**3GPP TSG-RAN4 Meeting #97-e *R4-2017389***

**Electronic meeting, 02 – 13 Nov., 2020**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v11.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** |  | **rev** |  | **Current version:** | **16.5.0** |  |
|  | | | | | | | | |
| *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:*** | Draft Big CR: Introduction of Rel-16 CSI-RS based L3 measurement RRM test cases | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | OPPO | | | | | | | | | |
| ***Source to TSG:*** | RAN4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_CSIRS\_L3meas-Perf | | | | |  | | ***Date:*** | | 2020-11-16 |
|  |  | | | |  | | |  | |  |
| ***Category:*** | **B** |  | | | | | | ***Release:*** | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The core requirements were completed in discussions and specified during RAN4 96-emeeting. This big CR aims to introduce test cases for CSI-RS based L3 measurement | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce the test cases for CSI-RS based intra-frequency measurement, inter-frequency measurement and measurement accuracy based on the agreed test case list in R4-2017229. It includes the endorsed CRs in RAN4 97e-meeting,   * R4-2017337, CR for CSI-RS configuration for L3 measurement, Qualcomm * R4-2017231, TC4 for intra-frequency measurement, Qualcomm * R4-2017232 , TC10 for measurement performance, Qualcomm * R4-2017233, TC1 for intra frequency measurement, TC1 for inter-frequency measurement, and TC1 for measurement performance, CATT * R4-2017234, TC2 for intra frequency measurement, and TC3 for inter-frequency measurement, Xiaomi * R4-2017314, TC2+ TC4 for measurement performance, Xiaomi * R4-2017235, TC6 for measurement performance, MTK * R4-2017237, TC2 for inter-frequency measurement, and TC5 for measurement performance, ZTE * R4-2017238, TC3 for intra-frequency measurement, Nokia * R4-2017239, TC7 for measurement performance, Nokia * R4-2017341, TC4 for inter-frequency measurement, OPPO * R4-2017310, TC8 for measurement performance, OPPO * R4-2017311, TC11 for measurement performance, OPPO * R4-2017312, TC9 for measurement performance, vivo * R4-2017313, TC3+TC12 for measurement performance, Huawei | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Performance test for measurement procedure will not be complete if not approved. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.3, A.4, A.5, A.6, A.7 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | |  | | | |
| ***Other specs*** | |  | **X** | Other core specifications | | |  | | | |
| ***affected:*** | |  | **X** | Test specifications | | |  | | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | |  | | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |

<Start of Change #1>

A.3 RRM test configurations

## A.3.X CSI-RS configurations for RRM

### A.3.X.1 FDD

**Table A.3.X.1-1: CSI-RS RRM Reference Measurement Channels for SCS=15kHz**

|  |  |
| --- | --- |
|  | **CSI-RS.RRM.FR1.1 FDD** |
| **CSI-RS-ResourceConfigMobility** |  |
| subcarrierSpacing, kHz | 15 |
| **CSI-RS-CellMobility** |  |
| cellIdnote1 | 0 |
| nrofPRBs | 48 |
| startPRB | 0 |
| density | 3 |
| **CSI-RS-Resource-Mobility** |  |
| csi-RS-Index | 0 |
| slotConfig: ms20 note2 | slot1 |
| associatedSSB | True |
| ssb-Index note3 | 0 |
| isQuasiColocated | True |
| firstOFDMSymbolInTimeDomain note4 | 10 |
| sequenceGenerationConfig | 0 |
| **Others** |  |
| nrofPorts | 1 |
| CDM Type | NoCDM |
| EPRE ratio to SSS, dB | 0 |
| Note1: unless specified otherwise  Note2: unless specified otherwise  Note3: assume the same SS/PBCH block index of the corresponding cell in the test case  Note4: unless specified otherwise | |

### A.3.X.2 TDD

**Table A.3.X.2-1: CSI-RS RRM Reference Measurement Channels for SCS=15kHz**

|  |  |
| --- | --- |
|  | **CSI-RS.RRM.FR1.1 TDD** |
| **CSI-RS-ResourceConfigMobility** |  |
| subcarrierSpacing, kHz | 15 |
| **CSI-RS-CellMobility** |  |
| cellIdnote1 | 0 |
| nrofPRBs | 48 |
| startPRB | 0 |
| density | 3 |
| **CSI-RS-Resource-Mobility** |  |
| csi-RS-Index | 0 |
| slotConfig: ms20 note2 | slot1 |
| associatedSSB | True |
| ssb-Index note3 | 0 |
| isQuasiColocated | True |
| firstOFDMSymbolInTimeDomain note4 | 10 |
| sequenceGenerationConfig | 0 |
| **Others** |  |
| nrofPorts | 1 |
| CDM Type | NoCDM |
| EPRE ratio to SSS, dB | 0 |
| Note1: unless specified otherwise  Note2: unless specified otherwise  Note3: assume the same SS/PBCH block index of the corresponding cell in the test case  Note4: unless specified otherwise | |

**Table A.3.X.2-2: CSI-RS RRM Reference Measurement Channels for SCS=30kHz**

|  |  |
| --- | --- |
|  | **CSI-RS.RRM.FR1.2 TDD** |
| **CSI-RS-ResourceConfigMobility** |  |
| subcarrierSpacing, kHz | 30 |
| **CSI-RS-CellMobility** |  |
| cellIdnote1 | 0 |
| nrofPRBs | 48 |
| startPRB | 0 |
| density | 3 |
| **CSI-RS-Resource-Mobility** |  |
| csi-RS-Index | 0 |
| slotConfig: ms20 note2 | slot1 |
| associatedSSB | True |
| ssb-Index note3 | 0 |
| isQuasiColocated | True |
| firstOFDMSymbolInTimeDomain note4 | 10 |
| sequenceGenerationConfig | 0 |
| **Others** |  |
| nrofPorts | 1 |
| CDM Type | NoCDM |
| EPRE ratio to SSS, dB | 0 |
| Note1: unless specified otherwise  Note2: unless specified otherwise  Note3: assume the same SS/PBCH block index of the corresponding cell in the test case  Note4: unless specified otherwise | |

**Table A.3.X.2-3: CSI-RS RRM Reference Measurement Channels for SCS=120kHz**

|  |  |
| --- | --- |
|  | **CSI-RS.RRM.FR2.1 TDD** |
| **CSI-RS-ResourceConfigMobility** |  |
| subcarrierSpacing, kHz | 120 |
| **CSI-RS-CellMobility** |  |
| cellIdnote1 | 0 |
| nrofPRBs | 48 |
| startPRB | 0 |
| density | 3 |
| **CSI-RS-Resource-Mobility** |  |
| csi-RS-Index | 0 |
| slotConfig: ms20 note2 | slot1 |
| associatedSSB | True |
| ssb-Index note3 | 0 |
| isQuasiColocated | True |
| firstOFDMSymbolInTimeDomain note4 | 10 |
| sequenceGenerationConfig | 0 |
| **Others** |  |
| nrofPorts | 1 |
| CDM Type | NoCDM |
| EPRE ratio to SSS, dB | 0 |
| Note1: unless specified otherwise  Note2: unless specified otherwise  Note3: assume the same SS/PBCH block index of the corresponding cell in the test case  Note4: unless specified otherwise | |

<End of Change #1>

<Start of Change #2>

## A.4.6 Measurement procedure

A.4.6.x CSI-RS based intra-frequency Measurement

A.4.6.x.1 EN-DC event triggered reporting tests without gap under DRX

A.4.6.x.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.4.6.x.1.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.x.1.2-1, A.4.6.x.1.2-2, A.4.6.x.1.2-3 and A.4.6.x.1.2-4 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used for the CSI-RS based L3 intra-frequency measurements. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.4.6.x.1.2-1: Supported test configurations**

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

**Table A.4.6.x.1.2-2: General test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Value** | | **Comment** |
|  |  | **configuration** | **Test 1** | **Test 2** |  |
| **Active cell** |  | 1, 2, 3, 4, 5, 6 | E-UTRAN Cell 1 and NR Cell 2 | |  |
| **Neighbour cell** |  | 1, 2, 3, 4, 5, 6 | NR Cell 3 | | Cell to be identified. |
| **RF Channel Number** |  | 1, 2, 3, 4, 5, 6 | 1: Cell 1  2: Cell 2 and Cell 3 | |  |
| **SSB configuration** |  | 1, 4 | SSB.1 FR1 | |  |
|  |  | 2, 5 | SSB.1 FR1 | |  |
|  |  | 3, 6 | SSB.2 FR1 | |  |
| **CSI-RS configuration for mobility** |  | 1, 4 | CSI-RS.RRM.FR1.1 FDD | |  |
|  | 2, 5 | CSI-RS.RRM.FR1.1 TDD | |  |
|  | 3, 6 | CSI-RS.RRM.FR1.2 TDD | |  |
| **SMTC configuration** |  | 1, 4 | SMTC.2 | |  |
|  |  | 2, 5 | SMTC.1 | |  |
|  |  | 3, 6 | SMTC.1 | |  |
| A3-Offset | dB | 1, 2, 3, 4, 5, 6 | -4.5 | |  |
| CP length |  | 1, 2, 3, 4, 5, 6 | Normal | |  |
| Hysteresis | dB | 1, 2, 3, 4, 5, 6 | 0 | |  |
| Time To Trigger | s | 1, 2, 3, 4, 5, 6 | 0 | |  |
| Filter coefficient |  | 1, 2, 3, 4, 5, 6 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2, 3, 4, 5, 6 | DRX.1 | DRX.2 |  |
| Time offset between PCell and PSCell |  | 1, 2, 3, 4, 5, 6 | 3 μs [TBD] | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | 1, 4 | 3 ms [TBD] | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | 2, 5 | 3 μs [TBD] | | Synchronous cells |
|  |  | 3, 6 | 3 μs [TBD] | | Synchronous cells |
| T1 | s | 1, 2, 3, 4, 5, 6 | 5 | |  |
| T2 | s | 1, 2, 3, 4, 5, 6 | 5 | 10 |  |

**Table A.4.6.x.1.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Cell 2** | | **Cell 3** | |
|  |  | **configuration** | **T1** | **T2** | **T1** | **T2** |
| TDD |  | 1, 4 | N/A | | N/A | |
| configuration |  | 2, 5 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC |  | 1, 4 | SR.1.1 FDD | | N/A | |
| configuration |  | 2, 5 | SR.1.1 TDD | |  | |
|  |  | 3, 6 | SR.2.1 TDD | |  | |
| RMSI CORESET |  | 1, 4 | CR.1.1 FDD | | CR.1.1 FDD | |
| RMC |  | 2, 5 | CR.1.1 TDD | | CR.1.1 TDD | |
| configuration |  | 3, 6 | CR.2.1 TDD | | CR.2.1 TDD | |
| Dedicated |  | 1, 4 | CCR.1.1 FDD | | CCR.1.1 FDD | |
| CORESET RMC |  | 2, 5 | CCR.1.1 TDD | | CCR.1.1 TDD | |
| configuration |  | 3, 6 | CCR.2.1 TDD | | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3, 4, 5, 6 | OP.1 | | OP.1 | |
| TRS |  | 1, 4 | TRS.1.1 FDD | | N/A | |
| configuration |  | 2, 5 | TRS.1.1 TDD | | N/A | |
|  |  | 3, 6 | TRS.1.2 TDD | | N/A | |
| Initial BWP configuration |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3, 4, 5, 6 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3, 4, 5, 6 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  |  | 2, 5 | -98 | | | |
|  |  | 3, 6 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  |  | 2, 5 |  | | | |
|  |  | 3, 6 |  | | | |
|  | dB | 1, 4 | 4 | -1.46 | -Infinity | -1.46 |
|  |  | 2, 5 |  |  |  |  |
|  |  | 3, 6 |  |  |  |  |
|  | dB | 1, 4 | 4 | 4 | -Infinity | 4 |
|  |  | 2, 5 |  |  |  |  |
|  |  | 3, 6 |  |  |  |  |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -94 | -94 | -94 | -94 |
|  |  | 2, 5 | -94 | -94 | -94 | -94 |
|  |  | 3, 6 | -91 | -91 | -91 | -91 |
| CSI-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -94 | -94 | -Infinity | -94 |
|  | 2, 5 | -94 | -94 | -Infinity | -94 |
|  | 3, 6 | -91 | -91 | -Infinity | -91 |
| Io | dBm/9.36 MHz | 1, 4 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/9.36 MHz | 2, 5 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/38.16 MHz | 3 | -58.50 | -56.16 | -58.50 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and CSI-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

A.4.6.x.1.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [920] ms from the beginning of time period T2. The UE is required to read the SSB index indicated by associatedSSB in the neighbour cell in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [6400] ms from the beginning of time period T2. The UE is required to read the SSB index indicated by associatedSSB in the neighbour cell in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

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

A.4.6.y CSI-RS based inter-frequency Measurement

A.4.6.y.1 EN-DC event triggered reporting tests for FR1 cell when non-DRX is used

A.4.6.y.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell measurement requirements in clause 9.10.3.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.y.1.1-1, A.4.6.y.1.1-2, and A.4.6.y.1.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.4.6.y.1.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.4.6.2.2.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

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

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.y.1.1-1.

**Table A.4.6.y.1.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2 | |

**Table A.4.6.y.1.1-2: General test parameters for EN-DC inter-frequency event triggered reporting**

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

**Table A.4.6.2.2.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Cell 2** | | **Cell 3** | |
|  |  | **configuration** | **T1** | **T2** | **T1** | **T2** |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode |  | Config 1,4 | FDD | | | |
|  |  | Config 2,3,5,6 | TDD | | | |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 | | | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | | |
| BWP BW | MHz | Config 1,4 | 10: NRB,c = 52 | | | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | | |
| TDD configuration |  | Config 2,5 | TDDConf.1.1 | | | |
|  |  | Config 3,6 | TDDConf.2.1 | | | |
| Initial DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | NA | |
| Initial UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | NA | |
| TRS configuration |  | Config 1,4 | TRS.1.1 FDD | | NA | |
|  |  | Config 2,5 | TRS.1.1 TDD | | NA | |
|  |  | Config 3,6 | TRS.1.2 TDD | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | Config 1,2,3,4,5,6 | OP.1 | | OP.1 | |
| PDSCH Reference |  | Config 1,4 | SR.1.1 FDD | | - | |
| measurement channel |  | Config 2,5 | SR.1.1 TDD | |  | |
|  |  | Config 3,6 | SR2.1 TDD | |  | |
| CORESET Reference |  | Config 1,4 | CR.1.1 FDD | | - | |
| Channel |  | Config 2,5 | CR.1.1 TDD | |  | |
|  |  | Config 3,6 | CR2.1 TDD | |  | |
| SSB parameters |  | Config 1,4 | SSB.1 FR1 | | SSB.5 FR1 | |
|  |  | Config 2,5 | SSB.1 FR1 | | SSB.5 FR1 | |
|  |  | Config 3,6 | SSB.2 FR1 | | SSB.6 FR1 | |
| CSI-RS configuration for mobility |  | Config 1 | CSI-RS-L3 1.1 FDD | | | |
| Config 4 | CSI-RS-L3 1.2 FDD | | | |
|  | Config 2,5 | CSI-RS-L3 1.1 TDD | | | |
| Config 3,6 | CSI-RS-L3 1.2 TDD | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2,4,5 | 15 | | | |
|  |  | Config 3,6 | 30 | | | |
| EPRE ratio of PSS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  | Config 1,2,3,4,5,6 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |
| Note2 | dBm/15kHz |  | -98 | | -98 | |
| Note2 | dBm/SCS | Config 1,2,4,5 | -98 | | -98 | |
|  |  | Config 3,6 | -95 | | -95 | |
| SS-RSRP Note 3 | dBm/SCS | Config 1,2,4,5 | -94 | -94 | -Infinity | -91 |
|  |  | Config 3,6 | -91 | -91 | -Infinity | -88 |
| CSI-RSRP Note 3 | dBm/SCS | Config 1,2,4,5 | -94 | -94 | -Infinity | -91 |
|  |  | Config 3,6 | -91 | -91 | -Infinity | -88 |
|  | dB | Config 1,2,3,4,5,6 | 4 | 4 | -Infinity | 7 |
|  | dB | Config 1,2,3,4,5,6 | 4 | 4 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | Config 1,2,4,5 | -64.59 | -64.59 | -70.05 | -62.26 |
|  | dBm/38.16MHz | Config 3,6 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition |  | Config 1,2,3,4,5,6 | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP, CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | |

A.4.6.y.1.2 Test Requirements

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

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

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

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

<End of Change #2>

<Start of Change #3>

A.4.7.X CSI-RSRP

A.4.7.X.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.X.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.2.2.1 and 10.1.2.2.2 for intra-frequency CSI-RS based L3 measurements.

