**3GPP TSG-RAN WG4 Meeting # 113 *R4-2417710***

**Orlando , US, Nov 18 – 22, 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **4993** | **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\_ext\_to\_71GHz-Perf) CR to TS 38.133 on test cases in FR2-2 with CCA |
|  |  |
| ***Source to WG:*** | CATT |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_ext\_to\_71GHz-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 handover in FR2-2 with CCA should be further revised:* A.3.10.2 SSB Configurations for FR2
* A.15.3.1.1 Intra-frequency handover from FR2-2 carrier with CCA to FR2-2 carrier with CCA; unknown target cell
* A.15.3.1.2 Inter-frequency handover from FR1 to FR2-2 carrier with CCA; unknown target cell
 |
|  |  |
| ***Summary of change:*** | * Revise the number of SSB pattern in FR2 in clause A.3.10.2.
* Add clarification of configuration description in Table A.15.3.1.2.2-1 in clause A.15.3.1.2.2.
* Revise SSB Configuration in configuration 2 of test case from ‘SSB.2 FR1’ to ‘SSB.1 FR1’ in Table A.15.3.1.2.2-3 in clause A.15.3.1.2.2.
* Add the SSB Configuration to replace TBD in Table A.15.3.1.1.2-3 in clause A.15.3.1.1.2 and Table A.15.3.1.2.2-3 in clause A.15.3.1.2.2.
* Correct some typos.
 |
|  |  |
| ***Consequences if not approved:*** | The related test cases for intra-frequency and inter-frequency handover would still be unclear. |
|  |  |
| ***Clauses affected:*** | A.3.10.2.11, A.3.10.2.12, A.3.10.2.13, A.3.10.2.14, A.3.10.2.15, A.3.10.2.16, A.3.10.2.17, A.3.10.2.18A.15.3.1.1, A.15.3.1.2 |
|  |  |
|  | **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.3.10.2.9 SSB pattern 9 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.9-1: SSB.9 FR2: SSB Pattern 9 for SSB SCS = 120 kHz in 100 MHz channel with 2 SSBs per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 100 MHz |
| SSB SCS | 120 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 2 |
| SS/PBCH block index | 2 | 3 |
| Symbol numbers containing SSBs Note 2 | 2-5 | 6-9 |
| Slot numbers containing SSB Note 2 | 1 | 1 |
| 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. |

#### A.3.10.2.10 SSB pattern 10 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.10-1: SSB.10 FR2: SSB Pattern 10 for SSB SCS = 240 kHz in 100 MHz channel with 2 SSBs per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 100 MHz |
| SSB SCS | 240 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 2 |
| SS/PBCH block index | 2 | 3 |
| Symbol numbers containing SSBs Note 2 | 4-7 | 8-11 |
| Slot numbers containing SSB Note 2 | 1 | 1 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+39)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.3.10.2.11 SSB pattern 11 in FR2: SSB allocation for SSB SCS=480 kHz in 400 MHz

Table A.3.10.2.11-1: SSB.11 FR2: SSB Pattern 11 for SSB SCS = 480 kHz in 400 MHz channel with 2 SSBs per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 400 MHz |
| SSB SCS | 480 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 2 |
| SS/PBCH block index | 0 | 1 |
| Symbol numbers containing SSBs Note 2 | 2-5 | 9-12 |
| Slot numbers containing SSB Note 2 | 0 | 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. |

A.3.10.2.12 SSB pattern 12 in FR2: SSB allocation for SSB SCS=960 kHz in 400 MHz

Table A.3.10.2.12-1: SSB.12 FR2: SSB Pattern 12 for SSB SCS = 960 kHz in 400 MHz channel with 2 SSBs per SS-burst

|  |  |
| --- | --- |
| **SSB Parameters** | **Values** |
| Channel bandwidth | 400 MHz |
| SSB SCS | 960 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 2 |
| SS/PBCH block index | 0 | 1 |
| Symbol numbers containing SSBs Note 2 | 2-5 | 9-12 |
| Slot numbers containing SSB Note 2 | 0 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+39)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.3.10.2.13 SSB pattern 13 in FR2: SSB allocation for SSB SCS=480 kHz in 400 MHz

Table A.3.10.2.13-1: SSB.13 FR2: SSB Pattern 13 for SSB SCS = 480 kHz in 400 MHz channel with 1 SSB per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 400 MHz |
| SSB SCS | 480 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSBs Note 2 | 2-5 |
| 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. |

