS |  |  |  |  |
| Propagation condition | Config 1, 2, 3, 4 |  | AWGN |  |

Table A.16.2.1.2.2-3: SSB specific test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 |
|  |  |  | T1 | T2 | T3 | T4 | T5 | T6 |
| Note1 | 1, 2, 3, 4 | dBm/15kHz | -100 |
| Note1 | 1, 2, 4 | dBm/SSB SCS | -100 |
| 3 | dBm/SSB SCS | -97 |
|  | 1, 2, 3, 4 | dB | 0 | 12 | 0 | 14 | 14 | 0 |
| SS RSRP Note2 | 1, 2, 4 | dBm/SSB SCS | -100 | -88 | -100 | -86 | -86 | -100 |
| 3 | dBm/SSB SCS | -97 | -85 | -97 | -83  | -83 | -97 |
| Io Note2 | 1, 2, 4 | dBm/ 9.36 MHz | -69.04 | -59.78 | -69.04 | -57.88 | -57.88 | -69.04 |
| 3 | dBm/ 18.36 MHz | -66.11 | -56.86 | -66.11 | -54.95 | -54.95 | -66.11 |
|  | 1, 2, 3, 4 | dB | 0 | 12 | 0 | 14 | 14 | 0 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

##### A.16.2.1.2.3 Test requirements

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

During Sub-test#1, UE shall transmit PUSCH at CG-SDT resource within 860ms after time point TF.

During Sub-test#2, after passing Sub-test#1, UE shall not transmit PUSCH at CG-SDT resources after TF until the end of the test at time point TG.

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

#### A.17.2.1.1 TA validation for CG-SDT in FR2 for RedCap

##### A.17.2.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly perform TA validation for CG-SDT transmission in clause 5.2B.3. The test includes two sub-tests, Sub-test#1 for testing valid TA where UE can initiate CG-SDT transmission, and Sub-test#2 for testing invalid TA where UE does not initiate CG-SDT transmission. Sub-test#2 is only tested if Sub-test#1 is passed. For each sub-test, UE is configured with CG-SDT configurations when entering RRC Inactive state. Sub-test#1 consists of four successive time periods, with time duration of T1, T2, T3 and T4 respectively. Sub-test#2 consists of two successive time periods, with time duration of T5 and T6 respectively. There is one cell, which is the active NR cell in FR2. Figure A.17.1.1.2.1-1 shows the variation of the RSRP over the duration of Sub-test#1 and Figure A.17.1.1.2.1-2 shows the variation of the RSRP over the duration of Sub-test#2.

In Sub-test#1:

- Prior to the time point TA, the UE shall be fully synchronized to PCell (Cell 1), be registered to the cell and have entered RRC connected mode.

- Before starting the test at time point TA, test equipment configures RSRP to P0.

- At time point TB, RSRP is changed from P0 to P1.

- At time point TC which is W1 after time point TB, UE expect to receive RRC release with CG-SDT configuration and RRC status is changed to INACTIVE status.

- At time point TD, RSRP is changed from P1 to P0.

- At time point TE, RSRP is changed from P0 to P2. TE must be W2 before TF.

- Test equipment triggers UL data arrival at UE lower layer at time point TF. After time point TF, test equipment observes whether UE transmits with CG-SDT no later than TG which is W3 after TF.

- After time point TG, RRC status is changed from RRC INACTIVE to RRC CONNECTED.

In Sub-test#2:

- Prior to the time point TA, the UE shall pass Sub-test#1 and have entered RRC connected mode. Otherwise, Sub-test#2 shall not be executed.

- From time point TA to time point TD, RSRP is set to P2.

- At time point TC, which is W1 after time point TB, UE expect to receive RRC release with CG SDT configuration and RRC status is changed to INACTIVE status.

- At time point TD, RSRP is changed from P2 to P0.

- Test equipment triggers UL data arrival at UE lower layer at time point TF. TF is 3520ms after TD. After time point TF, test equipment observes whether UE transmits with CG-SDT no later than TG which is W3 after TF.

W1 equals to 480ms and W2 equals to 480ms based on requirements in clause 5.2.B2.1. W3 is 1060ms.

Table A.17.2.1.1.1-1: Supported test configurations for FR2 PCell

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

Table A.17.2.1.1.1-2: General test parameters for TA validation for CG-SDT in FR2

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
|  |  | Test 1 |
| Active PCell |  | Cell 1 |
| RF Channel Number |  | 1 |
| Duplex mode | Config 1 |  | TDD |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |
| DL initial BWP configuration | Config 1 |  | DLBWP.0.1 |
| UL initial BWP configuration | Config 1 |  | ULBWP.0.1 |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 DD |
| SSB Configuration | Config 1 |  | SSB.3 FR2 |
| SMTC Configuration | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1 | kHz | 120 |
| PRACH Configuration  | Config 1 |  | Table A.3.8.3.4 |
| OCNG parameters |  | OP.5 |
| CP length  |  | Normal |
| Correlation Matrix and Antenna Configuration |  | 2x2 Low |
| DRX | s | 0.64 |
| cg-SDT-RSRP-ThresholdSSB | dBm | -110 |
| cg-SDT-RSRP-ChangeThreshold | dB | 8 |
| cg-SDT-TimeAlignmentTime |  | infinity |
| CG-SDT resource period | ms | 320 |
| T1 | s | 0.8 |
| T2 | s | 0.96 |
| T3 | s | 3.04 |
| T4 | s | 1.54 |
| T5 | s | 1.76 |
| T6 | s | 4.58 |

Table A.17.2.1.1.1-3: Cell specific test parameters TA validation for CG-SDT in FR2

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | SSB#0 |
|  | T1  | T2 | T3 | T4 | T5 | T6 |
| AoA setup |  | Setup 1 defined in A.3.15 |
| Assumption for UE beams Note 4 |  | Rough |
| EPRE ratio of PDCCH DMRS to SSS | dB | 4 |
| EPRE ratio of PDCCH to PDCCH DMRS | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | dB | 0 |
| EPRE ratio of PBCH to PBCH DMRS | dB |
| EPRE ratio of PSS to SSS | dB |
| EPRE ratio of PDSCH DMRS to SSS  | dB |
| EPRE ratio of PDSCH to PDSCH DMRS | dB |
| EPRE ratio of OCNG DMRS to SSS | dB |
| EPRE ratio of OCNG to OCNG DMRS | dB |
|  | Config 1 | dBm/15kHz | -109 |
|  | Config 1 | dBm/SCS | -100 |
|  | Config 1 | dB | 0 | 13 | 0 | 24.5 | 24.5 | 0 |
|  | Config 1 | dB | 0 | 13 | 0 | 24.5 | 24.5 | 0 |
| SS-RSRP | Config 1 | dBm/SCS | -100 | -87 | -100 | -75.5 | -75.5 | -100 |
| Io | Config 1 | dBm/95.04 MHz | -68 | -57.8 | -68 | -46.5 | -46.5 | -68 |
| Propagation condition |  | AWGN |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.Note 3: SS-RSRP 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. |



Figure A.17.2.1.1.1-1: RSRP variation model for CG-SDT Sub-test#1



Figure A.17.2.1.1.1-2: RSRP variation model for CG-SDT Sub-test#2

##### A.17.2.1.1.2 Test Requirements

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

During Sub-test#1, UE shall transmit UL data with CG-SDT within 1060ms after time point TF.

During Sub-test#2, after passing Sub-test#1, UE shall not transmit PUSCH at CG-SDT resources after TF until the end of the test at time point TG.

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

<End of Change 2>