A.4.7.X.1.2 Test parameters

In this set of test cases all NR cells are on the same carrier frequency. Supported test configurations are shown in table A.4.7.X.1.2-1. Both absolute and relative accuracy of CSI-RSRP intra-frequency measurements are tested by using the parameters in A.4.7.X.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

**Table A.4.7.X.1.2-1: CSI-RSRP Intra frequency CSI-RSRP supported test configurations**

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

**Table A.4.7.X.1.2-2: CSI-RSRP Intra frequency test parameters**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Test 1** | | | | | | **Test 2** | | | **Test 3** | | |
|  | | | | |  | **Cell 2** | | **Cell 3** | | | | **Cell 2** | **Cell 3** | | **Cell 2** | | **Cell 3** |
| Physical cell ID | | | | |  | 489 | | 0 | | | | 489 | | 0 | 489 | | 0 |
| SSB ARFCN | | | | |  | freq1 | | | | | | freq1 | | | freq1 | | |
| Duplex mode | | | Config 1,4 | |  | FDD | | | | | | | | | | | |
|  | | | Config 2,3,5,6 | |  | TDD | | | | | | | | | | | |
| TDD configuration | | | Config 1,4 | |  | Not Applicable | | | | | | | | | | | |
|  | | | Config 2,5 | |  | TDDConf.1.1 | | | | | | | | | | | |
|  | | | Config 3,6 | |  | TDDConf.2.1 | | | | | | | | | | | |
| BWchannel | | | Config 1,4 | | MHz | 10: NRB,c = 52 | | | | | | | | | | | |
|  | | | Config 2,5 | |  | 10: NRB,c = 52 | | | | | | | | | | | |
|  | | | Config 3,6 | |  | 40: NRB,c = 106 | | | | | | | | | | | |
| Downlink initial BWP configuration | | | | |  | DLBWP.0.1 | | | | | | | | | | | |
| Downlink dedicated BWP configuration | | | | |  | DLBWP.1.1 | | | | | | | | | | | |
| Uplink initial BWP configuration | | | | |  | ULBWP.0.1 | | | | | | | | | | | |
| Uplink dedicated BWP configuration | | | | |  | ULBWP.1.1 | | | | | | | | | | | |
| TRS configuration | | Config 1,4 | | |  | TRS.1.1 FDD | NA | | | | TRS.1.1 FDD | | | NA | | TRS.1.1 FDD | NA |
|  | | Config 2,5 | | |  | TRS.1.1 TDD | NA | | | | TRS.1.1 TDD | | | NA | | TRS.1.1 TDD | NA |
|  | | Config 3,6 | | |  | TRS.1.2 TDD | NA | | | | TRS.1.2 TDD | | | NA | | TRS.1.2 TDD | NA |
| DRX Cycle | | | | | ms | Not Applicable | | | | | | | | | | | |
| PDSCH Reference measurement channel | | | | Config 1,4 |  | SR.1.1 FDD | | | - | | | SR.1.1 FDD | - | | SR.1.1 FDD | | - |
|  | | | | Config 2,5 |  | SR.1.1 TDD | | |  | | | SR.1.1 TDD |  | | SR.1.1 TDD | |  |
|  | | | | Config 3,6 |  | SR2.1 TDD | | |  | | | SR2.1 TDD |  | | SR2.1 TDD | |  |
| RMSI CORESET Reference Channel | | | | Config 1,4 |  | CR.1.1 FDD | | | - | | | CR.1.1 FDD | - | | CR.1.1 FDD | | - |
|  | | | | Config 2,5 |  | CR.1.1 TDD | | |  | | | CR.1.1 TDD |  | | CR.1.1 TDD | |  |
|  | | | | Config 3,6 |  | CR2.1 TDD | | |  | | | CR2.1 TDD |  | | CR2.1 TDD | |  |
| Control Channel RMC | | | | Config 1,4 |  | CCR.1.1 FDD | | | - | | | CCR.1.1 FDD | - | | CCR.1.1 FDD | | - |
|  | | | | Config 2,5 |  | CCR.1.1 TDD | | |  | | | CCR.1.1 TDD |  | | CCR.1.1 TDD | |  |
|  | | | | Config 3,6 |  | CCR2.1 TDD | | |  | | | CCR2.1 TDD |  | | CCR2.1 TDD | |  |
| SSB configuration | | | | Config 1,4 |  | SSB.1 FR1 | | | SSB.1 FR1 | | | SSB.1 FR1 | SSB.1 FR1 | | SSB.1 FR1 | | SSB.1 FR1 |
|  | | | | Config 2,5 |  | SSB.1 FR1 | | | SSB.1 FR1 | | | SSB.1 FR1 | SSB.1 FR1 | | SSB.1 FR1 | | SSB.1 FR1 |
|  | | | | Config 3,6 |  | SSB.2 FR1 | | | SSB.2 FR1 | | | SSB.2 FR1 | SSB.2 FR1 | | SSB.2 FR1 | | SSB.2 FR1 |
| CSI-RS configuration for mobility | | | | Config 1,4 |  | CSI-RS.RRM.FR1.1 FDD | | | | | | | | | | | |
| Config 2,5 |  | CSI-RS.RRM.FR1.1 TDD | | | | | | | | | | | |
| Config 3,6 |  | CSI-RS.RRM.FR1.2 TDD | | | | | | | | | | | |
| Time offset with Cell 2 | | | | Config 1,4 | ms | - | | | 3 | | | - | 3 | | - | | 3 |
|  | | | | Config 2,3,5,6 | μs | - | | | 3 | | | - | 3 | | - | | 3 |
| SMTC configuration | | | | Config 1,4 |  | SMTC.2 | | | | | | | | | | | |
|  | | | | Config 2,3,5,6 |  | SMTC.1 | | | | | | | | | | | |
| OCNG Patterns | | | | |  | OP.1 | | | | | | | | | | | |
| PDSCH/PDCCH | | | Config 1,2,4,5 | | kHz | 15 kHz | | | | | | | | | | | |
| subcarrier spacing | | | Config 3,6 | |  | 30kHz | | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | | | dB | 0 | | | 0 | | | 0 | | 0 | 0 | | 0 |
| EPRE ratio of PBCH DMRS to SSS | | | | |  |  | | |  | | |  | |  |  | |  |
| EPRE ratio of PBCH to PBCH DMRS | | | | |  |  | | |  | | |  | |  |  | |  |
| EPRE ratio of PDCCH DMRS to SSS | | | | |  |  | | |  | | |  | |  |  | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | | |  |  | | |  | | |  | |  |  | |  |
| EPRE ratio of PDSCH DMRS to SSS | | | | |  |  | | |  | | |  | |  |  | |  |
| EPRE ratio of PDSCH to PDSCH | | | | |  |  | | |  | | |  | |  |  | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | | |  |  | | |  | | |  | |  |  | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | | |  |  | | |  | | |  | |  |  | |  |
| Note2 | Config 1,2,4,5 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/15KhZ | -106 | | | | | | -88 | | | -114 | | |
|  |  | | | NR\_FDD\_FR1\_B |  |  | | | | | |  | | | -113.5 | | |
|  |  | | | NR\_TDD\_FR1\_C |  |  | | | | | |  | | | -113 | | |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | | | | |  | | | -112.5 | | |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | | | | |  | | | -112 | | |
|  |  | | | NR\_FDD\_FR1\_F |  |  | | | | | |  | | | -111.5 | | |
|  |  | | | NR\_FDD\_FR1\_G |  |  | | | | | |  | | | -111 | | |
|  |  | | | NR\_FDD\_FR1\_H |  |  | | | | | |  | | | -110.5 | | |
|  | Config 3,6 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 |  | Not applicableNote 5 | | | | | | -94 | | | -114 | | |
|  |  | | | NR\_FDD\_FR1\_B |  |  | | | | | |  | | | -113.5 | | |
|  |  | | | NR\_TDD\_FR1\_C |  |  | | | | | |  | | | -113 | | |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | | | | |  | | | -112.5 | | |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | | | | |  | | | -112 | | |
|  |  | | | NR\_FDD\_FR1\_F |  |  | | | | | |  | | | -111.5 | | |
|  |  | | | NR\_FDD\_FR1\_G |  |  | | | | | |  | | | -111 | | |
|  |  | | | NR\_FDD\_FR1\_H |  |  | | | | | |  | | | -110.5 | | |
| Note2 | Config 1,2,4,5 | | | | dBm/SCS | -106 | | | | | | -88 | | | Same as Noc/15kHz | | |
|  | Config 3,6 | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | |  | Not applicableNote 5 | | | | | | -91 | | | -111 | | |
|  |  | | NR\_FDD\_FR1\_B | |  |  | | | | | |  | | | -110.5 | | |
|  |  | | NR\_TDD\_FR1\_C | |  |  | | | | | |  | | | -110 | | |
|  |  | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | |  |  | | | | | |  | | | -109.5 | | |
|  |  | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | |  |  | | | | | |  | | | -109 | | |
|  |  | | NR\_FDD\_FR1\_F | |  |  | | | | | |  | | | -108.5 | | |
|  |  | | NR\_FDD\_FR1\_G | |  |  | | | | | |  | | | -108 | | |
|  |  | | NR\_FDD\_FR1\_H | |  |  | | | | | |  | | | -107.5 | | |
|  | | | | | dB | 2.46 | | | | -5.97 | | 2.46 | | -5.97 | -0.01 | | -4.76 |
|  | | | | | dB | 6 | | | | 1 | | 6 | | 1 | 3 | | 0 |
| CSI-RSRPNote3 | Config 1,2,4,5 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/SCS | -100 | | | | -105 | | -82 | | -87 | -111.00 | | -114.00 |
|  |  | | | NR\_FDD\_FR1\_B |  |  | | | |  | |  | |  | -110.50 | | -113.50 |
|  |  | | | NR\_TDD\_FR1\_C |  |  | | | |  | |  | |  | -110.00 | | -113.00 |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | | |  | |  | |  | -109.50 | | -112.50 |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | | |  | |  | |  | -109.00 | | -112.00 |
|  |  | | | NR\_FDD\_FR1\_F |  |  | | | |  | |  | |  | -108.50 | | -111.50 |
|  |  | | | NR\_FDD\_FR1\_G |  |  | | | |  | |  | |  | -108.00 | | -111.00 |
|  |  | | | NR\_FDD\_FR1\_H |  |  | | | |  | |  | |  | -107.50 | | -110.50 |
|  | Config 3,6 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 |  | - Not applicableNote 5 | | | | Not applicableNote 5 | | -85 | | -90 | -108.00 | | -111.00 |
|  |  | | | NR\_FDD\_FR1\_B |  |  | | | |  | |  | |  | -107.50 | | -110.50 |
|  |  | | | NR\_TDD\_FR1\_C |  |  | | | |  | |  | |  | -107.00 | | -110.00 |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | | |  | |  | |  | -106.50 | | -109.50 |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | | |  | |  | |  | -106.00 | | -109.00 |
|  |  | | | NR\_FDD\_FR1\_F |  |  | | | |  | |  | |  | -105.50 | | -108.50 |
|  |  | | | NR\_FDD\_FR1\_G |  |  | | | |  | |  | |  | -105.00 | | -108.00 |
|  |  | | | NR\_FDD\_FR1\_H |  |  | | | |  | |  | |  | -104.50 | | -107.50 |
| IoNote3 | Config 1,2,4,5 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/  9.36MHz | -70.09 | | | | | | -52.09 | | | -80.03 | | |
|  |  | | | NR\_FDD\_FR1\_B |  |  | | | | | |  | | | -79.53 | | |
|  |  | | | NR\_TDD\_FR1\_C |  |  | | | | | |  | | | -79.03 | | |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | | | | |  | | | -78.53 | | |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | | | | |  | | | -78.03 | | |
|  |  | | | NR\_FDD\_FR1\_F |  |  | | | | | |  | | | -77.53 | | |
|  |  | | | NR\_FDD\_FR1\_G |  |  | | | | | |  | | | -77.03 | | |
|  |  | | | NR\_FDD\_FR1\_H |  |  | | | | | |  | | | -76.53 | | |
|  | Config 3,6 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/  38.16MHz | Not applicableNote 5 | | | | | | -51.99 | | | -73.94 | | |
|  |  | | | NR\_FDD\_FR1\_B |  |  | | | | | |  | | | -73.44 | | |
|  |  | | | NR\_TDD\_FR1\_C |  |  | | | | | |  | | | -72.94 | | |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | | | | |  | | | -72.44 | | |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | | | | |  | | | -71.94 | | |
|  |  | | | NR\_FDD\_FR1\_F |  |  | | | | | |  | | | -71.44 | | |
|  |  | | | NR\_FDD\_FR1\_G |  |  | | | | | |  | | | -70.94 | | |
|  |  | | | NR\_FDD\_FR1\_H |  |  | | | | | |  | | | -70.44 | | |
| Propagation condition | | | | | - | AWGN | | | | | | | | | | | |
| Antenna configuration | | | | |  | 1x2 | | | | | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Subtest 1 is not used when testing with 30kHz SSB SCS  Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification | | | | | | | | | | | | | | | | | |

A.4.7.X.1.3 Test Requirements

The CSI-RSRP measurement accuracy for cell 2 and cell 3 shall fulfil absolute requirement in clause 10.1.2.2.1 and relative requirement in clause 10.1.2.2.2.

A.4.7.X.2 EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.X.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.4.2.1 and 10.1.4.2.2 for inter-frequency measurements with the testing configurations in Table A.4.7.X.2.1-1.

**Table A.4.7.X.2.1-1: Applicable NR configurations for FR1 inter-frequency CSI-RSRP accuracy test**

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

A.4.7.X.2.2 Test parameters

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.4.7.X.2.2-1 below. Both absolute and relative accuracy of CSI-RSRP inter-frequency measurements are tested by using the parameters in Table A.4.7.X.2.2-1. The inter-frequency measurements are supported by a measurement gap.

