**3GPP TSG-RAN4 Meeting #112 *R4-2413970***

**Maastricht, Netherlands, 19th Aug 2024 - 23rd Aug 2024**

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| --- |
| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **4827** | **rev** | **-** | **Current version:** | **18.6.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network |  |

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|  |
| ***Title:***  | CR for Rel-18 eEMR test cases |
|  |  |
| ***Source to WG:*** | Nokia, Huawei, HiSilicon |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_Mob\_enh2-Perf |  | ***Date:*** | 2024-08-23 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***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](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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | Errors in the existing eEMR test cases and proposal to add two new test cases. |
|  |  |
| ***Summary of change:*** | * Corrections to some of the existing eEMR test cases.
* Proposal to add eEMR test cases for FR1 and FR2 for the case when UE has valid measurement results to report at connection setup.
* Adding new test cases because measValidationReportEMR-r18 and, measValidationReportReselectionMeasurements-r18 are different. The configurations for both measurement and reporting are also independent, therefore separate test cases are needed
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|  |  |
| ***Consequences if not approved:*** | Errors in the existing test cases and insufficient test coverage remain in the specification. |
|  |  |
| ***Clauses affected:*** | A.6.6.9.2, A.7.23.1, A.7.23.2, A.7.23.3  |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  |  |
| ***affected:*** |  | **x** |  Test specifications |  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** | Merge R4-2412214  |
|  |  |
| ***This CR's revision history:*** |  |

<< Change 1 >>

A.6.6.9.2 Test case for Idle mode fast CA/DC eEMR measurement for FR1 without valid reporting

A.6.6.9.2.1 Test Purpose and Environment

The purpose of this test is to verify UE measurement reporting behaviour as specified in clause 4.7 when the UE supports *measValidationReportEMR-r18*. This test will partly verify the fast CA/DC measurement reporting requirements in clause 4.7 when *measIdleValidityDuration* is configured for the test case when there are no measurement results to report at RRC connection setup.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as inter-frequency neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.9.2.1-1, A.6.6.9.2.1-2, A.6.6.9.2.1-3.

The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively.

During T1, the UE is connected to cell 1 only and shall not have any timing information of cell 2. UE is configured with early measurement reporting for cell 2 in *measIdleCarrierListNR-r16*. Beam level reporting for early measurements is not configured. The time point when UE receives RRC\_Release message from the TE defines the starting point of T2.

During T2 and T3 the UE is in idle mode.

At the beginning of T2, cell 2 becomes detectable however cell reselection shall not be performed. Signal level of cell 2 is set to the value given in Table A.6.6.9.2.1-3. The time when T331 timer expires defines the ending point of T2.

At the beginning of T3, the signal level of the neibour cell is set to turned off.The duration of the T3 equals to *measIdleValidityDuration.*

The time when TE sends the paging message is defined as the starting point of T4. During T4, in this test the UE shall not send measurement report.

**Table A.6.6.9.2.1-1: supported test configuration**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurationsNote 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell |

**Table A.6.6.9.2.1-2: General test parameters for Idle mode fast CA/DC eEMR measurement for FR1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
|  |  |  |  |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | Two FR1 NR carrier frequencies are used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell2 | NR cell 2 is on NR RF channel number 2.  |
| SMTC-SSB parameters |  | Config 1 | SSB.1 FR1 | As specified in clause A.3.10.1 |
|  |  | Config 2 | SSB.1 FR1 | As specified in clause A.3.10.1 |
|  |  | Config 3 | SSB.2 FR1 | As specified in clause A.3.10.1 |
| Hysteresis | dB | Config 1,2,3 | 0 |  |
| PRACH configuration index |  | Config 1,2,3 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| CP length |  | Config 1,2,3 | Normal |  |
| TimeToTrigger | s | Config 1,2,3 | 0 |  |
| Filter coefficient |  | Config 1,2,3 | 0 | L3 filtering is not used |
| DRX in connected mode |  | Config 1,2,3 | OFF | DRX is not used |
| DRX in idle mode | s | Config 1,2,3 | 0.32 | The value shall be used for all cells in the test. |
| T331 | s |  | 30 |  |
| *measIdleValidityDuration*  | s |  | 10 |  |
| Time offset between serving and neighbour cells |  | Config 1 | 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 | 5 |  |
| T2 | s | Config 1,2,3 | 30 |  |
| T3 | s | Config 1,2,3 | 10 |  |
| T4 | s | Config 1,2,3 | 1 |  |