A.3.10.2.14 SSB pattern 14 in FR2: SSB allocation for SSB SCS=960 kHz in 400 MHz

Table A.3.10.2.14-1: SSB.14 FR2: SSB Pattern 14 for SSB SCS = 960 kHz in 400 MHz channel with 1 SSB per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 400 MHz |
| SSB SCS | 960 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSBs Note 2 | 2-5 |
| 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+39)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.3.10.2.15 SSB pattern 15 in FR2: SSB allocation for SSB SCS=480 kHz in 400 MHz

Table A.3.10.2.15-1: SSB.15 FR2: SSB Pattern 15 for SSB SCS = 480 kHz in 400 MHz channel with 2 SSBs per SS-burst

|  |  |
| --- | --- |
| **SSB Parameters** | **Values** |
| Channel bandwidth | 400 MHz |
| SSB SCS | 480 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 2 |
| SS/PBCH block index | 2 | 3 |
| Symbol numbers containing SSBs Note 2 | 2-5 | 9-12 |
| Slot numbers containing SSB Note 2 | 1 | 1 |
| 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. |

A.3.10.2.16 SSB pattern 16 in FR2: SSB allocation for SSB SCS=960 kHz in 400 MHz

Table A.3.10.2.16-1: SSB.16 FR2: SSB Pattern 16 for SSB SCS = 960 kHz in 400 MHz channel with 2 SSBs per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 400 MHz |
| SSB SCS | 960 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 2 |
| SS/PBCH block index | 2 | 3 |
| Symbol numbers containing SSBs Note 2 | 2-5 | 9-12 |
| Slot numbers containing SSB Note 2 | 1 | 1 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+39)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.3.10.2.17 SSB pattern 17 in FR2: SSB allocation for SSB SCS=480 kHz in 400 MHz

Table A.3.10.2.17-1: SSB.17 FR2: SSB Pattern 17 for SSB SCS = 480 kHz in 400 MHz channel with 1 SSB per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 400 MHz |
| SSB SCS | 480 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 1 |
| Symbol numbers containing SSBs Note 2 | 9-12 |
| 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. |

A.3.10.2.18 SSB pattern 18 in FR2: SSB allocation for SSB SCS=960 kHz in 400 MHz

Table A.3.10.2.18-1: SSB.18 FR2: SSB Pattern 18 for SSB SCS = 960 kHz in 400 MHz channel with 1 SSB per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 400 MHz |
| SSB SCS | 960 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 1 |
| Symbol numbers containing SSBs Note 2 | 9-12 |
| 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+39)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.15.3.1.1 Intra-frequency handover from FR2-2 carrier with CCA to FR2-2 carrier with CCA; unknown target cell

##### A.15.3.1.1.1 Test Purpose and Environment

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

##### A.15.3.1.1.2 Test Parameters

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

The test scenario comprises of 1 carrier and two cells on the carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.15.3.1.1.2-1: Intra-frequency handover from FR2-2 carrier with CCA to FR2-2 carrier with CCA test configurations

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

Table A.15.3.1.1.2-2: General test parameters for Intra-frequency handover from FR2-2 carrier with CCA to FR2-2 carrier with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 | On the carrier under CCA |
|  | Neighbouring cell |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell |  | Cell 2 | On the carrier under CCA |
| A4-Offset | dBm | -120 |  |
| DL CCA model |  | A.3.26.2.1 |  |
| UL CCA model |  | A.3.26.2.2 |  |
| Hysteresis | dB | 0 |  |
| Time To Trigger | s | 0 |  |
| Filter coefficient |  | 0 | L3 filtering is not used |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells |  | 3 μs | Synchronous cells |
| T1 | s | 5 |  |
| T2 | s | ≤10 |  |