**Table A.4.7.X.2.2-1: CSI-RSRP inter-frequency test parameters**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Config** | **Unit** | **Test 1** | | | | **Test 2** | | | |
| **Cell 2** | | **Cell 3** | | **Cell 2** | | **Cell 3** | |
| SSB ARFCN | | 1~6 |  | freq1 | | freq2 | | freq1 | | freq2 | |
| BWchannel | | 1,4 | MHz | 10: NRB,c = 52 | | | | 10: NRB,c = 52 | | | |
|  | | 2,5 |  | 10: NRB,c = 52 | | | | 10: NRB,c = 52 | | | |
|  | | 3,6 |  | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| Gap pattern ID | |  |  | 0 | | | | 0 | | | |
| Duplex mode | | 1,4 |  | FDD | | | | FDD | | | |
|  | | 2,5 |  | TDD | | | | TDD | | | |
|  | | 3,6 |  | TDD | | | | TDD | | | |
| TDD configuration | | 1,4 |  | N/A | | | | N/A | | | |
|  | | 2,5 |  | TDDConf.1.1 | | | | TDDConf.1.1 | | | |
|  | | 3,6 |  | TDDConf.2.1 | | | | TDDConf.2.1 | | | |
| PDSCH Reference measurement channel | | 1,4 |  | SR.1.1 FDD | | - | | SR.1.1 FDD | | - | |
|  | | 2,5 |  | SR.1.1 TDD | |  | | SR.1.1 TDD | |  | |
|  | | 3,6 |  | SR.2.1 FDD | |  | | SR.2.1 FDD | |  | |
| RMSI CORESET Reference Channel | | 1,4 |  | CR.1.1 FDD | | - | | CR.1.1 FDD | | - | |
|  | | 2,5 |  | CR.1.1 TDD | | - | | CR.1.1 TDD | | - | |
|  | | 3,6 |  | CR.2.1 FDD | | - | | CR.2.1 FDD | | - | |
| Dedicated CORESET Reference Channel | | 1,4 |  | CCR.1.1 FDD | | - | | CCR.1.1 FDD | | - | |
|  | | 2,5 |  | CCR.1.1 TDD | | - | | CCR.1.1 TDD | | - | |
|  | | 3,6 |  | CCR.2.1 TDD | | - | | CCR.2.1 TDD | | - | |
| SSB configuration | | 1,4 |  | SSB.1 FR1 | | | | SSB.1 FR1 | | | |
|  | | 2,5 |  | SSB.1 FR1 | | | | SSB.1 FR1 | | | |
|  | | 3,6 |  | SSB.2 FR1 | | | | SSB.2 FR1 | | | |
| CSI-RS configuration for mobility | | 1,4 |  | CSI-RS.RRM.FR1.1 FDD | | | | | | | |
| 2,5 |  | CSI-RS.RRM.FR1.1 TDD | | | | | | | |
| 3,6 |  | CSI-RS.RRM.FR1.2 TDD | | | | | | | |
| OCNG Patterns | | 1~6 |  | OP.1 | | | | OP.1 | | | |
| TRS configuration | | 1,4 |  | TRS.1.1 FDD | | | - | TRS.1.1 FDD | | | - |
|  | | 2,5 |  | TRS.1.1 TDD | | |  | TRS.1.1 TDD | | |  |
|  | | 3,6 |  | TRS.1.2 TDD | | |  | TRS.1.2 TDD | | |  |
| Initial BWP Configuration | | 1~6 |  | DLBWP.0.1  ULBWP.0.1 | | | | DLBWP.0.1  ULBWP.0.1 | | | |
| Dedicated BWP configuration | | 1~6 |  | DLBWP.1.1  ULBWP.1.1 | | | | DLBWP.1.1  ULBWP.1.1 | | | |
| Time offset with Cell 2 | | 1,4 | ms | - | 3 | | | - | 3 | | |
|  | | 2,3,5,6 | μs | - | 3 | | | - | 3 | | |
| SMTC configuration | | 1,4 |  | SMTC.2 | | | | SMTC.2 | | | |
|  | | 2,3,5,6 |  | SMTC.1 | | | | SMTC.1 | | | |
| EPRE ratio of PSS to SSS | |  |  |  | |  | |  | |  | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | | 1~6 | dB | 0 | | 0 | | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |  | |  | |
| EPRE ratio of PDSCH to PDSCH DMRS | |  |  |  | |  | |  | |  | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |  |  |  | |  | |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |  |  | |  | |  | |  | |
| Note2 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5, | 1~6 | dBm/15kHz | -94.65 | | | | ( for Cell 3 +8dB) | | -115 | |
|  | NR\_FDD\_FR1\_B |  |  |  | | | |  | | -114.5 | |
|  | NR\_TDD\_FR1\_C |  |  |  | | | |  | | -114 | |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  |  | | | |  | | -113.5 | |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  |  | | | |  | | -113 | |
|  | NF\_FDD\_FR1\_F |  |  |  | | | |  | | -112.5 | |
|  | NR\_FDD\_FR1\_G |  |  |  | | | |  | | -112 | |
|  | NR\_FDD\_FR1\_H |  |  |  | | | |  | | -111.5 | |
| Note2 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5, | 1,2,4,5 | dBm/SSB SCS | -94.65 | | | | ( for Cell 3 +8dB) | | -115 | |
|  | NR\_FDD\_FR1\_B |  |  |  | | | |  | | -114.5 | |
|  | NR\_TDD\_FR1\_C |  |  |  | | | |  | | -114 | |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  |  | | | |  | | -113.5 | |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  |  | | | |  | | -113 | |
|  | NR\_FDD\_FR1\_F |  |  |  | | | |  | | -112.5 | |
|  | NR\_FDD\_FR1\_G |  |  |  | | | |  | | -112 | |
|  | NR\_FDD\_FR1\_H |  |  |  | | | |  | | -111.5 | |
|  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5,  NR\_SDL\_FR1\_A | 3,6 |  | -91.65 | | | | ( for C 3 +8dB) | | -112.00 | |
|  | NR\_FDD\_FR1\_B |  |  |  | | | |  | | -112.50 | |
|  | NR\_TDD\_FR1\_C |  |  |  | | | |  | | -112.00 | |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  |  | | | |  | | -111.50 | |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  |  | | | |  | | -111.00 | |
|  | NR\_FDD\_FR1\_F |  |  |  | | | |  | | -110.50 | |
|  | NR\_FDD\_FR1\_G |  |  |  | | | |  | | -110.00 | |
|  | NR\_FDD\_FR1\_H |  |  |  | | | |  | | -110.50 | |
|  | | 1~6 | dB | 10 | | 10 | | 13 | | -3 | |
| CSI-RSRPNote3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5 | 1,2,4,5 | dBm/SCS | -84.65 | | | | (RSRP for Cell 3 +25dB) | | -118.00 | |
|  | NR\_FDD\_FR1\_B |  |  |  | | | |  | | -117.50 | |
|  | NR\_TDD\_FR1\_C |  |  |  | | | |  | | -117.00 | |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  |  | | | |  | | -116.50 | |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  |  | | | |  | | -116.00 | |
|  | NR\_FDD\_FR1\_F |  |  |  | | | |  | | -115.50 | |
|  | NR\_FDD\_FR1\_G |  |  |  | | | |  | | -115.00 | |
|  | NR\_FDD\_FR1\_H |  |  |  | | | |  | | -114.50 | |
|  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5, | 3,6 |  | -81.65 | | | | (RSRP for Cell 3 +25dB) | | -115.00 | |
|  | NR\_FDD\_FR1\_B |  |  |  | | | |  | | -114.50 | |
|  | NR\_TDD\_FR1\_C |  |  |  | | | |  | | -114.00 | |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  |  | | | |  | | -113.50 | |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  |  | | | |  | | -113.00 | |
|  | NR\_FDD\_FR1\_F |  |  |  | | | |  | | -112.50 | |
|  | NR\_FDD\_FR1\_G |  |  |  | | | |  | | -112.00 | |
|  | NR\_FDD\_FR1\_H |  |  |  | | | |  | | -111.50 | |
| IoNote3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6, | 1,2,4,5 | dBm/  9.36MHz | -56.28 | | | | (Io for Channel 3 +19.75dB) | | -85.28 | |
|  | NR\_FDD\_FR1\_B |  |  |  | | | |  | | -84.78 | |
|  | NR\_TDD\_FR1\_C |  |  |  | | | |  | | -84.28 | |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  |  | | | |  | | -83.78 | |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  |  | | | |  | | -83.28 | |
|  | NR\_FDD\_FR1\_F |  |  |  | | | |  | | -82.78 | |
|  | NR\_FDD\_FR1\_G |  |  |  | | | |  | | -82.28 | |
|  | NR\_FDD\_FR1\_H |  |  |  | | | |  | | -81.78 | |
|  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6, | 3,6 | dBm/  38.16MHz | -50.19 | | | | (Io for Channel 3 +19.75dB) | | -79.19 | |
|  | NR\_FDD\_FR1\_B |  |  |  | | | |  | | -78.69 | |
|  | NR\_TDD\_FR1\_C |  |  |  | | | |  | | -78.19 | |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  |  | | | |  | | -77.69 | |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  |  | | | |  | | -77.19 | |
|  | NR\_FDD\_FR1\_F |  |  |  | | | |  | | -76.69 | |
|  | NR\_FDD\_FR1\_G |  |  |  | | | |  | | -76.19 | |
|  | NR\_FDD\_FR1\_H |  |  |  | | | |  | | -75.69 | |
|  | | 1~6 | dB | 10 | | 10 | | 13 | | -3 | |
| Propagation condition | | 1~6 | - | AWGN | | | | AWGN | | | |
| Antenna configuration | |  |  | 1x2 | | | | 1x2 | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5 The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification | | | | | | | | | | | |

A.4.7.X.2.3 Test Requirements

The CSI-RSRP measurement accuracy for Cell 2 and Cell 3 shall fulfil the Absolute requirement in clause 10.1.4.2.1 and Relative requirement in clause 10.1.4.2.2.

A.4.7.x CSI-RSRQ

A.4.7.x.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.x.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.7.

A.4.7.x.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.4.7.x.1.2-1. The absolute accuracy of CSI-RSRQ intra-frequency measurement is test by using the parameters in Table A.4.7.x.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

**Table A.4.7.x.1.2-1: CSI-RSRQ Intra frequency CSI-RSRQ supported test configurations**

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

**Table A.4.7.x.1.2-2: CSI-RSRQ Intra frequency test parameters**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | | | **Test 2** | | | **Test 3** | | |
|  | | |  | **Cell 2** | **Cell 3** | | **Cell 2** | **Cell 3** | | **Cell 2** | | **Cell 3** |
| SSB ARFCN | | |  | freq1 | | | freq1 | | | freq1 | | |
| Duplex mode | | Config 1,4 |  | FDD | | | | | | | | |
|  | | Config 2,3,5,6 |  | TDD | | | | | | | | |
| TDD configuration | | Config 1,4 |  | Not Applicable | | | | | | | | |
|  | | Config 2,5 |  | TDDConf.1.1 | | | | | | | | |
|  | | Config 3,6 |  | TDDConf.2.1 | | | | | | | | |
| BWchannel | | Config 1,4 | MHz | 10: NRB,c = 52 | | | | | | | | |
|  | | Config 2,5 |  | 10: NRB,c = 52 | | | | | | | | |
|  | | Config 3,6 |  | 40: NRB,c = 106 | | | | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | | | | |
| PDSCH Reference measurement channel | | Config 1,4 |  | SR.1.1 FDD | - | | SR.1.1 FDD | - | | SR.1.1 FDD | | - |
|  | | Config 2,5 |  | SR.1.1 TDD |  | | SR.1.1 TDD |  | | SR.1.1 TDD | |  |
|  | | Config 3,6 |  | SR2.1 TDD |  | | SR2.1 TDD |  | | SR2.1 TDD | |  |
| RMSI CORESET Reference Channel | | Config 1,4 |  | CR.1.1 FDD | - | | CR.1.1 FDD | - | | CR.1.1 FDD | |  |
|  | | Config 2,5 |  | CR.1.1 TDD |  | | CR.1.1 TDD |  | | CR.1.1 TDD | |  |
|  | | Config 3,6 |  | CR.2.1 TDD |  | | CR.2.1 TDD |  | | CR.2.1 TDD | |  |
| Control Channel RMC | | Config 1,4 |  | CCR.1.1 FDD | - | | CCR.1.1 FDD | - | | CCR.1.1 FDD | | - |
|  | | Config 2,5 |  | CCR.1.1 TDD |  | | CCR.1.1 TDD |  | | CCR.1.1 TDD | |  |
|  | | Config 3,6 |  | CCR.2.1 TDD |  | | CCR.2.1 TDD |  | | CCR.2.1 TDD | |  |
| TRS configuration | | Config 1,4 |  | TRS.1.1 FDD | - | | TRS.1.1 FDD | - | | TRS.1.1 FDD | | - |
| Config 2,5 |  | TRS.1.1 TDD |  | | TRS.1.1 TDD |  | | TRS.1.1 TDD | |  |
| Config 3,6 |  | TRS.1.2 TDD |  | | TRS.1.2 TDD |  | | TRS.1.2 TDD | |  |
| OCNG Patterns | | |  | OP. 1 | | | | | | | | |
| Time offset with | | Config 1,4 | ms | - | | [TBD] | - | | [TBD] | | - | [TBD] |
| Cell 2 | | Config 2,3,5,6 | μs | - | | [TBD] | - | | [TBD] | | - | [TBD] |
| SMTC | | Config 1,4 |  | SMTC.2 | | | | | | | | |
| configuration | | Config 2,3,5,6 |  | SMTC.1 | | | | | | | | |
| SSB configuration | | Config 1,2,4,5 |  | SSB.1 FR1 | | | | | | | | |
|  | | Config 3,6 |  | SSB.2 FR1 | | | | | | | | |
| CSI-RS configuration for RRM | | Config 1,4 |  | CSI-RS.RRM.FR1.1 FDD | | | | | | | | |
| Config 2, 5 |  | CSI-RS.RRM.FR1.1 TDD | | | | | | | | |
| Config 3, 6 |  | CSI-RS.RRM.FR1.2 TDD | | | | | | | | |
| PDSCH/PDCCH | | Config 1,2,4,5 | kHz | 15 kHz | | | | | | | | |
| subcarrier spacing | | Config 3,6 |  | 30kHz | | | | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | | 0 | 0 | | 0 | | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  | |  |  | |  | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  | |  |  | |  | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  | |  |  | |  | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  | |  |  | |  | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  | |  |  | |  | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  | |  |  | |  | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  | |  |  | |  | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  | |  |  | |  | |  |
| Note2 | Config 1,2,4,5 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 7 | dBm/15kHz | -85 | | | -101 | | | -114 | | |
|  |  | NR\_FDD\_FR1\_B |  |  | | |  | | | -113.5 | | |
|  |  | NR\_TDD\_FR1\_C |  |  | | |  | | | -113 | | |
|  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | |  | | | -112.5 | | |
|  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | |  | | | -112 | | |
|  |  | NR\_FDD\_FR1\_F |  |  | | |  | | | -111.5 | | |
|  |  | NR\_FDD\_FR1\_G |  |  | | |  | | | -111 | | |
|  |  | NR\_FDD\_FR1\_H |  |  | | |  | | | -110.5 | | |
|  | Config 3,6 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 7 |  | -91 | | | - | | | -114 | | |
|  |  | NR\_FDD\_FR1\_B |  |  | | |  | | | -113.5 | | |
|  |  | NR\_TDD\_FR1\_C |  |  | | |  | | | -113 | | |
|  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | |  | | | -112.5 | | |
|  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | |  | | | -112 | | |
|  |  | NR\_FDD\_FR1\_F |  |  | | |  | | | -111.5 | | |
|  |  | NR\_FDD\_FR1\_G |  |  | | |  | | | -111 | | |
|  |  | NR\_FDD\_FR1\_H |  |  | | |  | | | -110.5 | | |
| Note2 | Config 1,2,4,5 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 7 | dBm/SC S | -85 | | | -101 | | | -114 | | |
|  |  | NR\_FDD\_FR1\_B |  |  | | |  | | | -113.5 | | |
|  |  | NR\_TDD\_FR1\_C |  |  | | |  | | | -113 | | |
|  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | |  | | | -112.5 | | |
|  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | |  | | | -112 | | |
|  |  | NR\_FDD\_FR1\_F |  |  | | |  | | | -111.5 | | |
|  |  | NR\_FDD\_FR1\_G |  |  | | |  | | | -111 | | |
|  |  | NR\_FDD\_FR1\_H |  |  | | |  | | | -110.5 | | |
|  | Config 3,6 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 7 |  | -88 | | | - | | | -111 | | |
|  |  | NR\_FDD\_FR1\_B |  |  | | |  | | | -110.5 | | |
|  |  | NR\_TDD\_FR1\_C |  |  | | |  | | | -110 | | |
|  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | |  | | | -109.5 | | |
|  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | |  | | | -109 | | |
|  |  | NR\_FDD\_FR1\_F |  |  | | |  | | | -108.5 | | |
|  |  | NR\_FDD\_FR1\_G |  |  | | |  | | | -108 | | |
|  |  | NR\_FDD\_FR1\_H |  |  | | |  | | | -107.5 | | |
|  | | | dB | -1.76 | | | -4.7 | | | -5.46 | | -5.46 |
|  | | | dB | 3 | 3 | | -2.9 | -2.9 | | -4 | | -4 |
| CSI-RSRPNote3 | Config 1,2,4,5 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 7 | dBm/SCS | -82 | -82 | | -103.9 | -103.9 | | -118 | | -118 |
|  |  | NR\_FDD\_FR1\_B |  |  |  | |  |  | | -117.5 | | -117.5 |
|  |  | NR\_TDD\_FR1\_C |  |  |  | |  |  | | -117 | | -117 |
|  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  |  | |  |  | | -116.5 | | -116.5 |
|  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  |  | |  |  | | -116 | | -116 |
|  |  | NR\_FDD\_FR1\_F |  |  |  | |  |  | | -115.5 | | -115.5 |
|  |  | NR\_FDD\_FR1\_G |  |  |  | |  |  | | -115 | | -115 |
|  |  | NR\_FDD\_FR1\_H |  |  |  | |  |  | | -114.5 | | -114.5 |
|  | Config 3,6 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 7 |  | -85 | -85 | | - | - | | -115 | | -115 |
|  |  | NR\_FDD\_FR1\_B |  |  |  | |  |  | | -114.5 | | -114.5 |
|  |  | NR\_TDD\_FR1\_C |  |  |  | |  |  | | -114 | | -114 |
|  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  |  | |  |  | | -113.5 | | -113.5 |
|  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  |  | |  |  | | -113 | | -113 |
|  |  | NR\_FDD\_FR1\_F |  |  |  | |  |  | | -112.5 | | -112.5 |
|  |  | NR\_FDD\_FR1\_G |  |  |  | |  |  | | -112 | | -112 |
|  |  | NR\_FDD\_FR1\_H |  |  |  | |  |  | | -111.5 | | -111.5 |
| CSI-RSRQ Note3 | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 7 | dB | -14.77 | -14.77 | | -16.76 | -16.76 | | -17.34 | | -17.34 |
|  | | NR\_FDD\_FR1\_B |  |  |  | |  |  | |  | |  |
|  | | NR\_TDD\_FR1\_C |  |  |  | |  |  | |  | |  |
|  | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  |  | |  |  | |  | |  |
|  | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  |  | |  |  | |  | |  |
|  | | NR\_FDD\_FR1\_F |  |  |  | |  |  | |  | |  |
|  | | NR\_FDD\_FR1\_G |  |  |  | |  |  | |  | |  |
|  | | NR\_FDD\_FR1\_H |  |  |  | |  |  | |  | |  |
| IoNote3 | Config 1,2,4,5 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 7 | dBm/  9.36MHz | -50 | | | -70 | | | -83.5 | | |
|  |  | NR\_FDD\_FR1\_B |  |  | | |  | | | -83 | | |
|  |  | NR\_TDD\_FR1\_C |  |  | | |  | | | -82.5 | | |
|  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | |  | | | -82 | | |
|  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | |  | | | -81.5 | | |
|  |  | NR\_FDD\_FR1\_F |  |  | | |  | | | -81 | | |
|  |  | NR\_FDD\_FR1\_G |  |  | | |  | | | -80.5 | | |
|  |  | NR\_FDD\_FR1\_H |  |  | | |  | | | -80 | | |
|  | Config 3,6 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 7 | dBm/  38.16MHz | -50 | | | - | | | -77.4 | | |
|  |  | NR\_FDD\_FR1\_B |  |  | | |  | | | -76.9 | | |
|  |  | NR\_TDD\_FR1\_C |  |  | | |  | | | -76.4 | | |
|  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | |  | | | -75.9 | | |
|  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | |  | | | -75.4 | | |
|  |  | NR\_FDD\_FR1\_F |  |  | | |  | | | -74.9 | | |
|  |  | NR\_FDD\_FR1\_G |  |  | | |  | | | -74.4 | | |
|  |  | NR\_FDD\_FR1\_H |  |  | | |  | | | -73.9 | | |
| Propagation condition | | | - | AWGN | AWGN | | AWGN | AWGN | | AWGN | | AWGN |
| Antenna configuration | | |  | 1x2 | 1x2 | | 1x2 | 1x2 | | 1x2 | | 1x2 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: 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: CSI-RSRQ, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-RSRQ, CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in Clause 3.5.2.  Note 6: Subtest 2 is not used when testing with 30kHz SSB and CSI-RS SCS  Note 7: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification | | | | | | | | | | | | |

A.4.7.x.1.3 Test Requirements

The CSI-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.7.