**Table A.6.6.9.2.1-3: Cell specific test parameters for Idle and connected mode for fast CA/DC eEMR measurement for FR1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | **Cell 2** |
|  |  |  | **T1** | **T2** | **T3** | **T4** | **T1** | **T2** | **T3** | **T4** |
| NR RF Channel Number |  | Config 1,2,3 | 1 | 2 |
| Duplex mode |  | Config 1 | FDD |
|  |  | Config 2,3 | TDD |
| TDD configuration |  | N.A | N.A |
|  |  | TDDConf.1.1 | TDDConf.1.1 |
|  |  | TDDConf.2.1 | TDDConf.2.1 |
| BWchannel | MHz | Config 1,2 | 10: NRB,c = 52 |
|  |  | Config 3 | 40: NRB,c = 106 |
| BWP BW | MHz | Config 1,2 | 10: NRB,c = 52 |
|  |  | Config 3 | 40: NRB,c = 106 |
| BWP configuration | Initial DL BWP |  | Config 1, 2, 3 | DLBWP.0.1 | NA |
|  | Initial UL BWP |  |  | ULBWP.0.1 | NA |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | NA |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | NA |
| TRS configuration |  | Config 1 | 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 | OP.1 | OP.1 |
| PDSCH Reference measurement channel |  | Config 1 | SR.1.1 FDD | SR.1.1 FDD |
|  |  | Config 2 | SR.1.1 TDD | SR.1.1 TDD |
|  |  | Config 3 | SR2.1 TDD | SR2.1 TDD |
| CORESET Reference Channel |  | Config 1 | CR.1.1 FDD | CR.1.1 FDD |
|  |  | Config 2 | CR.1.1 TDD | CR.1.1 TDD |
|  |  | Config 3 | CR2.1 TDD | CR2.1 TDD |
| SSB parameters |  | Config 1 | SSB.1 FR1 | SSB.5 FR1 |
|  |  | Config 2 | SSB.1 FR1 | SSB.5 FR1 |
|  |  | Config 3 | SSB.2 FR1 | SSB.6 FR1 |
| SMTC configuration defined in A.3.11 |  | Config 1 | SMTC.2 | SMTC.5 |
|  |  | Config 2, 3 | SMTC.1 | SMTC.4 |
| 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 |  | -98 | -98 |
| Note2 | dBm/SCS | Config 1,2 | -98 | -98 |
|  |  | Config 3 | -95 | -95 |
| SS-RSRP Note 3 | dBm/SCS | Config 1,2 | -91 | -infinity | -98 | infinity | infinity |
|  |  | Config 3 | -88 | -infinity | -95 | infinity | infinity |
|  | dB | Config 1,2,3 | 7 | - infinity | 0 | infinity | infinity |
|  | dB | Config 1,2,3 | 7 | infinity | 0 | infinity | infinity |
| IoNote3 | dBm/9.36MHz | Config 1,2 | -62.26 | -70.05 | -67.04 | -70.05 | -70.05 |
|  | dBm/38.16MHz | Config 3 | -56.15 | -63.96 | -60.93 | -63.96 | -63.96 |
| 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. |

A.6.6.9.2.2 Test Requirements

During the period T2 and T3, the UE shall not perform reselection.

At the start of T4 the UE is paged for connection setup. During the connection setup the UE is requested to transmit early measurement report for cell 2.

The UE shall NOT send early measurement report to the PCell in this test.