Table A.15.3.1.1.2-3: Cell specific test parameters for Intra-frequency handover from FR2-2 carrier with CCA to FR2-2 carrier with CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell 2 |
|  |  | T1 | T2 | T1 | T2 |
| Assumption for UE beamsNote 6 |  | 1,2,3 | Rough | Rough |
| AoA setup |  | 1,2,3 | Setup 1 as defined in A.3.15 |
| NR RF Channel Number |  | 1,2,3 | 1 | 1 |
| PCCA\_DL |  | 1,2,3 | 0.93 | 0.93 |
| PCCA\_UL |  | 1,2,3 | 1 | 1 |
| Duplex mode |  | 1,2,3 | TDD |
| TDD configuration |  | 1 | TBD |
|  | 2 | TBD |
|  | 3 | TBD |
| BWchannel | MHz | 1 | 100: NRB,c = 66 |
| 2 | 400: NRB,c = 66 |
| 3 | 400: NRB,c = 33 |
| Data RBs allocated |  | 1 | 66 |
|  | 2 | 66 |
|  | 3 | 33 |
| DRx Cycle | ms | 1,2,3 | Not Applicable |
| PDSCH Reference measurement channel |  | 1 | SR3.1 TDD |
|  | 2 | TBD |
|  | 3 | TBD |
| RMSI CORESET Reference Channel |  | 1 | CR3.1 TDD |
|  | 2 | TBD |
|  | 3 | TBD |
| Control Channel RMC |  | 1 | CCR.3.1 TDD |
|  | 2 | TBD |
|  | 3 | TBD |
| OCNG Patterns |  | 1,2,3 | O P. 1 |
| SMTC Configuration |  | 1,2,3 | SMTC pattern 1 |
| SSB Configuration |  | 1 | SSB. 3 FR2 |
|  | 2 | SSB.13 FR2 |
|  | 3 | SSB.14 FR2 |
| PDSCH/PDCCH subcarrier spacing | kHz | 1 | 120 |
| 2 | 480 |
| 3 | 960 |
| PUCCH/PUSCH subcarrier spacing | kHz | 1 | 120  |
| 2 | 480 |
| 3 | 960 |
| PRACH configuration |  | 1,2,3 | FR2 PRACH configuration 1 |
| TRS configuration |  | 1 | TRS.2.1 TDD |
|  | 2 | TBD |
|  | 3 | TBD |
| PDSCH/PDCCH TCI state |  | 1,2,3 | TCI.State.2 |
| BWP configuraiton  | Initial DL BWP |  | 1,2,3 | DLBWP.0.1 |
| Dedicated DL BWP |  | 1,2,3 | DLBWP.1.1 |
| Initial UL BWP |  | 1,2,3 | ULBWP.0.1 |
| Dedicated UL BWP |  | 1,2,3 | ULBWP.1.1 |
| EPRE ratio of PSS to SSS | dB |  | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |  |
| Note2 | dBm/15kHz |  | -104.7 |
| Note2 | dBm/SCS | 1 | -95.7 |
| 2 | -89.7 |
| 3 | -86.7 |
|  | dB |  | 6 | -1.8 | -Infinity | 0 |
|  | dB |  | 6 | 6 | -Infinity | 7 |
| IoNote3 | dBm/95.04 MHz Note4 |  | -59.7 | -56.7 | -59.7 | -56.7 |
| dBm/380.16 MHz Note4 |  | -53.7 | -50.7 | -53.7 | -50.7 |
| Propagation condition | - |  | AWGN | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zoneNote 5: As observed with 0 dBi gain antenna at the centre of the quiet zone Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

##### A.15.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than RRC procedure delay + Tinterrupt from the beginning of time period T2.

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

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

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

Tinterrupt is defined in clause 6.1B.1.3.2.

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

##### A.15.3.1.2.1 Test Purpose and Environment

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

##### A.15.3.1.2.2 Test Parameters

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

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

Table A.15.3.1.2.2-1: Inter-frequency handover from FR1 to FR2-2 carrier with CCA test configurations

|  |  |  |
| --- | --- | --- |
| **Configuration** | **Description for target cell** | **Description for serving cell** |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations |

Table A.15.3.1.2.2-2: General test parameters Inter-frequency handover from FR1 to FR2-2 carrier with CCA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 | On carrier with CCA |
| Final condition | Active cell |  | Cell 2 | On carrier with CCA |
| A4-Offset | dBm | -120 |  |
| DL CCA model |  | A.3.26.2.1 |  |
| UL CCA model |  | A.3.26.2.2 |  |
| Hysteresis | dB | 0 |  |
| Time To Trigger | s | 0 |  |
| Filter coefficient |  | 0 | L3 filtering is not used |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells |  | 3 μs | Synchronous cells |
| T1 | s | 5 |  |
| T2 | s | ≤10 |  |