A.4.7.x.2 EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.x.2.1 Test Purpose and Environment

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

A.4.7.x.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.4.7.x.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-RSRQ inter-frequency measurement are tested by using test parameters in Table A.4.7.x.2.2-2. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

**Table A.4.7.x.2.2-1: CSI-RSRQ Inter frequency CSI-RSRQ supported test configurations**

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

**Table A.4.7.x.2.2-2: CSI-RSRQ Inter frequency test parameters**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | | | | | | **Test 2** | | | | **Test 3** | | | |
|  | | |  | **Cell 2** | | | | **Cell 3** | | **Cell 2** | | **Cell 3** | | **Cell 2** | | | **Cell 3** |
| SSB ARFCN | | |  | freq1 | | | freq2 | | | freq1 | | freq2 | | freq1 | | freq2 | |
| Duplex mode | | Config 1,4 |  | FDD | | | | | | | | | | | | | |
|  | | Config 2,3,5,6 |  | TDD | | | | | | | | | | | | | |
| TDD configuration | | Config 1,4 |  | Not Applicable | | | | | | | | | | | | | |
|  | | Config 2,5 |  | TDDConf.1.1 | | | | | | | | | | | | | |
|  | | Config 3,6 |  | TDDConf.2.1 | | | | | | | | | | | | | |
| BWchannel | | Config 1,4 | MHz | 10: NRB,c = 52 | | | | | | | | | | | | | |
|  | | Config 2,5 |  | 10: NRB,c = 52 | | | | | | | | | | | | | |
|  | | Config 3,6 |  | 40: NRB,c = 106 | | | | | | | | | | | | | |
| BWP BW | | Config 1,4 | MHz | 10: NRB,c = 52 | | | | | | | | | | | | | |
|  | | Config 2,5 |  | 10: NRB,c = 52 | | | | | | | | | | | | | |
|  | | Config 3,6 |  | 40: NRB,c = 106 | | | | | | | | | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | | | | | | | | | |
| PDSCH Reference measurement channel | | Config 1,4 |  | SR.1.1 FDD | | - | | | | SR.1.1 FDD | | - | | SR.1.1 FDD | | | - |
|  | | Config 2,5 |  | SR.1.1 TDD | |  | | | | SR.1.1 TDD | |  | | SR.1.1 TDD | | |  |
|  | | Config 3,6 |  | SR.2.1 TDD | |  | | | | SR.2.1 TDD | |  | | SR.2.1 TDD | | |  |
| RMSI CORESET Reference Channel | | Config 1,4 |  | CR.1.1 FDD | | - | | | | CR.1.1 FDD | | - | | CR.1.1 FDD | | | - |
|  | | Config 2,5 |  | CR.1.1 TDD | |  | | | | CR.1.1 TDD | |  | | CR.1.1 TDD | | |  |
|  | | Config 3,6 |  | CR.2.1 TDD | |  | | | | CR.2.1 TDD | |  | | CR.2.1 TDD | | |  |
| Dedicated CORESET Reference Channel | | Config 1,4 |  | CCR.1.1 FDD | | - | | | | CCR.1.1 FDD | | - | | CCR.1.1 FDD | | | - |
|  | | Config 2,5 |  | CCR.1.1 TDD | |  | | | | CCR.1.1 TDD | |  | | CCR.1.1 TDD | | |  |
|  | | Config 3,6 |  | CCR.2.1 TDD | |  | | | | CCR.2.1 TDD | |  | | CCR.2.1 TDD | | |  |
| TRS configuration | | Config 1,4 |  | TRS.1.1 FDD | | - | | | | TRS.1.1 FDD | | - | | TRS.1.1 FDD | | | - |
| Config 2,5 |  | TRS.1.1 TDD | |  | | | | TRS.1.1 TDD | |  | | TRS.1.1 TDD | | |  |
| Config 3,6 |  | TRS.1.2 TDD | |  | | | | TRS.1.2 TDD | |  | | TRS.1.2 TDD | | |  |
| CSI-RS configuration for RRM | | Config 1,4 |  | CSI-RS.RRM.FR1.1 FDD | | | | | | | | | | | | | |
| Config 2,5 |  | CSI-RS.RRM.FR1.1 TDD | | | | | | | | | | | | | |
| Config 3,6 |  | CSI-RS.RRM.FR1.2 TDD | | | | | | | | | | | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | | | | | | | | | | |
| Time offset with Cell 2 | | Config 1,4 | ms | - | [TBD] | | | | - | | [TBD] | | - | | [TBD] | | |
|  | | Config 2,3,5,6 | μs | - | [TBD] | | | | - | | [TBD] | | - | | [TBD] | | |
| SMTC configuration | | Config 1,4 |  | SMTC pattern 2 | | | | | | | | | | | | | |
|  | | Config 2,3,5,6 |  | SMTC pattern 1 | | | | | | | | | | | | | |
| SSB configuration | | Config 1,2,4,5 |  | SSB pattern 1 in FR1 | | | | | | | | | | | | | |
|  | | Config 3,6 |  | SSB pattern 2 in FR1 | | | | | | | | | | | | | |
| PDSCH/PDCCH | | Config 1,2,4,5 | kHz | 15 kHz | | | | | | | | | | | | | |
| subcarrier spacing | | Config 3,6 |  | 30 kHz | | | | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | 0 | | | | 0 | | 0 | | 0 | | | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  | |  | | | |  | |  | |  | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  | |  | | | |  | |  | |  | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  | |  | | | |  | |  | |  | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  | |  | | | |  | |  | |  | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  | |  | | | |  | |  | |  | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  | |  | | | |  | |  | |  | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  | |  | | | |  | |  | |  | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  | |  | | | |  | |  | |  | | |  |
| Note2 | Config 1,2,4,5 | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A  NR\_SDL\_FR1\_A | dBm/15kHz | -80.18 | | | -80.18 | | | -106 | | -106 | | -116 | | -116 | |
|  |  | NR\_FDD\_FR1\_B |  |  | | |  | | |  | |  | | -115.5 | | -115.5 | |
|  |  | NR\_TDD\_FR1\_C |  |  | | |  | | |  | |  | | -115 | | -115 | |
|  |  | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | |  | | |  | |  | | -114.5 | | -114.5 | |
|  |  | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | |  | | |  | |  | | -114 | | -114 | |
|  |  | NR\_FDD\_FR1\_G |  |  | | |  | | |  | |  | | -113 | | -113 | |
|  |  | NR\_FDD\_FR1\_H |  |  | | |  | | |  | |  | | -112.5 | | -112.5 | |
|  | Config 3,6 | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A  NR\_SDL\_FR1\_A | dBm/15kHz | -86.27 | | | -86.27 | | | -113 | | -113 | | -116 | | -116 | |
|  |  | NR\_FDD\_FR1\_B |  |  | | |  | | |  | |  | | -115.5 | | -115.5 | |
|  |  | NR\_TDD\_FR1\_C |  |  | | |  | | |  | |  | | -115 | | -115 | |
|  |  | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | |  | | |  | |  | | -114.5 | | -114.5 | |
|  |  | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | |  | | |  | |  | | -114 | | -114 | |
|  |  | NR\_FDD\_FR1\_G |  |  | | |  | | |  | |  | | -113 | | -113 | |
|  |  | NR\_FDD\_FR1\_H |  |  | | |  | | |  | |  | | -112.5 | | -112.5 | |
| Note2 | Config 1,2,4,5 | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A  NR\_SDL\_FR1\_A | dBm/SCS | -80.18 | | | -80.18 | | | -106 | | -106 | | -116 | | -116 | |
|  |  | NR\_FDD\_FR1\_B |  |  | | |  | | |  | |  | | -115.5 | | -115.5 | |
|  |  | NR\_TDD\_FR1\_C |  |  | | |  | | |  | |  | | -115 | | -115 | |
|  |  | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | |  | | |  | |  | | -114.5 | | -114.5 | |
|  |  | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | |  | | |  | |  | | -114 | | -114 | |
|  |  | NR\_FDD\_FR1\_G |  |  | | |  | | |  | |  | | -113 | | -113 | |
|  |  | NR\_FDD\_FR1\_H |  |  | | |  | | |  | |  | | -112.5 | | -112.5 | |
|  | Config 3,6 | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A  NR\_SDL\_FR1\_A |  | -83.27 | | | -83.27 | | | -110 | | -110 | | -113 | | -113 | |
|  |  | NR\_FDD\_FR1\_B |  |  | | |  | | |  | |  | | -112.5 | | -112.5 | |
|  |  | NR\_TDD\_FR1\_C |  |  | | |  | | |  | |  | | -112 | | -112 | |
|  |  | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | |  | | |  | |  | | -111.5 | | -111.5 | |
|  |  | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | |  | | |  | |  | | -111 | | -111 | |
|  |  | NR\_FDD\_FR1\_G |  |  | | |  | | |  | |  | | -110 | | -110 | |
|  |  | NR\_FDD\_FR1\_H |  |  | | |  | | |  | |  | | -109.5 | | -109.5 | |
|  | | | dB | -1.75 | | | -1.75 | | | -1.75 | | -1.75 | | 3 | | | -1.75 |
|  | | | dB | -1.75 | | | -1.75 | | | -1.75 | | -1.75 | | 3 | | | -1.75 |
| CSI-RSRPNote3 | Config 1,2,4,5 | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A  NR\_SDL\_FR1\_A | dBm/SCS | -81.93 | | | | -81.93 | | -107.75 | | -107.75 | | -113 | | -117.75 | |
|  |  | NR\_FDD\_FR1\_B |  |  | | | |  | |  | |  | | -112.5 | | -117.25 | |
|  |  | NR\_TDD\_FR1\_C |  |  | | | |  | |  | |  | | -112 | | -116.75 | |
|  |  | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | | |  | |  | |  | | -111.5 | | -116.25 | |
|  |  | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | | |  | |  | |  | | -111 | | -115.75 | |
|  |  | NR\_FDD\_FR1\_G |  |  | | | |  | |  | |  | | -110 | | -114.75 | |
|  |  | NR\_FDD\_FR1\_H |  |  | | | |  | |  | |  | | -109.5 | | -114.25 | |
|  | Config 3,6 | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A  NR\_SDL\_FR1\_A |  | -85.02 | | | | -85.02 | | -111.75 | | -111.75 | | -110 | | | -114.75 |
|  |  | NR\_FDD\_FR1\_B |  |  | | | |  | |  | |  | | -109.5 | | | -114.25 |
|  |  | NR\_TDD\_FR1\_C |  |  | | | |  | |  | |  | | -109 | | | -113.75 |
|  |  | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | | |  | |  | |  | | -108.5 | | | -113.25 |
|  |  | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | | |  | |  | |  | | -108 | | | -112.75 |
|  |  | NR\_FDD\_FR1\_G |  |  | | | |  | |  | |  | | -107 | | | -111.75 |
|  |  | NR\_FDD\_FR1\_H |  |  | | | |  | |  | |  | | -106.5 | | | -111.25 |
| CSI-RSRQ Note3 | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A | dB | -14.77 | | | | -14.77 | | -40.59 | | -40.59 | | -12.56 | | | -14.76 |
|  | | NR\_FDD\_FR1\_B |  |  | | | |  | |  | |  | |  | | |  |
|  | | NR\_TDD\_FR1\_C |  |  | | | |  | |  | |  | |  | | |  |
|  | | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | | |  | |  | |  | |  | | |  |
|  | | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | | |  | |  | |  | |  | | |  |
|  | | NR\_FDD\_FR1\_G |  |  | | | |  | |  | |  | |  | | |  |
|  | | NR\_FDD\_FR1\_H |  |  | | | |  | |  | |  | |  | | |  |
| IoNote3 | Config 1,2,4,5 | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A  NR\_SDL\_FR1\_A | dBm/  9.36MHz | -50 | | | -50 | | | -75.83 | | -75.83 | | -83.28 | | -85.83 | |
|  |  | NR\_FDD\_FR1\_B |  |  | | |  | | |  | |  | | -82.78 | | -85.33 | |
|  |  | NR\_TDD\_FR1\_C |  |  | | |  | | |  | |  | | -82.28 | | -84.83 | |
|  |  | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | |  | | |  | |  | | -81.78 | | -84.33 | |
|  |  | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | |  | | |  | |  | | -81.28 | | -83.83 | |
|  |  | NR\_FDD\_FR1\_G |  |  | | |  | | |  | |  | | -80.28 | | -82.83 | |
|  |  | NR\_FDD\_FR1\_H |  |  | | |  | | |  | |  | | -79.78 | | -82.33 | |
|  | Config 3,6 | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A  NR\_SDL\_FR1\_A | dBm/  38.16MHz | -50 | | | -50 | | | -76.73 | | -76.73 | | -77.19 | | -79.73 | |
|  |  | NR\_FDD\_FR1\_B |  |  | | |  | | |  | |  | | -76.69 | | -79.23 | |
|  |  | NR\_TDD\_FR1\_C |  |  | | |  | | |  | |  | | -76.19 | | -78.73 | |
|  |  | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | |  | | |  | |  | | -75.69 | | -78.23 | |
|  |  | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | |  | | |  | |  | | -75.19 | | -77.73 | |
|  |  | NR\_FDD\_FR1\_G |  |  | | |  | | |  | |  | | -74.19 | | -76.73 | |
|  |  | NR\_FDD\_FR1\_H |  |  | | |  | | |  | |  | | -73.69 | | -76.53 | |
| Propagation condition | | |  | AWGN | | AWGN | | | | AWGN | | AWGN | | 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: CSI-RSRQ, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-RSRQ, CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in Section 3.5.2. | | | | | | | | | | | | | | | | | |

A.4.7.2.2.3 Test Requirements

The CSI-RSRQ measurement accuracy shall fulfil the requirements in section 10.1.9.

A.4.7.X CSI-SINR

A.4.7.X.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.X.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.a.b.c.d.

A.4.7.X.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.4.7.X.1.2-1. The absolute accuracy of CSI-SINR intra-frequency measurement is tested by using the parameters in Table A.4.7.X.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell. CSI-RS for mobility configured for Cell 2 is associated to the SSB of Cell 2, and CSI-RS for mobility configured for Cell 3 is associated to the SSB of Cell 3.