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

<< End of Change 1 >>

<< Change 2 >>

A.7.6.23.1 Test case for Idle mode fast CA/DC eEMR measurement for FR2 without valid reporting

A.7.6.23.1.1 Test Purpose and Environment

The purpose of this test is to verify UE measurement reporting behaviour as specified in clause 4.7 when the UE supports *measValidationReportEMR-r18*. This test will partly verify the fast CA/DC measurement reporting requirements in clause 4.7 when *measIdleValidityDuration* is configured for the test case when there are no measurement results to report at RRC connection setup.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as inter-frequency neighbour cell in FR2 on NR RF channel 2. The test parameters are given in Tables A.7.6.23.1.1-1, A.7.6.23.1.1-2, A.7.6.23.1.1-3 and A.7.6.23.1.1-4.

The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively.

Before T1, the UE is connected to cell 1 and configured with inter-frequency measurement on cell 2 with periodic reporting. The time when a valid measurement report is received at TE defines the starting point of T1.

During T1, the UE is configured with early measurement reporting for cell 2 in *measIdleCarrierListNR-r16*. Beam level reporting for early measurements is not configured. The time point when UE receives RRC\_Release message from the TE defines the starting point of T2.

During T2 and T3 the UE is in idle mode.

At the beginning of T2, cell 2 becomes detectable however cell reselection shall not be performed. Signal level of cell 2 is set to the value given in Table A.7.6.23.1.1-3. The time when T331 timer expires defines the ending point of T2.At the beginning of T3, the signal level of the cell 2 is set to turned off.The duration of the T3 equals to *measIdleValidityDuration.*

The time when TE sends the paging message is defined as the starting point of T4. During T4, in this test the UE shall not send measurement report.

**Table A.7.6.23.1.1-1: supported test configuration**

|  |  |  |
| --- | --- | --- |
| **Config** | **Description for serving cell** | **Description for neighbor cell** |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurationsNote 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell |

**Table A.7.6.23.1.1-2: General test parameters for Idle mode fast CA/DC eEMR measurement for FR2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
|  |  |  |  |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | One FR1 and one FR2 NR carrier frequencies are used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell2 | NR cell 2 is on NR RF channel number 2.  |
| SMTC-SSB parameters |  | Config 1 | Cell1: SSB.1 FR1Cell2: SSB.1 FR2 |  |
|  |  | Config 2 | Cell1: SSB.1 FR1Cell2: SSB.1 FR2 |  |
|  |  | Config 3 | Cell1: SSB.2 FR1Cell2: SSB.2 FR2 |  |
| Hysteresis | dB | Config 1,2,3 | 0 |  |
| PRACH configuration index |  | Config 1,2,3 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| CP length |  | Config 1,2,3 | Normal |  |
| TimeToTrigger | s | Config 1,2,3 | 0 |  |
| Filter coefficient |  | Config 1,2,3 | 0 | L3 filtering is not used |
| DRX in connected mode |  | Config 1,2,3 | OFF | DRX is not used |
| DRX in idle mode | s | Config 1,2,3 | 0.32 | The value shall be used for all cells in the test. |
| T331 | s |  | 30 |  |
| *measIdleValidityDuration*  | s |  | 50 |  |
| Time offset between serving and neighbour cells |  | Config 1 | 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 | 1 |  |
| T2 | s | Config 1,2,3 | 30 |  |
| T3 | s | Config 1,2,3 | 50 |  |
| T4 | s | Config 1,2,3 | 1 |  |