Table A.15.3.1.2.2-3: Cell specific test parameters for NR FR1-FR2-2 carrier with CCA Inter frequency handover test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell 2 |
|  |  | T1 | T2 | T1 | T2 |
| Assumption for UE beamsNote 6 |  | 1,2,3 | - | Rough |
| AoA setup |  | 1,2,3 | - | Setup 1 as defined in A.3.15 |
| NR RF Channel Number |  | 1,2,3 | 1 | 2 |
| PCCA\_DL |  | 1,2,3 | - | 0.93 |
| PCCA\_UL |  | 1,2,3 | - | 1 |
| Duplex mode |  | 1 | FDD | TDD |
|  | 2,3 | TDD | TDD |
| TDD configuration |  | 1 | - | TBD |
|  | 2 | TDDConf.1.1 | TBD |
|  | 3 | TDDConf.2.1 | TBD |
| BWchannel | MHz | 1 | 10: NRB,c = 52 | 100: NRB,c = 66 |
| 2 | 10: NRB,c = 52 | 400: NRB,c = 66 |
| 3 | 40: NRB,c = 106 | 400: NRB,c = 33 |
| Data RBs allocated |  | 1 | 52 | 66 |
|  | 2 | 52 | 66 |
|  | 3 | 106 | 33 |
| DRx Cycle | ms | 1,2,3 | Not Applicable | Not Applicable |
| PDSCH Reference measurement channel |  | 1 | SR.1.1 FDD | SR3.1 TDD |
|  | 2 | SR.1.1 TDD | TBD |
|  | 3 | SR2.1 TDD | TBD |
| RMSI CORESET Reference Channel |  | 1 | CR.1.1 FDD | CR3.1 TDD |
|  | 2 | CR.1.1 TDD | TBD |
|  | 3 | CR2.1 TDD | TBD |
| Control Channel RMC |  | 1 | CCR.1.1 FDD  | CCR.3.1 TDD |
|  | 2 | CCR.1.1 TDD | TBD |
|  | 3 | CCR.2.1 TDD | TBD |
| OCNG Patterns |  | 1,2,3 | O P. 1 | O P. 1 |
| SMTC Configuration |  | 1 | SMTC.1 | SMTC pattern 1 |
|  |  | 2,3 | SMTC.2 | SMTC pattern 1 |
| SSB Configuration |  | 1 | SSB.1 FR1 | SSB. 3 FR2 |
|  | 2 | SSB.1 FR1 | SSB.13 FR2 |
|  | 3 | SSB.2 FR1 | SSB.14 FR2 |
| PDSCH/PDCCH subcarrier spacing | kHz | 1 | 15  | 120 |
| 2 | 30 | 480 |
| 3 | 30 | 960 |
| PUCCH/PUSCH subcarrier spacing | kHz | 1 | 15  | 120  |
| 2 | 30 | 480 |
| 3 | 30 | 960 |
| PRACH configuration |  | 1,2,3 | FR1 PRACH configuration 1 | FR2 PRACH configuration 1 |
| TRS configuration |  | 1 | TRS.1.1 FDD | TRS.2.1 TDD |
|  | 2 | TRS.1.1 TDD | TBD |
|  | 3 | TRS.1.2 TDD | TBD |
| PDSCH/PDCCH TCI state |  | 1,2,3 | - | TCI.State.2 |
| BWP configuraiton  | Initial DL BWP |  | 1,2,3 | DLBWP.0.1 | DLBWP.0.1 |
| Dedicated DL BWP |  | 1,2,3 | LBWP.1.1 | DLBWP.1.1 |
| Initial UL BWP |  | 1,2,3 | ULBWP.0.1 | ULBWP.0.1 |
| Dedicated UL BWP |  | 1,2,3 | ULBWP.1.1 | ULBWP.1.1 |
| EPRE ratio of PSS to SSS | dB |  | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |  |
| Note2 | dBm/15kHz |  | Link only, see clause A.3.7A | -104.7 |
| Note2 | dBm/SCS | 1 |  | -95.7 |
| 2 |  | -89.7 |
| 3 |  | -86.7 |
|  | dB |  |  | -Infinity | 7 |
|  | dB |  |  | -Infinity | 7 |
| IoNote3 | dBm/95.04 MHz Note4 |  |  | -58.9 | -58.9 |
| dBm/380.16 MHz Note4 |  |  | -52.9 | -52.9 |
| Propagation condition | - |  |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zoneNote 5: As observed with 0 dBi gain antenna at the centre of the quiet zone Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

##### A.15.3.1.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than RRC procedure delay + Tinterrupt from the beginning of time period T2.

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

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

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

Tinterrupt is defined in clause 6.1B.1.4.2.

<End of Change 2>