**Table A.4.7.X.1.2-1: CSI-SINR Intra frequency CSI-SINR supported test configurations**

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

**Table A.4.7.X.1.2-2: CSI-SINR Intra frequency test parameters**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Test 1** | | | | **Test 2** | | | | |
|  | | | | |  | **Cell 2** | | **Cell 3** | | **Cell 2** | | | **Cell 3** | |
| SSB ARFCN | | | | |  | freq1 | | | | freq1 | | | | |
| Duplex mode | | | | Config 1,4 |  | FDD | | | | | | | | |
|  | | | | Config 2,3,5,6 |  | TDD | | | | | | | | |
| TDD configuration | | | | Config 1,4 |  | Not Applicable | | | | | | | | |
|  | | | | Config 2,5 |  | TDDConf.1.1 | | | | | | | | |
|  | | | | Config 3,6 |  | TDDConf.2.1 | | | | | | | | |
| Downlink initial BWP configuration | | | | |  | DLBWP.0.1 | | | | | | | | |
| Downlink dedicated BWP configuration | | | | |  | DLBWP.1.1 | | | | | | | | |
| Uplink initial BWP configuration | | | | |  | ULBWP.0.1 | | | | | | | | |
| Uplink dedicated BWP configuration | | | | |  | ULBWP.1.1 | | | | | | | | |
| DRX Cycle configuration | | | | | ms | Not Applicable | | | | | | | | |
| TRS configuration | | | Config 1, 4 | |  | TRS.1.1 FDD | | | | | | | | |
|  | | | Config 2, 5 | |  | TRS.1.1 TDD | | | | | | | | |
|  | | | Config 3, 6 | |  | TRS.1.2 TDD | | | | | | | | |
| PDSCH Reference measurement channel | | | | Config 1,4 |  | SR.1.1 FDD | | - | | SR.1.1 FDD | | | - | |
|  | | | | Config 2,5 |  | SR.1.1 TDD | |  | | SR.1.1 TDD | | |  | |
|  | | | | Config 3,6 |  | SR.2.1 TDD | |  | | SR2.1 TDD | | |  | |
| RMSI CORESET Reference Channel | | | | Config 1,4 |  | CR.1.1 FDD | | - | | CR.1.1 FDD | | |  | |
|  | | | | Config 2,5 |  | CR.1.1 TDD | |  | | CR.1.1 TDD | | |  | |
|  | | | | Config 3,6 |  | CR.2.1 TDD | |  | | CR.2.1 TDD | | |  | |
| Dedicated CORESET Reference Channel | | | | Config 1,4 |  | CCR.1.1 FDD | | - | | CCR.1.1 FDD | | | - | |
|  | | | | Config 2,5 |  | CCR.1.1 TDD | |  | | CCR.1.1 TDD | | |  | |
|  | | | | Config 3,6 |  | CCR.2.1 TDD | |  | | CCR.2.1 TDD | | |  | |
| OCNG Patterns | | | | |  | OP.1 | | | | | | | | |
| SS-RSSI-Measurement | | | | |  | Not Applicable | | | | | | | | |
| Time offset with Cell 2 | | | | Config 1,4 | μs | - | [TBD] | | - | | [TBD] | - | | [TBD] |
|  | | | | Config 2,3,5,6 | μs | - | [TBD] | | - | | [TBD] | - | | [TBD] |
| SMTC configruation | | | | Config 1,4 |  | SMTC.2 | | | | | | | | |
|  | | | | Config 2,3,5,6 |  | SMTC.1 | | | | | | | | |
| SSB configuration | | | | Config 1,2,4,5 |  | SSB.1 FR1 | | | | | | | | |
|  | | | | Config 3,6 |  | SSB.2 FR1 | | | | | | | | |
| CSI-RS configuration for RRM | | | | Config 1,4 |  | CSI-RS.RRM.FR1.1 FDD | | | | | | | | |
| Config 2,5 |  | CSI-RS.RRM.FR1.1 TDD | | | | | | | | |
| Config 3,6 |  | CSI-RS.RRM.FR1.2 TDD | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1,2,4,5 | kHz | 15 | | | | | | | | |
| Config 3,6 | 30 | | | | | | | | |
| EPRE ratio of PSS to SSS | | | | | dB | 0 | | 0 | | 0 | | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | | | |  |  | |  | |  | | |  | |
| EPRE ratio of PBCH to PBCH DMRS | | | | |  |  | |  | |  | | |  | |
| EPRE ratio of PDCCH DMRS to SSS | | | | |  |  | |  | |  | | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | | |  |  | |  | |  | | |  | |
| EPRE ratio of PDSCH DMRS to SSS | | | | |  |  | |  | |  | | |  | |
| EPRE ratio of PDSCH to PDSCH | | | | |  |  | |  | |  | | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | | |  |  | |  | |  | | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | | |  |  | |  | |  | | |  | |
| Note2 | | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/15kHz | -93 | | | | -116 | | | | |
|  | | | | NR\_FDD\_FR1\_B |  |  | | | | -115.5 | | | | |
|  | | | | NR\_TDD\_FR1\_C |  |  | | | | -115 | | | | |
|  | | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | | | -114.5 | | | | |
|  | | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | | | -114 | | | | |
|  | | | | NR\_FDD\_FR1\_F |  |  | | | | -113.5 | | | | |
|  | | | | NR\_FDD\_FR1\_G |  |  | | | | -113 | | | | |
|  | | | | NR\_FDD\_FR1\_H |  |  | | | | -112.5 | | | | |
| Note2 | Config 1,2,4,5 | | | | dBm/SCS | -93 | | | | Same as Noc for 15kHz | | | | |
|  | Config 3,6 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 |  | -90 | | | | -113 | | | | |
|  |  | | | NR\_FDD\_FR1\_B |  |  | | | | -112.5 | | | | |
|  |  | | | NR\_TDD\_FR1\_C |  |  | | | | -112 | | | | |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | | | -111.5 | | | | |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | | | -111 | | | | |
|  |  | | | NR\_FDD\_FR1\_F |  |  | | | | -110.5 | | | | |
|  |  | | | NR\_FDD\_FR1\_G |  |  | | | | -110 | | | | |
|  |  | | | NR\_FDD\_FR1\_H |  |  | | | | -109.5 | | | | |
|  | | | | | dB | 0 | | -3.19 | | -5.46 | | | -5.46 | |
|  | | | | | dB | 4.54 | | 2.66 | | -4 | | | -4 | |
| CSI-RSRPNote3 | Config 1,2,4,5 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | dBm/SCS | -88.46 | | -90.34 | | -120 | | | -120 | |
|  |  | | | NR\_FDD\_FR1\_B |  |  | |  | | -119.5 | | | -119.5 | |
|  |  | | | NR\_TDD\_FR1\_C |  |  | |  | | -119 | | | -119 | |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | |  | | -118.5 | | | -118.5 | |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | |  | | -118 | | | -118 | |
|  |  | | | NR\_FDD\_FR1\_F |  |  | |  | | -117.5 | | | -117.5 | |
|  |  | | | NR\_FDD\_FR1\_G |  |  | |  | | -117 | | | -117 | |
|  |  | | | NR\_FDD\_FR1\_H |  |  | |  | | -116.5 | | | -116.5 | |
|  | Config 3,6 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 |  | -85.46 | | -87.34 | | -117 | | | -117 | |
|  |  | | | NR\_FDD\_FR1\_B |  |  | |  | | -116.5 | | | -116.5 | |
|  |  | | | NR\_TDD\_FR1\_C |  |  | |  | | -116 | | | -116 | |
|  |  | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | |  | | -115.5 | | | -115.5 | |
|  |  | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | |  | | -115 | | | -115 | |
|  |  | | | NR\_FDD\_FR1\_F |  |  | |  | | -114.5 | | | -114.5 | |
|  |  | | | NR\_FDD\_FR1\_G |  |  | |  | | -114 | | | -114 | |
|  |  | | | NR\_FDD\_FR1\_H |  |  | |  | | -113.5 | | | -113.5 | |
| CSI-SINR Note3 | | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dB | 0 | | -3.19 | | -5.46 | | | -5.46 | |
|  | | | | NR\_FDD\_FR1\_B |  |  | |  | |  | | |  | |
|  | | | | NR\_TDD\_FR1\_C |  |  | |  | |  | | |  | |
|  | | | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | |  | |  | | |  | |
|  | | | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | |  | |  | | |  | |
|  | | | | NR\_FDD\_FR1\_F |  |  | |  | |  | | |  | |
|  | | | | NR\_FDD\_FR1\_G |  |  | |  | |  | | |  | |
|  | | | | NR\_FDD\_FR1\_H |  |  | |  | |  | | |  | |
| IoNote3 | | Config 1,2,4,5 | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/  9.36MHz | -57.5 | | | | -85.51 | | | | |
|  | |  | | NR\_FDD\_FR1\_B |  |  | | | | -85.01 | | | | |
|  | |  | | NR\_TDD\_FR1\_C |  |  | | | | -84.51 | | | | |
|  | |  | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | | | -84.01 | | | | |
|  | |  | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | | | -83.51 | | | | |
|  | |  | | NR\_FDD\_FR1\_F |  |  | | | | -83.01 | | | | |
|  | |  | | NR\_FDD\_FR1\_G |  |  | | | | -82.51 | | | | |
|  | |  | | NR\_FDD\_FR1\_H |  |  | | | | -82.01 | | | | |
|  | | Config 3,6 | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/  38.16MHz | -51.41 | | | | -79.41 | | | | |
|  | |  | | NR\_FDD\_FR1\_B |  |  | | | | -78.91 | | | | |
|  | |  | | NR\_TDD\_FR1\_C |  |  | | | | -78.41 | | | | |
|  | |  | | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |  | | | | -77.91 | | | | |
|  | |  | | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |  | | | | -77.41 | | | | |
|  | |  | | NR\_FDD\_FR1\_F |  |  | | | | -76.91 | | | | |
|  | |  | | NR\_FDD\_FR1\_G |  |  | | | | -76.41 | | | | |
|  | |  | | NR\_FDD\_FR1\_H |  |  | | | | -75.91 | | | | |
| Propagation condition | | | | | - | AWGN | | | | | | | | |
| Antenna configuration | | | | | - | 1x2 | | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-SINR, CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in Clause 3.5.2.  Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification | | | | | | | | | | | | | | |

A.4.7.X.1.3 Test Requirements

The CSI-SINR measurement accuracy shall fulfil the requirements in clause 10.a.b.c.d.

A.4.7.X.2 EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.X.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.a.b.c.d and 10.a.b.c.d for interfrequency measurement.

A.4.7.X.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.4.7.X.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-SINR inter-frequency measurement are tested by using test parameters in Table A.4.7.X.2.2-2. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell of which specific test parameters for this test case are specified in Table A.3.7.2.1-1. CSI-RS for mobility configured for Cell 2 is associated to the SSB of Cell 2, and CSI-RS for mobility configured for Cell 3 is associated to the SSB of Cell 3.

**Table A.4.7.X.2.2-1: CSI-SINR Inter frequency CSI-SINR supported test configurations**

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

**Table A.4.7.X.2.2-1: CSI-SINR Inter frequency test parameters**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Test 1** | | | **Test 2** | | | | **Test 3** | | | |
|  | | | |  | **Cell 2** | **Cell 3** | | **Cell 2** | | **Cell 3** | | **Cell 2** | | **Cell 3** | |
| **SSB ARFCN** | | | |  | **freq1** | **freq2** | | **freq1** | | **freq2** | | **freq1** | | **freq2** | |
| Duplex mode | | | Config 1,4 |  | FDD | | | | | | | | | | |
|  | | | Config 2,3,5,6 |  | TDD | | | | | | | | | | |
| TDD configuration | | | Config 1,4 |  | Not Applicable | | | | | | | | | | |
|  | | | Config 2,5 |  | TDDConf.1.1 | | | | | | | | | | |
|  | | | Config 3,6 |  | TDDConf.2.1 | | | | | | | | | | |
| Downlink initial BWP configuration | | | |  | DLBWP.0.1 | | | | | | | | | | |
| Downlink dedicated BWP configuration | | | |  | DLBWP.1.1 | | | | | | | | | | |
| Uplink initial BWP configuration | | | |  | ULBWP.0.1 | | | | | | | | | | |
| Uplink dedicated BWP configuration | | | |  | ULBWP.1.1 | | | | | | | | | | |
| DRX Cycle configuration | | | | ms | Not Applicable | | | | | | | | | | |
| TRS configuration | | Config 1, 4 | |  | TRS.1.1 FDD | | | | | | | | | | |
|  | | Config 2, 5 | |  | TRS.1.1 TDD | | | | | | | | | | |
|  | | Config 3, 6 | |  | TRS.1.2 TDD | | | | | | | | | | |
| PDSCH Reference measurement channel | | | Config 1,4 |  | SR.1.1 FDD | - | | SR.1.1 FDD | | - | | SR.1.1 FDD | | - | |
|  | | | Config 2,5 |  | SR.1.1 TDD |  | | SR.1.1 TDD | |  | | SR.1.1 TDD | |  | |
|  | | | Config 3,6 |  | SR.2.1 TDD |  | | SR.2.1 TDD | |  | | SR.2.1 TDD | |  | |
| RMSI CORESET Reference Channel | | | Config 1,4 |  | CR.1.1 FDD | - | | CR.1.1 FDD | | - | | CR.1.1 FDD | | - | |
|  | | | Config 2,5 |  | CR.1.1 TDD |  | | CR.1.1 TDD | |  | | CR.1.1 TDD | |  | |
|  | | | Config 3,6 |  | CR.2.1 TDD |  | | CR.2.1 TDD | |  | | CR.2.1 TDD | |  | |
| Dedicated CORESET Reference Channel | | | Config 1,4 |  | CCR.1.1 FDD | - | | CCR.1.1 FDD | | - | | CCR.1.1 FDD | | - | |
|  | | | Config 2,5 |  | CCR.1.1 TDD |  | | CCR.1.1 TDD | |  | | CCR.1.1 TDD | |
|  | | | Config 3,6 |  | CCR.2.1 TDD |  | | CCR.2.1 TDD | |  | | CCR.2.1 TDD | |
| OCNG Patterns | | | |  | OP.1 | | | | | | | | | | |
| SS-RSSI-Measurement | | | |  | Not Applicable | | | | | | | | | | |
| Time offset with Cell 2 | | | Config 1,4 | μs | - | | [TBD] | | - | | [TBD] | | - | | [TBD] |
|  | | | Config 2,3,5,6 | μs | - | | e | | - | | [TBD] | | - | | [TBD] |
| SMTC configuration | | | Config 1,4 |  | SMTC.2 | | | | | | | | | | |
|  | | | Config 2,3,5,6 |  | SMTC.1 | | | | | | | | | | |
| SSB configuration | | | Config 1,2,4,5 |  | SSB.1 FR1 | | | | | | | | | | |
|  | | | Config 3,6 |  | SSB.2 FR1 | | | | | | | | | | |
| CSI-RS configuration for RRM | | | Config 1,4 |  | CSI-RS.RRM.FR1.1 FDD | | | | | | | | | | |
| Config 2,5 |  | CSI-RS.RRM.FR1.1 TDD | | | | | | | | | | |
| Config 3,6 |  | CSI-RS.RRM.FR1.2 TDD | | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | Config 1,2,4,5 | kHz | 15 | | | | | | | | | | |
|  | | | Config 3,6 |  | 30 | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | | dB | 0 | 0 | | 0 | | 0 | | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | | |  |  |  | |  | |  | |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | | | |  |  |  | |  | |  | |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | | | |  |  |  | |  | |  | |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | |  |  |  | |  | |  | |  | |  | |
| EPRE ratio of PDSCH DMRS to SSS | | | |  |  |  | |  | |  | |  | |  | |
| EPRE ratio of PDSCH to PDSCH | | | |  |  |  | |  | |  | |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | |  |  |  | |  | |  | |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | |  |  |  | |  | |  | |  | |  | |
| Note2 | Config 1,2,4,5 | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dBm/15kHz | -88 | | | -108.5 | | | | -119.5 | | | |
|  |  | | NR\_FDD\_FR1\_B |  |  | | |  | | | | -119 | | | |
|  |  | | NR\_TDD\_FR1\_C |  |  | | |  | | | | -118.5 | | | |
|  |  | | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | |  | | | | -118 | | | |
|  |  | | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | |  | | | | -117.5 | | | |
|  |  | | NR\_FDD\_FR1\_F |  |  | | |  | | | | -117 | | | |
|  |  | | NR\_FDD\_FR1\_G |  |  | | |  | | | | -116.5 | | | |
|  |  | | NR\_FDD\_FR1\_H |  |  | | |  | | | | -116 | | | |
| Note2 | Config 1,2,4,5 | | | dBm/SCS | -88 | | | -108.5 | | | | Same as Noc for 15kHz | | | |
|  | Config 3,6 | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 |  | -85 | | | -105.5 | | | | -116.5 | | | |
|  |  | | NR\_FDD\_FR1\_B |  |  | | |  | | | | -116 | | | |
|  |  | | NR\_TDD\_FR1\_C |  |  | | |  | | | | -115.5 | | | |
|  |  | | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | |  | | | | -115 | | | |
|  |  | | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | |  | | | | -114.5 | | | |
|  |  | | NR\_FDD\_FR1\_F |  |  | | |  | | | | -114 | | | |
|  |  | | NR\_FDD\_FR1\_G |  |  | | |  | | | | -114.5 | | | |
|  |  | | NR\_FDD\_FR1\_H |  |  | | |  | | | | -113 | | | |
|  | | | | dB | -1.75 | | | 20 | | | | -4.0 | | | |
|  | | | | dB | -1.75 | | | 20 | | | | -4.0 | | | |
| CSI-RSRPNote3 | Config 1,2,4,5 | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dBm/SCS | -89.75 | | | -88.5 | | | | -123.5 | | | |
|  |  | | NR\_FDD\_FR1\_B |  |  | | |  | | | | -123 | | | |
|  |  | | NR\_TDD\_FR1\_C |  |  | | |  | | | | -122.5 | | | |
|  |  | | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | |  | | | | -122 | | | |
|  |  | | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | |  | | | | -121.5 | | | |
|  |  | | NR\_FDD\_FR1\_F |  |  | | |  | | | | -121 | | | |
|  |  | | NR\_FDD\_FR1\_G |  |  | | |  | | | | -120.5 | | | |
|  |  | | NR\_FDD\_FR1\_H |  |  | | |  | | | | -120 | | | |
|  | Config 3,6 | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 |  | -86.75 | | | -85.5 | | | | -120.5 | | | |
|  |  | | NR\_FDD\_FR1\_B |  |  | | |  | | | | -120 | | | |
|  |  | | NR\_TDD\_FR1\_C |  |  | | |  | | | | -119.5 | | | |
|  |  | | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | |  | | | | -119 | | | |
|  |  | | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | |  | | | | -118.5 | | | |
|  |  | | NR\_FDD\_FR1\_F |  |  | | |  | | | | -118 | | | |
|  |  | | NR\_FDD\_FR1\_G |  |  | | |  | | | | -117.5 | | | |
|  |  | | NR\_FDD\_FR1\_H |  |  | | |  | | | | -117 | | | |
| CSI-SINR Note3 | | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dB | -1.75 | | | 20 | | | | -4.0 | | | |
|  | | | NR\_FDD\_FR1\_B |  |  | | |  | | | |  | | | |
|  | | | NR\_TDD\_FR1\_C |  |  | | |  | | | |  | | | |
|  | | | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | |  | | | |  | | | |
|  | | | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | |  | | | |  | | | |
|  | | | NR\_FDD\_FR1\_F |  |  | | |  | | | |  | | | |
|  | | | NR\_FDD\_FR1\_G |  |  | | |  | | | |  | | | |
|  | | | NR\_FDD\_FR1\_H |  |  | | |  | | | |  | | | |
| IoNote3 | Config 1,2,4,5 | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dBm/  9.36MHz | -57.83 | | | -60.5 | | | | -90.09 | | | |
|  |  | | NR\_FDD\_FR1\_B |  |  | | |  | | | | -89.59 | | | |
|  |  | | NR\_TDD\_FR1\_C |  |  | | |  | | | | -89.09 | | | |
|  |  | | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | |  | | | | -88.59 | | | |
|  |  | | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | |  | | | | -88.09 | | | |
|  |  | | NR\_FDD\_FR1\_F |  |  | | |  | | | | -87.59 | | | |
|  |  | | NR\_FDD\_FR1\_G |  |  | | |  | | | | -87.09 | | | |
|  |  | | NR\_FDD\_FR1\_H |  |  | | |  | | | | -86.59 | | | |
|  | Config 3,6 | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dBm/  38.16MHz | -51.73 | | | -54.41 | | | | -84 | | | |
|  |  | | NR\_FDD\_FR1\_B |  |  | | |  | | | | -83.5 | | | |
|  |  | | NR\_TDD\_FR1\_C |  |  | | |  | | | | -83 | | | |
|  |  | | NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |  |  | | |  | | | | -82.5 | | | |
|  |  | | NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |  |  | | |  | | | | -82 | | | |
|  |  | | NR\_FDD\_FR1\_F |  |  | | |  | | | | -81.5 | | | |
|  |  | | NR\_FDD\_FR1\_G |  |  | | |  | | | | -81 | | | |
|  |  | | NR\_FDD\_FR1\_H |  |  | | |  | | | | -80.5 | | | |
| Propagation condition | | | | - | AWGN | | | | | | | | | | |
| Antenna configuration | | | | - | 1x2 | | | | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-SINR, CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in Clause 3.5.2.  Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification | | | | | | | | | | | | | | | |

A.4.7.X.2.3 Test Requirements

The CSI-SINR measurement accuracy shall fulfil the requirements in clause 10.a.b.c.d and 10.a.b.c.d.