**Table A.7.6.23.1.1-3: Cell specific test parameters in Idle and Connected mode for Idle mode fast CA/DC eEMR measurement for FR2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | **Cell 2** |
|  |  |  | **T1** | **T2** | **T3** | **T4** | **T1** | **T2** | **T3** | **T4** |
| NR RF Channel Number |  | Config 1,2,3 | 1 | 2 |
| Duplex mode |  | Config 1 | FDD | TDD |
|  |  | Config 2,3 | TDD | TDD |
| TDD configuration |  | N.A | N.A  | TDDConf.3.1 |
|  |  | TDDConf.1.1 | TDDConf.1.1 | TDDConf.3.1 |
|  |  | TDDConf.2.1 | TDDConf.2.1 | TDDConf.3.1 |
| BWchannel | MHz | Config 1,2 | 10: NRB,c = 52 | 100: NRB,c = 66 |
|  |  | Config 3 | 40: NRB,c = 106 | 100: NRB,c = 66 |
| BWP BW | MHz | Config 1,2 | 10: NRB,c = 52 | 100: NRB,c = 66 |
|  |  | Config 3 | 40: NRB,c = 106 | 100: NRB,c = 66 |
| BWP configuration | Initial DL BWP |  | Config 1, 2, 3 | DLBWP.0.1 | NA |
|  | Initial UL BWP |  |  | ULBWP.0.1 | NA |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | NA |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | NA |
| TRS configuration |  | Config 1 | 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 | OP.1 | OP.1 |
| PDSCH Reference measurement channel |  | Config 1 | SR.1.1 FDD | SR.3.1 TDD |
|  |  | Config 2 | SR.1.1 TDD | SR.3.1 TDD |
|  |  | Config 3 | SR2.1 TDD | SR.3.1 TDD |
| CORESET Reference Channel |  | Config 1 | CR.1.1 FDD | CR.3.1 TDD |
|  |  | Config 2 | CR.1.1 TDD | CR.3.1 TDD |
|  |  | Config 3 | CR2.1 TDD | CR.3.1 TDD |
| SSB parameters |  | Config 1 | SSB.1 FR1 | SSB.1 FR2 |
|  |  | Config 2 | SSB.1 FR1 | SSB.1 FR2 |
|  |  | Config 3 | SSB.2 FR1 | SSB.1 FR2 |
| SMTC configuration defined in A.3.11 |  | Config 1 | SMTC.2 | SMTC.1 |
|  |  | Config 2, 3 | SMTC.1 | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2 | 15 | 120 |
|  |  | Config 3 | 30 | 120 |
| 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 |  | -98 | See Table A.7.6.23.1.1-4 |
| Note2 | dBm/SCS | Config 1,2 | -98 |
|  |  | Config 3 | -95 |
| SS-RSRP Note 3 | dBm/SCS | Config 1,2 | -91 |
|  |  | Config 3 | -88 |
|  | dB | Config 1,2,3, | 7 |
|  | dB | Config 1,2,3 | 7 |
| IoNote3 | dBm/9.36MHz | Config 1,2 | -62.26 |
|  | dBm/38.16MHz | Config 3 | -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.7.6.23.1.1-4: OTA related test parameters for Test case Idle mode fast** **CA/DC eEMR measurement for FR2**

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | Cell 2 |
| T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| Angle of arrival configuration |  | N/A | Setup 1 defined in clause A.3.15.1 |
| Assumption for UE beams Note 7 |  | N/A | Rough |
| Note 1 | Config 1,2,3 | dBm/15kHz | N/A | -104.7 | -104.7 | -104.7 | -104.7 |
| Note 1 | Config 1,2,3 | dBm/SCS | -95.7 | -95.7 | -95.7 | -95.7 |
|  | Config 1,2,3 | dB | 7 | 7 | -infinity | -infinity |
|  | Config 1,2,3 | dB | 7 | 7 | -infinity | -infinity |
| SSB\_RPNote 2, Note 4  | Config 1,2,3 | dBm/SCS | -88.7 | -88.7 | -infinity | -infinity |
| IoNote 2, Note 4 | Config 1,2,3 | dBm/95.04 MHz | -58.92 | -58.92 | -66.68 | -66.68 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.Note 2: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 3: VoidNote 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zoneNote 5: VoidNote 6: Void Note 7: Information about types of UE beam is given in B.2.1.3 and does not imit UE implementation or test system implementation. |

A.7.6.23.1.2 Test Requirements

During the period T2 and T3, the UE shall not perform reselection.

At the start of T4 the UE is paged for connection setup. During the connection setup the UE is requested to transmit early measurement report for cell 2.

The UE shall NOT send early measurement report to the PCell in this test.