<End of Change #3>

<Start of Change #4>

## A.5.6 Measurement procedure

A.5.6.X CSI-RS based Intra-frequency Measurements

A.5.6.X.1 EN-DC event triggered reporting test without gap under non-DRX

A.5.6.X.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell identification requirements in clause 9.10.2.X. Supported test configurations are shown in table A.5.6.X.1.1-1.

**Table A.5.6.X.1.1-1: supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | LTE FDD, 120 kHz SSB SCS, 120Khz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, 120 kHz SSB SCS, 120Khz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, 240 kHz SSB SCS, 120Khz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, 240 kHz SSB SCS, 120Khz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.X.1.1-2, A.5.6.X.1.1-3 and A.5.6.X.1.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

**Table A.5.6.X.1.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Value** | **Comment** |
| Active cell |  | 1~4 | E-UTRAN PCell (Cell 1)  PSCell (Cell 2) |  |
| Neighbour cell |  | 1~4 | Cell 3 | Cell to be identified. |
| RF Channel Number |  | 1~4 | 1: Cell 1  2: Cell 2 and Cell 3 | One TDD carrier frequency is used for the NR cells and one TDD or FDD carrier frequency is used for E-UTRAN cell. |
| SMTC configuration |  | 1~4 | SMTC.1 |  |
| A3-Offset | dB | 1~4 | -6 |  |
| CP length |  | 1~4 | Normal |  |
| Hysteresis | dB | 1~4 | 0 |  |
| Time To Trigger | s | 1~4 | 0 |  |
| Filter coefficient |  | 1~4 | 0 | L3 filtering is not used |
| DRX |  | 1~4 | OFF |  |
| Time offset between Cell 1 and Cell 2 |  | 1~4 | 3 μs | Synchronous EN-DC |
| Time offset between Cell 2 and Cell 3 |  | 1~4 | 3 μs | Synchronous cells |
| T1 | s | 1~4 | 5 |  |
| T2 | s | 1~4 | 5 |  |

**Table A.5.6.X.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 2** | | **Cell 3** | |
|  |  |  | **T1** | **T2** | **T1** | **T2** |
| TDD configuration |  | 1~4 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1~4 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Intial BWP configuration |  | 1~4 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1~4 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1~4 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1~4 | SSB | | SSB | |
| PDSCH RMC configuration |  | 1~4 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1~4 | CR.3.1 TDD | | CR.3.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1~4 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| OCNG Patterns |  | 1~4 | OP.1 | | OP.1 | |
| TRS configuration |  | 1~4 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI state |  | 1~4 | TCI.State.2 | | N/A | |
| SSB configuration |  | 1, 2 | SSB.3 FR2 | | SSB.3 FR2 | |
|  |  | 3, 4 | SSB.4 FR2 | | SSB.4 FR2 | |
| CSI-RS RRM configuration |  | 1~4 | CSI-RS.RRM.FR2.1 TDD | | CSI-RS.RRM.FR2.1 TDD | |
| firstOFDMSymbolInTimeDomain |  | 1~4 | 7 | | 12 | |
| Propagation Condition |  | 1~4 | AWGN | | | |

**Table A.5.6.X.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 2** | | **Cell 3** | |
|  |  |  | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | 1~4 | Setup 3 defined in A.3.15.3 | | | |
|  |  |  | **AoA1** | | **AoA2** | |
| Assumption for UE beamsNote 4 |  | 1~4 | Rough | | Rough | |
|  | dB | 1~4 | 4 | 4 | -Infinity | 8 |
| Note 2 | dBm/15 KHz | 1~4 | -102 | | | |
| Note 2 | dBm/SCS | 1, 2 | -93 | | | |
|  |  | 3, 4 | -90 | | | |
| SS-RSRP | dBm/SCS | 1, 2 | -89 | -89 | -Infinity | -85 |
|  |  | 3, 4 | -86 | -86 | -Infinity | -82 |
| CSI-RSRP | dBm/SCS | 1, 2 | -89 | -89 | -Infinity | -85 |
|  |  | 3, 4 | -86 | -86 | -Infinity | -82 |
|  | dB | 1~4 | 4 | 4 | -Infinity | 8 |
|  | dBm/95.04MHz | 1~4 | -58.56 | | -55.38 | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | | |

A.5.6.X.1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,

- 1.44s for a UE supporting power class 2, 3 and 4

The UE is required to read the neighbour cell SSB index in this test in order to detect associated SSB for the CSI-RS resource of Cell 3.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

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

A.5.6.y CSI-RS based Inter-frequency Measurements

A.5.6.y.1 EN-DC event triggered reporting tests for NR FR2 cell when DRX is used

A.5.6.y.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.10.3.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6. x.x.1-1, A.5.6. x.x.1-2, and A.5.6. x.x.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6. x.x.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.y.x.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6. x.x.1-1.

**Table A.5.6.y.x.1-1 EN-DC event triggered reporting tests for FR2-FR2**

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

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.5.6.y.x.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection with DRX**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Value** | | | | **Comment** |
|  |  | **configuration** | **Test 1** | **Test 2** | **Test 3** | **Test 4** |  |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 | | | | One E-UTRAN TDD carrier frequencies is used. |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | | | | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1,2 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2 | 0 | | 13 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 39 | | 39 | |  |
| SMTC-SSB parameters |  | Config 1,2 | SSB.3 FR2 | | | | As specified in clause A.3.10.2 |
| A3-Offset | dB | Config 1,2 | -6 | | | |  |
| Hysteresis | dB | Config 1,2 | 0 | | | |  |
| CP length |  | Config 1,2 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2 | 0 | | | |  |
| Filter coefficient |  | Config 1,2 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2 | DRX.1 | | | | As specified in clause A.3.3.3 |
| Time offset between PCell and PSCell |  | Config 1,2 | [3] μs | | | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | [3] us | | | | Synchronous cells |
| T1 | s | Config 1,2 | 5 | | | |  |
| T2 | s | Config 1,2 | 11 for PC1; 6.5 for other PC | 108 for PC1; 67 for other PC | 11 for PC1; 6.5 for other PC | 108 for PC1; 67 for other PC |  |

**Table A.5.6.y.x.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Cell 2** | | | **Cell 3** | |
|  |  | **configuration** | **T1** | **T2** | | **T1** | **T2** |
| AoA setup |  | Config 1,2 | Setup 1 as specified in clause A.3.15 | | | | |
| Assumption for UE beamsNote 7 |  | Config 1,2 | Rough | | | Rough | |
| NR RF Channel Number |  | Config 1,2 | 1 | | | 2 | |
| Duplex mode |  | Config 1,2 | TDD | | | TDD | |
| BWchannel | MHz | Config 1,2 | 10: NRB,c = 66 | | | 100: NRB,c = 66 | |
| BWP BW | MHz | Config 1,2 | 10: NRB,c = 66 | | | 100: NRB,c = 66 | |
| TDD configuration |  | Config 1,2 | TDDConf.3.1 | | | TDDConf.3.1 | |
| Initial DL BWP |  | Config 1,2 | DLBWP.0.1 | | | NA | |
| Initial UL BWP |  | Config 1,2 | ULBWP.0.1 | | |  | |
| Dedicated DL BWP |  | Config 1,2 | DLBWP.1.1 | | | NA | |
| Dedicated UL BWP |  | Config 1,2 | ULBWP.1.1 | | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | Config 1,2 | OP.1 | | | OP.1 | |
| PDSCH Reference measurement channel |  | Config 1,2 | SR.3.1 TDD | | | - | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2 | 120 | | | 120 | |
| CORESET Reference Channel |  | Config 1,2 | CR.3.1 TDD | | | - | |
| TRS configuration |  | Config 1,2 | TRS.2.1 TDD | | | NA | |
| TCI configuration |  | Config 1,2 | CSI-RS.Config.0 | | | NA | |
| SMTC configuration defined in A.3.11 |  | Config 1,2 | SMTC.1 | | | SMTC.1 | |
| CSI-RS RRM configuration |  | Config 1,2 | CSI-RS.RRM.FR2.1 TDD | | | CSI-RS.RRM.FR2.1 TDD | |
| firstOFDMSymbolInTimeDomain |  | Config 1,2 | 7 | | | 12 | |
| Note2 | dBm/15kHz Note5 |  | -104.7 | | | -104.7 | |
| Note2 | dBm/SCS Note4 | Config 1,2 | -95.7 | | | -95.7 | |
| CSI-RSRP Note 3 | dBm/SCS Note5 | Config 1,2 | -89.7 | | -89.7 | -Infinity | -86.7 |
| SS-RSRP Note 3 | dBm/SCS Note5 | Config 1,2 | -89.7 | | -89.7 | -Infinity | -86.7 |
|  | dB | Config 1,2 | 6 | | 6 | -Infinity | 9 |
|  | dB | Config 1,2 | 6 | | 6 | -Infinity | 9 |
| IoNote3 | dBm/95.04 MHz Note5 | Config 1,2 | -59.7 | | -59.7 | -66.7 | -57.2 |
| Propagation Condition |  | Config 1,2,3,4,5,6 | AWGN | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP, CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

A.5.6.y.1.2 Test Requirements

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

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

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

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE is required to read the neighbour cell SSB index in this test in order to detect associated SSB for the CSI-RS resource of Cell 3.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

<End of Change #4>

<Start of Change #5>

A.5.7 Measurement Performance requirements

A.5.7.X CSI-RSRP

A.5.7.X.1 EN-DC intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.5.7.X.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RS based RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.X.1.1 and 10.1.X.1.2 for intra-frequency measurements.

A.5.7.X.1.2 Test parameters

In this set of test cases, all NR cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.X.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table A.5.7.X.1.2-2 and A.5.7.X.1.2-3. The E-UTRA PCell is configured as specified in clause A.3.7.2.2. In all test cases, cell 1 is the PCell, cell 2 is the PSCell and cell 3 is the target cell. The test consists of two time phases T1 and T2.

**Table A.5.7.X.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations**

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

**Table A.5.7.X.1.2-2: CSI-RSRP Intra frequency general test parameters**

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

**Table A.5.7.X.1.2-3: CSI-RSRP Intra frequency OTA related test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **T1** | | **T2** | |
| **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 8 |  | Rough | | | |
| Note1 | dBm/15kHzNote4 | -91.6 | | N/A | |
| Note1 | dBm/SCSNote4 | -82.6 | | N/A | |
|  | dB | 6.0 | 1.0 | N/A | N/A |
| Es | dBm/SCSNote4 |  |  | (Table B.2.2-2 Rx Beam Peak +2.1dB) | (Table B.2.2-2 Rx Beam Peak +2.1dB) |
| SSB\_RPNote2 | dBm/SCS | -76.6 | -81.6 | (Table B.2.2-2 Rx Beam Peak +2.1dB) | (Table B.2.2-2 Rx Beam Peak +2.1dB) |
| BB Note6 | dB | 2.44 | -5.98 | -5.98 | -5.98 |
| CSI\_RP | dBm/SCS | -76.6 | -81.6 | (Table B.2.2-2 Rx Beam Peak +2.1dB) | (Table B.2.2-2 Rx Beam Peak +2.1dB) |
| IoNote2 | dBm/95.04 MHz Note4 | -50.05 | | (Table B.2.2-2 Rx Beam Peak +29.70dB) | |
| Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SSB\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4.  Note 7: All parameters apply for configurations 1 and 2  Note 8: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.5.7.X.1.3 Test Requirements

The CSI-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.X.1.1 and relative accuracy requirements in clause 10.1.X.1.2. The following requirements are to be verified:

During T1:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported CSI-RSRP is in the range shown in table A.5.7.X.1.3-1.

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

During T2:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported CSI-RSRP is in the range shown in table A.5.7.X.1.3-1.

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

During T1 and T2:

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

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

**Table A.5.7.X.1.3-1: CSI-RSRP absolute accuracy test requirement**

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

A.5.7.X.2 EN-DC inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.5.7.X.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RS based RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.Y.1.1 and 10.1.Y.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.5.7.X.2.1-1.

**Table A.5.7.X.2.1-1: Applicable NR configurations for FR2 inter-frequency CSI-RSRP accuracy test**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | FDD LTE PCell, cells 2&3 120 kHz SSB SCS, 120KHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | TDD LTE PCell, cells 2&3 120 kHz SSB SCS, 120KHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | FDD LTE PCell, cells 2&3 240 kHz SSB SCS, 120KHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| 4 | TDD LTE PCell, cells 2&3 240 kHz SSB SCS, 120KHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |

A.5.7.X.2.2 Test parameters

In this set of test cases, there are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.7.X.2.2-1 and Table A.5.7.X.2.2-2 below. Both absolute and relative accuracy of RSRP intrer-frequency measurements are tested by using the parameters in Table A.5.7.X.2.2-1 and Table A.5.7.X.2.2-2. The inter-frequency measurements are supported by a measurement gap.

**Table A.5.7.X.2.2-1: CSI-RSRP inter-frequency general test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** |
| Physical cell ID |  |  | 489 | 0 | 489 | 0 |
| SSB ARFCN | 1~4 |  | freq1 | freq2 | freq1 | freq2 |
| BWchannel | 1~4 |  | 100:  NRB,c = 66 | | 100:  NRB,c = 66 | |
| Gap pattern ID |  |  | 0 | | 0 | |
| Duplex mode | 1~4 |  | TDD | TDD | TDD | TDD |
| TDD configuration | 1~4 |  | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH Reference measurement channel | 1~4 |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel | 1~4 |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Reference Channel | 1~4 |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| SSB configuration | 1,2 |  | SSB.3 FR2 | | SSB.3 FR2 | |
| 3,4 | SSB.4 FR2 | | SSB.4 FR2 | |
| OCNG Patterns | 1~4 |  | OP.3 | | OP.3 | |
| Initial BWP Configuration | 1~4 |  | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP configuration | 1~4 |  | DLBWP.1.3  ULBWP.1.3 | | DLBWP.1.3  ULBWP.1.3 | |
| TRS Configuration | 1~4 |  | TRS.2.1 TDD | | TRS.2.1 TDD | |
| PDCCH/PDSCH TCI Configuration | 1~4 |  | TCI.State.2 | | TCI.State.2 | |
| SMTC configuration | 1~4 |  | SMTC.1 | | SMTC.1 | |
| CSI-RS configuration for RRM | 1~4 |  | CSI-RS.RRM.3.1 TDD | CSI-RS.RRM.3.2 TDD | CSI-RS.RRM.3.1 TDD | CSI-RS.RRM.3.2 TDD |
| Time offset between Cell 2 and Cell 3 | 1~4 | μs | [3] | | [3] | |
| EPRE ratio of PSS to SSS | 1~4 | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation condition | 1~4 | - | AWGN | AWGN | AWGN | AWGN |
| Antenna configuration | 1~4 | - | 1x2 | 1x2 | 1x2 | 1x2 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void | | | | | | |

**Table A.5.7.X.2.2-2: CSI-RSRP inter-frequency OTA related test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** |
| Angle of arrival configuration |  | Setup 4b according to clause A.3.15.4.2 | | Setup 4b according to clause A.3.15.4.2 | |
| AoA1  Spherical coverage | AoA2  Rx Beam Peak | AoA1  Spherical coverage | AoA2  Rx Beam Peak |
| Assumption for UE beamsNote 7 |  | Rough | Rough | Assumption for UE beamsNote 7 |  |
| Note1 | dBm/15kHzNote4 | -90.6 | -90.6 | (Table B.2.3-2 Rx Beam Peak +1.97dB) | (Table B.2.3-2 Rx Beam Peak -3.03dB) |
| Note1 | dBm/SCSNote4 | -81.6 | -81.6 | (Table B.2.3-2 Rx Beam Peak +11.0dB) | (Table B.2.3-2 Rx Beam Peak +6.0dB) |
|  | dB | 6.0 | 6.0 | 17.0 | -1.0 |
| SSB\_RPNote2 | dBm/SCS | -75.60 | -75.60 | (Table B.2.3-2 Rx Beam Peak +28.0dB) | (Table B.2. 3-2 Rx Beam Peak +5.0dB) |
| (SSB\_RPCell 1 – SSB\_RPCell 2) | dB | 0 | | 23.00 | |
| BB Note6 | dB | 5.29 | 5.96 | 8.86 | -3.92 |
| CSI\_RP | dBm/SCS | -75.60 | -75.60 | (Table B.2.2-2 Rx Beam Peak +2.1dB) | (Table B.2.2-2 Rx Beam Peak +2.1dB) |
| IoNote2 | dBm/95.04 MHz Note4 | -50.03 | -50.03 | (Table B.2.3-2 Rx Beam Peak +52.68dB) | (Table B.2.3-2 Rx Beam Peak +33.13dB) |
| (Iofreq 1 – Io freq 2) | dB | 0 | | 19.55 | |
| Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SSB\_RP, Es/Iot, Io, (SSB\_RPCell 2 – SSB\_RPCell 1) and (Iofreq 2 – Io freq 1) levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP or ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.5.7.X.2.3 Test Requirements

The CSI-RSRP measurement accuracy for Cell 2 and Cell 3 shall fulfil the absolute requirements in clause 10.1.X.1.1 and the relative requirements in clause 10.1.X.1.2.

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported CSI-RSRP is in the range shown in Table A.5.7.X.2.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported CSI -RSRP meets the requirements in Table A.5.7.X.2.3-2.

Test 2:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported CSI -RSRP is in the range shown in Table A.5.7.X.2.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported CSI -RSRP meets the requirements in Table A.5.7.X.2.3-2.

**Table A.5.7.X.2.3-1: CSI-RSRP absolute accuracy test requirement**

|  |  |
| --- | --- |
|  | **Test requirement Notes1,2,3,4** |
| Cell 2 | CSI \_RP2 -δ +Gmin +X ≤ Reported RSRP(dBm) ≤ CSI \_RP2 +δ +Gmax |
| Cell 3 | CSI \_RP3 -δ +Gmin ≤ Reported RSRP(dBm) ≤ CSI \_RP3 +δ+Gmax |
| Note 1: CSI\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.5.1.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class  Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value. | |

**Table A.5.7.X.2.3-2: CSI-RSRP relative accuracy test requirement**

|  |  |
| --- | --- |
|  | **Test requirement Notes1,2,3,4** |
| Cell 3 – Cell 2 | CSI \_RP3 - CSI \_RP2 -δ ≤ Reported RSRP(dB) ≤ CSI\_RP3 - CSI\_RP2 +δ–(X) |
| Note 1: CSI\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration  Note 2: δ is the RSRP relative accuracy requirement from Table 10.1.5.1.2-1  Note 3: Void  Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value. | |

A.5.7.y CSI-RSRQ

A.5.7.y.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell

A.5.7.y.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.8 for inter-frequency measurement.

A.5.7.y.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.5.7.y.1.2-1. The absolute accuracy of CSI-RSRQ intra-frequency measurement is test by using the parameters in Table A.5.7.y.1.2-2. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1.

**Table A.5.7.y.1.2-1: CSI-RSRQ Intra frequency CSI-RSRQ supported test configurations**

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

**Table A.5.7.y.1.2-2: CSI-RSRQ Intra frequency test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** |
| SSB ARFCN | |  | **Freq1** | | **Freq1** | |
| Duplex mode | |  | TDD | | TDD | |
| TDD configuration | |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | DLBWP.0.1 | | | |
| Dedicated DL BWP | DLBWP.1.1 | | | |
| Initial UL BWP | ULBWP.0.1 | | | |
| Dedicated UL BWP | ULBWP.1.1 | | | |
| TRS configuration | |  | TRS.2.1 TDD |  | TRS.2.1 TDD |  |
| CSI-RS configuration for RRM | |  | CSI-RS.RRM.FR2.1 TDD | | | |
| TCI state | |  | TCI.State.0 |  | TCI.State.0 |  |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD |  | SR.3.1 TDD |  |
| RMSI CORESET Reference Channel | |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC | |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns | |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration | |  | SMTC.1 | | | |
| SSB configuration | |  | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 |
| PDSCH/PDCCH subcarrier spacing | | kHz | 120 | 120 | 120 | 120 |
| SS-RSSI-Measurement | |  | Not Applicable | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS | |
| EPRE ratio of PBCH to PBCH\_DMRS | |
| EPRE ratio of PDCCH\_DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |
| EPRE ratio of PDSCH\_DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
|  | | dB | 3 | 3 | -3 | -3 |
| 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: CSI-RSRQ, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-RSRQ and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Void | | | | | | |

**Table A.5.7.y.1.2-3: CSI-RSRQ Intra frequency OTA related test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 9 |  | Rough | | | |
| Note1 | dBm/15kHzNote4 | -95 | | -95 | |
| Note1 | dBm/SCSNote3 | -86 | | -86 | |
| CSI-RSRPNote2 | dBm/SCS Note4 | -83 | -83 | -89 | -89 |
| CSI-RSRQ Note2 | dB | -14.77 | -14.77 | -16.81 | -16.81 |
|  | dB | -1.76 | -1.76 | -4.76 | -4.76 |
| IoNote2 | dBm/95.04 MHz Note4 | -50 | | -54 | -54 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: CSI-RSRQ, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: CSI-RSRQ and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: NR operating band groups are as defined in Clause 3.5.2.  Note 7: Void  Note 8: Void  Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.5.7.y.1.3 Test Requirements

The CSI-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal CSI-RSRQ [+2.5dB] to Nominal CSI-RSRQ [-3.5dB] and the CSI-RSRQ measurement accuracy in test 2 shall be within the range Nominal CSI-RSRQ [+3.5dB] to Nominal CSI-RSRQ [-4.5dB] according to the requirements in clause 10.1.8 with an additional -1dB margin reflecting the possible impact of UE self-noise in the test. Nominal CSI-RSRQ is the value shown in table A.5.7.y.1.2-3.

A.5.7.y.2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.y.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.10 for inter-frequency measurement.

A.5.7.y.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.5.7.y.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-RSRQ inter-frequency measurement are tested by using test setup in Table A.5.7.y.2.2-2 and Table A.5.7.y.2.2-3. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

**Table A.5.7.y.2.2-1: CSI-RSRQ Inter frequency CSI-RSRQ supported test configurations**

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** |
| SSB ARFCN |  | Freq1 | freq2 | freq1 | Freq2 |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| CSI-RS configuration for RRM |  | CSI-RS.RRM.FR2.1 TDD | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
|  |
|  | dB | -1.75 | -1.75 | -3 | -3 |
| 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: CSI-RSRQ, CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-RSRQ and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | |

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** |
| AoA setup |  | Setup 1 in clause A.3.15 | | Setup 1 in clause A.3.15 | |
| Assumption for UE beamsNote 8 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -94.03 | | -94.03 | |
| Note1 | dBm/SCSNote3 | -85.0 | | -85.0 | |
| CSI-RPNote2 | dBm/SCS Note4 | -86.75 | -86.75 | -88 | -88 |
| CSI-RSRQNote2 | dB | -14.75 | -14.75 | -15.56 | -15.56 |
|  | dB | -1.75 | -1.75 | -3 | -3 |
| IoNote2 | dBm/95.04 MHz Note4 | -53.8 | -53.8 | -54.25 | -54.25 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: CSI-RSRQ, CSI-RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: CSI-RSRQ and CSI-RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.5.7.2.2.3 Test Requirements

The CSI-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal CSI-RSRQ[+2.5dB] to Nominal CSI-RSRQ[-3.5dB] and the CSI-RSRQ measurement accuracy in test 2 shall be within the range Nominal CSI-RSRQ[+3.5dB] to Nominal CSI-RSRQ[-4.5dB] according to the requirements in clause 10.1.10 with an additional -1dB margin reflecting the possible impact of UE self-noise in the test.

The CSI-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.

A.5.7.Z CSI-SINR

A.5.7.Z.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.Z.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.13.2.1.

A.5.7.Z.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.Z.1.2-1. The absolute accuracy of CSI-SINR intra-frequency measurement is test by using the parameters in Table A.5.7.Z.1.2-2 and Table A.5.7.Z.1.2-3. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

**Table A.5.7.Z.1.2-1: CSI-SINR Intra frequency CSI-SINR supported test configurations**

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

**Table A.5.7.Z.1.2-2: CSI-SINR Intra frequency test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** |
| SSB ARFCN |  | **Freq2** | | **Freq2** | |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | | | |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | | | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | | |
| DRX cycle configuration | ms | Not applicable | | | |
| TRS configuration |  | TRS.2.1 TDD | | | |
| TCI state |  | TCI.State.0 | | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD |  | SR.3.1 TDD |  |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated RMSI CORESET Reference Channel |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 | | | |
| SSB configuration |  | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 |
| CSI-RS for mobility |  | - | CSI-RS.RRM.FR2.1 TDD | - | CSI-RS.RRM.FR2.1 TDD |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| CSI-RSSI-Measurement |  | Not Applicable | | | |
| EPRE ratio of PSS to SSS | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| 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: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | |

**Table A.5.7.Z.1.2-3: CSI-SINR Intra frequency OTA related test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 7 |  | Rough | | Rough | |
| Note1 | dBm/15kHz Note4 | -105 | | N/A | |
| Note1 | dBm/SCS Note3 | -96 | | N/A | |
|  | dB | 4.54 | 2.66 | -3 | -3 |
| CSI-RSRPNote2 | dBm/SCS Note4 | -91.46 | -93.34 | -99 | -99 |
| CSI-SINR Note2 | dB | 0 | -3.2 | -4.76 | -4.76 |
|  | dB | 0 | -3.2 | -4.76 | -4.76 |
| IoNote2 | dBm/95.04 MHz Note4 | -59.2 | | -64 | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: NR operating band groups are as defined in Clause 3.5.2.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.5.7.Z.1.3 Test Requirements

The CSI-SINR absolute measurement accuracy in test 1 shall be within the range Nominal CSI-SINR+3B to Nominal CSI-SINR -4dB and the CSI-SINR measurement accuracy in test 2 shall be within the range Nominal CSI-SINR +3.5dB to Nominal CSI-SINR -4.5dB according to the requirements in clause 10.1.10.13.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test. Nominal CSI-SINR is the value shown in table A.5.7.Z.1.2-3.

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

A.5.7.Z.2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.Z.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.15.2.1 and 10.1.15.2.2 for inter-frequency measurement.

A.5.7.Z.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.5.7.Z.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-SINR inter-frequency measurement are tested by using test setup in Table A.5.7.Z.2.2-2 and Table A.5.7.Z.2.2-3. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

**Table A.5.7.Z.2.2-1: CSI-SINR Inter frequency CSI-SINR supported test configurations**

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

**Table A.5.7.Z.2.2-2: CSI-SINR Inter frequency general test parameters**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | | **Test 3** | |
| **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** |
| SSB ARFCN |  | Freq1 | freq2 | freq1 | Freq2 | freq1 | Freq2 |
| Duplex mode |  | TDD | | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | | | | | |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | | | | | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | | | | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | | | | |
| DRX cycle configuration | ms | Not applicable | | | | | |
| TRS configuration |  | TRS.2.1 TDD | | | | | |
| TCI state |  | TCI.State.0 | | | | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| CSI-RS for mobility |  | - | CSI-RS.RRM.FR2.1 TDD | - | CSI-RS.RRM.FR2.1 TDD | - | CSI-RS.RRM.FR2.1 TDD |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| 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: CSI-SINR, CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | |

**Table A.5.7.Z.2.2-3: CSI-SINR Inter frequency OTA related test parameters**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | | **Test 3** | |
| **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** | **Cell 2** | **Cell 3** |
| Angle of arrival configuration | degrees | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 7 |  | Rough | | Rough | | Rough | |
| Note1 | dBm/15kHz Note4 | -105 | | -105 | | -105 | |
| Note1 | dBm/SCS Note3 | -96 | | -96 | | -96 | |
|  | dB | -0.5 | -0.5 | 11.0 | 11.0 | -3.0 | -3.0 |
| CSI-RSRPNote2 | dBm/SCS Note4 | -96.5 | -96.5 | -85 | -85 | -99 | -99 |
| CSI-SINRNote2 | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
|  | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
| IoNote2 | dBm/95.04 MHz Note4 | -69.3 | | -55.4 | | -65.24 | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: NR operating band groups are as defined in Clause 3.5.2.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

A.5.7.Z.2.3 Test Requirements

The CSI-SINR absolute measurement accuracy in test 1 shall be within the range Nominal CSI-SINR+3dB to Nominal CSI-SINR -4dB and the CSI-SINR measurement accuracy in test 2 shall be within the range Nominal CSI-SINR+3.5dB to Nominal CSI-SINR -4.5dB according to the requirements in clause 10.1.15.2.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test. Nominal CSI-SINR is the value shown in table A.5.7.2.2.2-3

The CSI-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.2.2.

<End of Change #5>

<Start of Change #6>

A.6 NR standalone tests with all NR cells in FR1

A.6.6 Measurement procedure

A.6.6.X CSI-RS based intra-frequency Measurements

A.6.6.X.1 SA event triggered reporting tests without gap under non-DRX

A.6.6.X.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA CSI-RS based L3 intra-frequency requirements in clauses 9.10.2.

A.6.6.X.1.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell and neighbour cell are given in Table A.6.6.X.1.2-1 and A.6.6.X.1.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

**Table A.6.6.X.1.2-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB and CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

**Table A.6.6.X.1.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for FR1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| Active cell |  | 1, 2, 3 | Cell 1 |  |
| Neighbour cell |  | 1, 2, 3 | Cell 2 | Cell to be identified and measured. |
| RF Channel Number |  | 1, 2, 3 | 1: Cell 1 and Cell 2 |  |
| SSB configuration |  | 1 | SSB.1 FR1 |  |
| 2 | SSB.1 FR1 |  |
| 3 | SSB.2 FR1 |  |
| SMTC configuration |  | 1 | SMTC.2 |  |
| 2 | SMTC.1 |  |
| 3 | SMTC.1 |  |
| CSI-RS configuration |  | 1 | CSI-RS.RRM.FR1.1 FDD |  |
| 2 | CSI-RS.RRM.FR1.1 TDD |  |
| 3 | CSI-RS.RRM.FR1.2 TDD |  |
| A3-Offset | dB | 1, 2, 3 | -4.5 |  |
| CP length |  | 1, 2, 3 | Normal |  |
| Hysteresis | dB | 1, 2, 3 | 0 |  |
| Time To Trigger | s | 1, 2, 3 | 0 |  |
| Filter coefficient |  | 1, 2, 3 | 0 | L3 filtering is not used |
| DRX |  | 1, 2, 3 |  | OFF |
| Time offset between serving and neighbour cells |  | 1 | [TBD] | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
| 2 | [TBD] | Synchronous cells |
| 3 | [TBD] | Synchronous cells |
| T1 | s | 1, 2, 3 | 5 |  |
| T2 | s | 1, 2, 3 | 5 |  |

**Table A.6.6.X.1.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for FR1**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| TDD configuration |  | 1 | TN/A | | TN/A | |
| 2 | TDDConf.1.1 | | TDDConf.1.1 | |
| 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
| 2 | SR.1.1 TDD | |
| 3 | SR.2.1 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | CR.1.1 FDD | |
| 2 | CR.1.1 TDD | | CR.1.1 TDD | |
| 3 | CR.2.1 TDD | | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | CCR.1.1 FDD | |
| 2 | CCR.1.1 TDD | | CCR.1.1 TDD | |
| 3 | CCR.2.1 TDD | | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | |
| TRS Configuration |  | 1 | TRS.1.1 FDD | | N/A | |
| 2 | TRS.1.1 TDD | | N/A | |
| 3 | TRS.1.2 TDD | | N/A | |
| IInitial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
| 2 | -98 | | | |
| 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
| 2 |
| 3 |
|  | dB | 1 | 4 | -1.46 | -Infinity | -1.46 |
| 2 |
| 3 |
|  | dB | 1 | 4 | 4 | -Infinity | 4 |
| 2 |
| 3 |
| CSI-RSRP Note 3 | dBm/SCS kHz | 1 | -94 | -94 | -Infinity | -94 |
| 2 | -94 | -94 | -Infinity | -94 |
| 3 | -91 | -91 | -Infinity | -91 |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | --64.60 | -62.25 |
| dBm/9.36 MHz | 2 | -64.60 | -62.25 | --64.60 | -62.25 |
| dBm/38.16 MHz | 3 | -58.50 | -56.16 | --58.50 | -56.16 |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: CSI-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

A.6.6.X.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

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

A.6.6.Y CSI-RS based inter-frequency Measurements

A.6.6.Y.1 SA event triggered reporting tests with gap under DRX

A.6.6.Y.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA CSI-RS based L3 inter-frequency measurement requirements in clause 9.10.3.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.Y.1.1-1, A.6.6.Y.1.1-2 and A.6.6.Y.1.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.Y.1.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.6.6.Y.1.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided at least once every 500 ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

**Table A.6.6.Y.1.1-1: SA event triggered reporting tests for FR1-FR1**

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

**Table A.6.6.Y.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | | | | **Comment** |
| **Test 1** | **Test 2** | **Test 3** | **Test 4** |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | | | | Two FR1 NR carrier frequencies is 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. |
| Gap Pattern Id |  | Config 1,2,3 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2,3 | -6 | | | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | | | |  |
| 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 |  | Config 1,2,3 | [TBD] | [TBD] | [TBD] | [TBD] | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1 | [TBD] | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 2,3 | [TBD] | | | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | | | |  |
| T2 | s | Config 1,2,3 | 1.3 | 13.5 | 1.3 | 13.5 |  |

**Table A.6.6.Y.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | |  | Config 1 | FDD | | | |
|  | Config 2,3 | TDD | | | |
| TDD configuration | |  | Config 1 | Not Applicable | | | |
|  | Config 2 | TDDConf.1.1 | | | |
|  | Config 3 | TDDConf.2.1 | | | |
| BWchannel | | 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 | |  | |
|  | Config 2 | SR.1.1 TDD | |
|  | Config 3 | SR2.1 TDD | |
| CORESET Reference Channel | |  | Config 1 | CR.1.1 FDD | | - | |
|  | Config 2 | CR.1.1 TDD | |
|  | Config 3 | 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 | |
| CSI-RS configuration | |  | Config 1 | CSI-RS.RRM.FR1.1 FDD | | CSI-RS.RRM.FR1.1 FDD | |
| Config 2 | CSI-RS.RRM.FR1.1 TDD | | CSI-RS.RRM.FR1.1 TDD | |
| Config 3 | CSI-RS.RRM.FR1.2 TDD | | CSI-RS.RRM.FR1.2 TDD | |
| 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 | |
| CSI-RSRP Note 3 | | dBm/SCS | Config 1,2 | -94 | -94 | -Infinity | -91 |
| Config 3 | -91 | -91 | -Infinity | -88 |
|  | | dB | Config 1,2,3 | 4 | 4 | -Infinity | 7 |
|  | | dB | Config 1,2,3 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | dBm/9.36MHz | Config 1,2 | -64.59 | -64.59 | -70.05 | -62.26 |
| dBm/38.16MHz | Config 3 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | |  | Config 1,2,3 | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | |

A.6.6.Y.1.2 Test Requirements

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

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

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

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

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

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

<End of Change #6>

<Start of Change #7>

A.6.7 Measurement Performance requirements

A.6.7.X CSI-RSRP

A.6.7.X.1 SA: intra-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.X.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.2.3.1 and 10.1.2.3.2 for CSI-RS intra-frequency measurements.