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

<< End of Change 2 >>

<< Change 3 >>

A.7.6.23.2 Test case for Idle mode fast CA/DC cell reselection measurement for FR2 without valid reporting

A.7.6.23.2.1 Test Purpose and Environment

The purpose of this test is to verify UE measurement reporting behaviour as specified in clause 4.7 when the UE supports *measValidationReportReselectionMeasurements-r18* This test will partly verify the fast CA/DC measurement reporting requirements in clause 4.7 when *measReselectionValidityDuration-r18* is configured for te test case when there are no measurement results to report at RRC connection setup.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as inter-frequency neighbour cell in FR2 on NR RF channel 2. The test parameters are given in Tables A.7.6.23.2-1, A.7.6.23.2-2, A.7.6.23.2-3 and A.7.6.23.2-4.

The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively.

Before T1, the UE is connected to cell 1 and configured with inter-frequency measurement on cell 2 with periodic reporting. The time when a valid measurement report is received at TE defines the starting point of T1.

During T1, the UE is configured with early measurement reporting for cell 2 in *MeasReselectionCarrierListNR-r18*. Beam level reporting for early measurements is not configured. The time point when UE receives RRC\_Release message from the TE defines the starting point of T2.

During T2 and T3 the UE is in idle mode.

At the beginning of T2, cell 2 becomes detectable however no cell reselection is being performed. Signal level of cell 2 is set to the level according to Table A.7.6.23.2-3. The duration of T2 is set to fixed value according to the Table A.7.6.23.2-2.

At the beginning of T3, the signal level of the cell 2 is set to turned off.The duration of the T3 equals to *measReselectionValidityDuration-r18.*

The time when TE sends the paging message defined as the starting point of T4.

During T4, UE shall not send measurement report.

**Table A.7.6.23.2-1: supported test configuration**

|  |  |  |
| --- | --- | --- |
| **Config** | **Description for serving cell** | **Description for neighbor cell** |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurationsNote 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell |

**Table A.7.6.23.2-2: General test parameters for Idle mode fast CA/DC cell reselection measurement for FR2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
|  |  |  |  |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | One FR1 and one FR2 NR carrier frequencies are used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell2 | NR cell 2 is on NR RF channel number 2.  |
| SMTC-SSB parameters |  | Config 1 | Cell1: SSB.1 FR1Cell2: SSB.1 FR2 |  |
|  |  | Config 2 | Cell1: SSB.1 FR1Cell2: SSB.1 FR2 |  |
|  |  | Config 3 | Cell1: SSB.2 FR1Cell2: SSB.2 FR2 |  |
| Hysteresis | dB | Config 1,2,3 | 0 |  |
| PRACH configuration index |  | Config 1,2,3 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| CP length |  | Config 1,2,3 | Normal |  |
| TimeToTrigger | s | Config 1,2,3 | 0 |  |
| Filter coefficient |  | Config 1,2,3 | 0 | L3 filtering is not used |
| DRX in connected mode |  | Config 1,2,3 | OFF | DRX is not used |
| DRX in idle mode | s | Config 1,2,3 | 0.32 | The value shall be used for all cells in the test. |
| T331 | s |  | 30 |  |
| *measIdleValidityDuration*  | s |  | 50 |  |
| Time offset between serving and neighbour cells |  | Config 1 | 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 | 1 |  |
| T2 | s | Config 1,2,3 | 30 |  |
| T3 | s | Config 1,2,3 | 50 |  |
| T4 | s | Config 1,2,3 | 1 |  |

**Table A.7.6.23.2-3: Cell specific test parameters in Idle and Connected mode for Idle mode fast CA/DC cell-reselection measurement for FR2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | **Cell 2** |
|  |  |  | **T1** | **T2** | **T3** | **T4** | **T1** | **T2** | **T3** | **T4** |
| NR RF Channel Number |  | Config 1,2,3 | 1 | 2 |
| Duplex mode |  | Config 1 | FDD | TDD |
|  |  | Config 2,3 | TDD | TDD |
| TDD configuration |  | N.A | N.A  | TDDConf.3.1 |
|  |  | TDDConf.1.1 | TDDConf.1.1 | TDDConf.3.1 |
|  |  | TDDConf.2.1 | TDDConf.2.1 | TDDConf.3.1 |
| BWchannel | MHz | Config 1,2 | 10: NRB,c = 52 | 100: NRB,c = 66 |
|  |  | Config 3 | 40: NRB,c = 106 | 100: NRB,c = 66 |
| BWP BW | MHz | Config 1,2 | 10: NRB,c = 52 | 100: NRB,c = 66 |
|  |  | Config 3 | 40: NRB,c = 106 | 100: NRB,c = 66 |
| BWP configuration | Initial DL BWP |  | Config 1, 2, 3 | DLBWP.0.1 | NA |
|  | Initial UL BWP |  |  | ULBWP.0.1 | NA |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | NA |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | NA |
| TRS configuration |  | Config 1 | 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 | OP.1 | OP.1 |
| PDSCH Reference measurement channel |  | Config 1 | SR.1.1 FDD | SR.3.1 TDD |
|  |  | Config 2 | SR.1.1 TDD | SR.3.1 TDD |
|  |  | Config 3 | SR2.1 TDD | SR.3.1 TDD |
| CORESET Reference Channel |  | Config 1 | CR.1.1 FDD | CR.3.1 TDD |
|  |  | Config 2 | CR.1.1 TDD | CR.3.1 TDD |
|  |  | Config 3 | CR2.1 TDD | CR.3.1 TDD |
| SSB parameters |  | Config 1 | SSB.1 FR1 | SSB.1 FR2 |
|  |  | Config 2 | SSB.1 FR1 | SSB.1 FR2 |
|  |  | Config 3 | SSB.2 FR1 | SSB.1 FR2 |
| SMTC configuration defined in A.3.11 |  | Config 1 | SMTC.2 | SMTC.1 |
|  |  | Config 2, 3 | SMTC.1 | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2 | 15 | 120 |
|  |  | Config 3 | 30 | 120 |
| 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 |  | -98 | See Table A.7.6.23.2-4 |
| Note2 | dBm/SCS | Config 1,2 | -98 |
|  |  | Config 3 | -95 |
| SS-RSRP Note 3 | dBm/SCS | Config 1,2 | -91 |
|  |  | Config 3 | -88 |
|  | dB | Config 1,2,3 | 7 |
|  | dB | Config 1,2,3 | 7 |
| IoNote3 | dBm/9.36MHz | Config 1,2 | -62.26 |
|  | dBm/38.16MHz | Config 3 | -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.7.6.23.2-4: OTA related test parameters for Test case Idle mode fast** **CA/DC cell-reselection measurement for FR2**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | **Cell 2** |
| **T1** | **T2** | **T3** | **T4** | **T1** | **T2** | **T3** | **T4** |
| Angle of arrival configuration |  | N/A | Setup 1 defined in clause A.3.15.1 |
| Assumption for UE beams Note 7 |  | N/A | Rough |
| Note 1 | Config 1,2,3 | dBm/15kHz | N/A | -104.7 | -104.7 | -104.7 | -104.7 |
| Note 1 | Config 1,2,3 | dBm/SCS | -95.7 | -95.7 | -95.7 | -95.7 |
|  | Config 1,2,3 | dB | 7 | 7 | -infinity | -infinity |
|  | Config 1,2,3 | dB | 7 | 7 | -infinity | -infinity |
| SSB\_RPNote 2, Note 4  | Config 1,2,3 | dBm/SCS | -88.7 | -88.7 | -infinity | -infinity |
| IoNote 2, Note 4 | Config 1,2,3 | dBm/95.04 MHz | -58.92 | -58.92 | -66.68 | -66.68 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.Note 2: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 3: VoidNote 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zoneNote 5: VoidNote 6: Void Note 7: Information about types of UE beam is given in B.2.1.3 and does not imit UE implementation or test system implementation. |

A.7.6.23.2.2 Test Requirements

During the period T2 and T3, the UE shall not perform reselection.

At the start of T4 the UE is paged for connection setup. During the connection setup the UE is requested to transmit early measurement report for cell 2.

The UE shall NOT send early measurement report to the PCell in this test.

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

<< End of Change 3 >>

<< Change 4 >>

A.7.6.23.3 Test case for Idle mode fast CA/DC cell reselection measurement for FR2 with valid reporting

A.7.6.23.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the required measurements on the serving cell and the configured inter-frequency carrier for idle mode measurement reporting after the UE has entered Idle mode when the UE supports *measValidationReportReselectionMeasurements-r18*. This test will partly verify the fast CA/DC measurement reporting requirements in clause 4.7 when *measReselectionValidityDuration-r18* is configured for the test case when there are measurement results to report at RRC connection setup.

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 FR2 on NR RF channel 2. The test parameters are given in Tables A.7.6.23.3.1-1, A.7.6.23.3.1-2, A.7.6.23.3.1-3 A.7.6.23.3.1-4.

The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively.

During T1, the UE is connected to cell 1 only and shall not have any timing information of cell 2. UE is configured with early measurement reporting for cell 2 in *MeasReselectionCarrierListNR-r18*. Beam level reporting for early measurements is not configured. The time point when UE receives RRC\_Release message from the TE defines as the starting point of T2.

During T2, cell 2 becomes detectable however no cell reselection is being performed. Signal level of cell 2 is set to fixed value according to Table A.7.6.23.3-2. The duration of T2 is set to fixed value according to the Table A.7.6.23.3-2.

The duration of the T3 equals to the configured value *measReselectionValidityDuration-r18.* During T3, the signal level of cell 2 is set to another value according to the Table A.7.6.23.3-2.

The time when TE sends the paging message defines the starting point of T4. During T4, UE shall send measurement report within the duration of T4.

**Table A.7.6.23.3-1: supported test configuration**

|  |  |  |
| --- | --- | --- |
| **Config** | **Description for serving cell** | **Description for neighbor cell** |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurationsNote 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell |

**Table A.7.6.23.3-2: General test parameters for Idle mode fast CA/DC cell reselection measurement for FR2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
|  |  |  |  |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | One FR1 and one FR2 NR carrier frequencies are used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell2 | NR cell 2 is on NR RF channel number 2.  |
| SMTC-SSB parameters |  | Config 1 | Cell1: SSB.1 FR1Cell2: SSB.1 FR2 |  |
|  |  | Config 2 | Cell1: SSB.1 FR1Cell2: SSB.1 FR2 |  |
|  |  | Config 3 | Cell1: SSB.2 FR1Cell2: SSB.2 FR2 |  |
| Hysteresis | dB | Config 1,2,3 | 0 |  |
| PRACH configuration index |  | Config 1,2,3 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| CP length |  | Config 1,2,3 | Normal |  |
| TimeToTrigger | s | Config 1,2,3 | 0 |  |
| Filter coefficient |  | Config 1,2,3 | 0 | L3 filtering is not used |
| DRX in connected mode |  | Config 1,2,3 | OFF | DRX is not used |
| DRX in idle mode | s | Config 1,2,3 | 0.32 | The value shall be used for all cells in the test. |
| T331 | s |  | 30 |  |
| *measIdleValidityDuration*  | s |  | 50 |  |
| Time offset between serving and neighbour cells |  | Config 1 | 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 | 1 |  |
| T2 | s | Config 1,2,3 | 30 |  |
| T3 | s | Config 1,2,3 | 50 |  |
| T4 | s |  | 1 |  |

**Table A.7.6.23.3-3: Cell specific test parameters in Idle and Connected mode for Idle mode fast CA/DC cell-reselection measurement for FR2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | **Cell 2** |
|  |  |  | **T1** | **T2** | **T3** | **T4** | **T1** | **T2** | **T3** | **T4** |
| NR RF Channel Number |  | Config 1,2,3 | 1 | 2 |
| Duplex mode |  | Config 1 | FDD | TDD |
|  |  | Config 2,3 | TDD | TDD |
| TDD configuration |  | N.A | N.A  | TDDConf.3.1 |
|  |  | TDDConf.1.1 | TDDConf.1.1 | TDDConf.3.1 |
|  |  | TDDConf.2.1 | TDDConf.2.1 | TDDConf.3.1 |
| BWchannel | MHz | Config 1,2 | 10: NRB,c = 52 | 100: NRB,c = 66 |
|  |  | Config 3 | 40: NRB,c = 106 | 100: NRB,c = 66 |
| BWP BW | MHz | Config 1,2 | 10: NRB,c = 52 | 100: NRB,c = 66 |
|  |  | Config 3 | 40: NRB,c = 106 | 100: NRB,c = 66 |
| BWP configuration | Initial DL BWP |  | Config 1, 2, 3 | DLBWP.0.1 | NA |
|  | Initial UL BWP |  |  | ULBWP.0.1 | NA |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | NA |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | NA |
| TRS configuration |  | Config 1 | 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 | OP.1 | OP.1 |
| PDSCH Reference measurement channel |  | Config 1 | SR.1.1 FDD | SR.3.1 TDD |
|  |  | Config 2 | SR.1.1 TDD | SR.3.1 TDD |
|  |  | Config 3 | SR2.1 TDD | SR.3.1 TDD |
| CORESET Reference Channel |  | Config 1 | CR.1.1 FDD | CR.3.1 TDD |
|  |  | Config 2 | CR.1.1 TDD | CR.3.1 TDD |
|  |  | Config 3 | CR2.1 TDD | CR.3.1 TDD |
| SSB parameters |  | Config 1 | SSB.1 FR1 | SSB.1 FR2 |
|  |  | Config 2 | SSB.1 FR1 | SSB.1 FR2 |
|  |  | Config 3 | SSB.2 FR1 | SSB.1 FR2 |
| SMTC configuration defined in A.3.11 |  | Config 1 | SMTC.2 | SMTC.1 |
|  |  | Config 2, 3 | SMTC.1 | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2 | 15 | 120 |
|  |  | Config 3 | 30 | 120 |
| 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 |  | -98 | See Table A.7.6.23.3-4 |
| Note2 | dBm/SCS | Config 1,2 | -98 |
|  |  | Config 3 | -95 |
| SS-RSRP Note 3 | dBm/SCS | Config 1,2 | -91 |
|  |  | Config 3 | -88 |
|  | dB | Config 1,2,3,4, | 7 |
|  | dB | Config 1,2,3 | 7 |
| IoNote3 | dBm/9.36MHz | Config 1,2 | -62.26 |
|  | dBm/38.16MHz | Config 3 | -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.7.6.23.3-4: OTA related test parameters for Test case Idle mode fast** **CA/DC cell-reselection measurement for FR2**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | **Cell 2** |
| **T1** | **T2** | **T3** | **T4** | **T1** | **T2** | **T3** | **T4** |
| Angle of arrival configuration |  | N/A | Setup 1 defined in clause A.3.15.1 |
| Assumption for UE beams Note 7 |  | N/A | Rough |
| Note 1 | Config 1,2,3 | dBm/15kHz | N/A | -104.7 | -104.7 | -104.7 | -104.7 |
| Note 1 | Config 1,2,3 | dBm/SCS | -95.7 | -95.7 | -95.7 | -95.7 |
|  | Config 1,2,3 | dB | 7 | 7 | -0.5 | - 0.5 |
|  | Config 1,2,3 | dB | 7 | 7 | -0.5 | -0.5 |
| SSB\_RPNote 2, Note 4  | Config 1,2,3 | dBm/SCS | -88.7 | -88.7 | -96.5 | -96.5 |
| IoNote 2, Note 4 | Config 1,2,3 | dBm/95.04 MHz | -58.92 | -58.92 | -69.3 | -69.3 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.Note 2: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 3: VoidNote 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zoneNote 5: VoidNote 6: Void Note 7: Information about types of UE beam is given in B.2.1.3 and does not imit UE implementation or test system implementation. |

A.7.6.23.3.2 Test Requirements

During the period T2 and T3 the UE shall not perform reselection.

At the start of T4 the UE is paged for connection setup. During the connection setup the UE is requested to transmit early measurement report for cell 2.

The UE shall send early measurement report to the PCell with valid measurement results.

After receiving the requested early measurement report, the test equipment verifies the accuracy of measurement reported for cell 2 meets the requirements in Section 10.1.4B for SS-RSRP and in Section 10.1.8B for SS-RSRQ and test ends. In the test case, the reported measurements are considered valid if they fulfil measurement accuracy requirements according to cell 2 signal level during T3.

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

<< End of Change 4 >>