A.6.7.X.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.6.7.X.1.2-1. Both absolute and relative accuracy of CSI-RSRP intra-frequency measurements are tested by using the parameters in A.6.7.X.1.2-2. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

**Table A.6.7.X.1.2-1: CSI-RSRP intra frequency supported test configurations**

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

**Table A.6.7.X.1.2-2: CSI-RSRP intra frequency test parameters**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | | **Unit** | **Test 1** | | | **Test 2** | | | | | | **Test 3** | | | | | |
| **Cell 1** | **Cell 2** | | **Cell 1** | | **Cell 2** | | | | **Cell 1** | | | **Cell 2** | | |
| Cell ID | | | | | |  | 489 | 0 | | 489 | | 0 | | | | 489 | | 0 | | | |
| SSB ARFCN | | | | | |  | freq1 | | | freq1 | | | | | | freq1 | | | | | |
| Duplex mode | | | | Config 1 | |  | FDD | | | | | | | | | | | | | | |
| Config 2,3 | | TDD | | | | | | | | | | | | | | |
| TDD configuration | | | | Config 1 | |  | Not Applicable | | | | | | | | | | | | | | |
| Config 2 | | TDDConf.1.1 | | | | | | | | | | | | | | |
| Config 3 | | TDDConf.2.1 | | | | | | | | | | | | | | |
| BWchannel | | | | Config 1 | | MHz | 10: NRB,c = 52 | | | | | | | | | | | | | | |
| Config 2 | | 10: NRB,c = 52 | | | | | | | | | | | | | | |
| Config 3 | | 40: NRB,c = 106 | | | | | | | | | | | | | | |
| BWP BW | | | | Config 1 | |  | 10: NRB,c = 52 | | | | | | | | | | | | | | |
| Config 2 | | 10: NRB,c = 52 | | | | | | | | | | | | | | |
| Config 3 | | 40: NRB,c = 106 | | | | | | | | | | | | | | |
| Downlink initial BWP configuration | | | | | |  | DLBWP.0.1 | | | | | | | | | | | | | | |
| Downlink dedicated BWP configuration | | | | | |  | DLBWP.1.1 | | | | | | | | | | | | | | |
| Uplink initial BWP configuration | | | | | |  | ULBWP.0.1 | | | | | | | | | | | | | | |
| Uplink dedicated BWP configuration | | | | | |  | ULBWP.1.1 | | | | | | | | | | | | | | |
| TRS configuration | | | | | Config 1 |  | TRS.1.1 FDD | | NA | | TRS.1.1 FDD | | | NA | TRS.1.1 FDD | | | | | | NA |
| Config 2 |  | TRS.1.1 TDD | | NA | | TRS.1.1 TDD | | | NA | TRS.1.1 TDD | | | | | | NA |
| Config 3 |  | TRS.1.2 TDD | | NA | | TRS.1.2 TDD | | | NA | TRS.1.2 TDD | | | | | | NA |
| DRX Cycle | | | | | | ms | Not Applicable | | | | | | | | | | | | | | |
| PDSCH Reference measurement channel | | | | Config 1 | |  | SR.1.1 FDD | | - | SR.1.1 FDD | | - | | | | SR.1.1 FDD | | | | | - |
| Config 2 | | SR.1.1 TDD | | SR.1.1 TDD | | SR.1.1 TDD | | | | |
| Config 3 | | SR2.1 TDD | | SR2.1 TDD | | SR2.1 TDD | | | | |
| RMSI CORESET Reference Channel | | | | Config 1 | |  | CR.1.1 FDD | | - | CR.1.1 FDD | | - | | | | CR.1.1 FDD | | | | | - |
| Config 2 | | CR.1.1 TDD | | CR.1.1 TDD | | CR.1.1 TDD | | | | |
| Config 3 | | CR2.1 TDD | | CR2.1 TDD | | CR2.1 TDD | | | | |
| Control channel RMC | | | | Config 1 | |  | CCR.1.1 FDD | | - | CCR.1.1 FDD | | - | | | | CCR.1.1 FDD | | | | | - |
| Config 2 | | CCR.1.1 TDD | | CCR.1.1 TDD | | CCR.1.1 TDD | | | | |
| Config 3 | | CCR2.1 TDD | | CCR2.1 TDD | | CCR2.1 TDD | | | | |
| SSB configuration | | Config 1 | | | |  | SSB.1 FR1 | | SSB.1 FR1 | SSB.1 FR1 | | SSB.1 FR1 | | | | SSB.1 FR1 | | | | SSB.1 FR1 | |
| Config 2 | | | |  | SSB.1 FR1 | | SSB.1 FR1 | SSB.1 FR1 | | SSB.1 FR1 | | | | SSB.1 FR1 | | | | SSB.1 FR1 | |
| Config 3 | | | |  | SSB.2 FR1 | | SSB.2 FR1 | SSB.2 FR1 | | SSB.2 FR1 | | | | SSB.2 FR1 | | | | SSB.2 FR1 | |
| Time offset with Cell 1 | | Config 1 | | | | ms | - | | [TBD] | - | | [TBD] | | | | - | | | | [TBD] | |
| Config 2,3 | | | | μs | - | | [TBD] | - | | [TBD] | | | | - | | | | [TBD] | |
| SMTC configuration | | Config 1 | | | |  | SMTC.2 | | | | | | | | | | | | | | |
| Config 2,3 | | | |  | SMTC.1 | | | | | | | | | | | | | | |
| CSI-RS configuration | | Config 1 | | | |  | CSI-RS.RRM.FR1.1 FDD | | | | | | | | | | | | | | |
| Config 2 | | | |  | CSI-RS.RRM.FR1.1 TDD | | | | | | | | | | | | | | |
| Config 3 | | | |  | CSI-RS.RRM.FR1.2 TDD | | | | | | | | | | | | | | |
| OCNG Patterns | | | | | |  | OCNG pattern 1 | | | | | | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1,2 | | kHz | 15 kHz | | | | | | | | | | | | | | |
| Config 3 | | 30kHz | | | | | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | | | | dB | 0 | | 0 | 0 | | | 0 | | | | 0 | | | | 0 |
| EPRE ratio of PBCH DMRS to SSS | | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | | | | |
| EPRE ratio of PDSCH to PDSCH | | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | | | |
| Note2 | Config 1,2 | | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/15KhZ | -106 | | | -88 | | | | | | | -114 | | | | |
| NR\_FDD\_FR1\_B | -113.5 | | | | |
| NR\_TDD\_FR1\_C | -113 | | | | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -112.5 | | | | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -112 | | | | |
| NR\_FDD\_FR1\_F | -111.5 | | | | |
| NR\_FDD\_FR1\_G | -111 | | | | |
| NR\_FDD\_FR1\_H | -110.5 | | | | |
| Config 3 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | | Not applicableNote 5 | | | -94 | | | | | | | -114 | | | | |
| NR\_FDD\_FR1\_B | | -113.5 | | | | |
| NR\_TDD\_FR1\_C | | -113 | | | | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | | -112.5 | | | | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | | -112 | | | | |
| NR\_FDD\_FR1\_F | | -111.5 | | | | |
| NR\_FDD\_FR1\_G | | -111 | | | | |
| NR\_FDD\_FR1\_H | | -110.5 | | | | |
| Note2 | Config 1,2 | | | | | dBm/SCS | -106 | | | -88 | | | | | | | Same as Noc/15kHz | | | | |
| Config 3 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | | Not applicableNote 5 | | | -91 | | | | | | | -111 | | | | |
| NR\_FDD\_FR1\_B | | -110.5 | | | | |
| NR\_TDD\_FR1\_C | | -110 | | | | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | | -109.5 | | | | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | | -109 | | | | |
| NR\_FDD\_FR1\_F | | -108.5 | | | | |
| NR\_FDD\_FR1\_G | | -108 | | | | |
| NR\_FDD\_FR1\_H | | -107.5 | | | | |
|  | | | | | | dB | 2.46 | | -5.97 | 2.46 | | | -5.97 | | | | -0.01 | | | | -4.76 |
|  | | | | | | dB | 6 | | 1 | 6 | | | 1 | | | | 3 | | | | 0 |
| CSI-RSRPNote3 | Config 1,2 | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | | | dBm/SCS | -100 | | -105 | -82 | | | -87 | | | | -111.00 | | | | -114.00 |
| NR\_FDD\_FR1\_B | | | -110.50 | | | | -113.50 |
| NR\_TDD\_FR1\_C | | | -110.00 | | | | -113.00 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | | | -109.50 | | | | -112.50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | | | -109.00 | | | | -112.00 |
| NR\_FDD\_FR1\_F | | | -108.50 | | | | -111.50 |
| NR\_FDD\_FR1\_G | | | -108.00 | | | | -111.00 |
| NR\_FDD\_FR1\_H | | | -107.50 | | | | -110.50 |
| Config 3 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | | Not applicableNote 5 | | Not applicableNote 5 | -85 | | | -90 | | | | -108.00 | | | | -111.00 |
| NR\_FDD\_FR1\_B | | -107.50 | | | | -110.50 |
| NR\_TDD\_FR1\_C | | -107.00 | | | | -110.00 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | | -106.50 | | | | -109.50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | | -106.00 | | | | -109.00 |
| NR\_FDD\_FR1\_F | | -105.50 | | | | -108.50 |
| NR\_FDD\_FR1\_G | | -105.00 | | | | -108.00 |
| NR\_FDD\_FR1\_H | | -104.50 | | | | -107.50 |
| IoNote3 | Config 1,2 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | | dBm/  9.36MHz | -70.09 | | | -52.09 | | | | | | | -80.03 | | | | |
| NR\_FDD\_FR1\_B | | -79.53 | | | | |
| NR\_TDD\_FR1\_C | | -79.03 | | | | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | | -78.53 | | | | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | | -78.03 | | | | |
| NR\_FDD\_FR1\_F | | -77.53 | | | | |
| NR\_FDD\_FR1\_G | | -77.03 | | | | |
| NR\_FDD\_FR1\_H | | -76.53 | | | | |
| Config 3 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | | dBm/  38.16MHz | Not applicableNote 5- | | | -51.99 | | | | | | | -73.94 | | | | |
| NR\_FDD\_FR1\_B | | -73.44 | | | | |
| NR\_TDD\_FR1\_C | | -72.94 | | | | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | | -72.44 | | | | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | | -71.94 | | | | |
| NR\_FDD\_FR1\_F | | -71.44 | | | | |
| NR\_FDD\_FR1\_G | | -70.94 | | | | |
| NR\_FDD\_FR1\_H | | -70.44 | | | | |
| Propagation condition | | | | | | - | AWGN | | | | | | | | | | | | | | |
| Antenna configuration | | | | | |  | 1x2 | | | | | | | | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Subtest 1 is not used when testing with 30kHz SSB and CSI-RS SCS.  Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification | | | | | | | | | | | | | | | | | | | | | |

A.6.7.X.1.3 Test Requirements

The CSI-RSRP measurement accuracy for cell 1 and cell 2 shall fulfil absolute requirement in clause 10.1.2.3.1 and relative requirement in clause 10.1.2.3.2.

A.6.7.X.2 SA inter-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.X.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.4.3.1 and 10.1.4.3.2 for CSI-RS inter-frequency measurements with the testing configurations for NR cells in Table A.6.7.X.2.1-1.

**Table A.6.7.X.2.1-1: Applicable NR configurations for FR1 inter-frequency CSI-RSRP accuracy test**

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

A.6.7.X.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.6.7.X.2.2-1 below. Both absolute and relative accuracy of CSI-RSRP inter-frequency measurements are tested by using the parameters in Table A.6.7.X.2.2-1. The inter-frequency measurements are supported by a measurement gap.

**Table A.6.7.X.2.2-1: CSI-RSRP inter-frequency test parameters**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Config** | **Unit** | **Test 1** | | | | **Test 2** | | |
| **Cell 1** | | | **Cell 2** | **Cell 1** | | **Cell 2** |
| SSB ARFCN | | 1~3 |  | freq1 | | | freq2 | freq1 | | freq2 |
| BWchannel | | 1 | MHz | 10: NRB,c = 52 | | | | 10: NRB,c = 52 | | |
| 2 | 10: NRB,c = 52 | | | | 10: NRB,c = 52 | | |
| 3 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | |
| Duplex mode | | 1 |  | FDD | | | | FDD | | |
| 2 | TDD | | | | TDD | | |
| 3 | TDD | | | | TDD | | |
| TDD configuration | | 1 |  | N/A | | | | N/A | | |
| 2 | TDDConf.1.1 | | | | TDDConf.1.1 | | |
| 3 | TDDConf.2.1 | | | | TDDConf.2.1 | | |
| PDSCH Reference measurement channel | | 1 |  | SR.1.1 FDD | | | - | SR.1.1 FDD | | - |
| 2 | SR.1.1 TDD | | | SR.1.1 TDD | |
| 3 | SR.2.1 FDD | | | SR.2.1 FDD | |
| RMSI CORESET Reference Channel | | 1 |  | CR.1.1 FDD | | | - | CR.1.1 FDD | | - |
| 2 | CR.1.1 TDD | | | - | CR.1.1 TDD | | - |
| 3 | CR.2.1 FDD | | | - | CR.2.1 FDD | | - |
| Dedicated CORESET Reference Channel | | 1 |  | CCR.1.1 FDD | | | - | CCR.1.1 FDD | | - |
| 2 |  | CCR.1.1 TDD | | | - | CCR.1.1 TDD | | - |
| 3 |  | CCR.2.1 TDD | | | - | CCR.2.1 TDD | | - |
| SSB configuration | | 1 |  | SSB.1 FR1 | | | | SSB.1 FR1 | | |
| 2 | SSB.1 FR1 | | | | SSB.1 FR1 | | |
| 3 | SSB.2 FR1 | | | | SSB.2 FR1 | | |
| OCNG Patterns | | 1~3 |  | OP.1 | | | | OP.1 | | |
| TRS configuration | | 1 |  | TRS.1.1 FDD | | - | | TRS.1.1 FDD | |  |
| 2 |  | TRS.1.1 TDD | | TRS.1.1 TDD | |
| 3 |  | TRS.1.2 TDD | | TRS.1.2 TDD | |
| Initial BWP Configuration | | 1~3 |  | DLBWP.0.1  ULBWP.0.1 | | | | DLBWP.0.1  ULBWP.0.1 | | |
| Dedicated BWP configuration | | 1~3 |  | DLBWP.1.1  ULBWP.1.1 | | | | DLBWP.1.1  ULBWP.1.1 | | |
| Time offset with Cell 1 | | 1 | ms | - | [TBD] | | | - | [TBD] | |
| 2,3 | μs | - | [TBD] | | | - | [TBD] | |
| SMTC configuration | | 1 |  | SMTC.2 | | | | SMTC.2 | | |
| 2,3 |  | SMTC.1 | | | | SMTC.1 | | |
| CSI-RS configuration | | 1 |  | CSI-RS.RRM.FR1.1 FDD | | | | CSI-RS.RRM.FR1.1 FDD | | |
| 2 |  | CSI-RS.RRM.FR1.1 TDD | | | | CSI-RS.RRM.FR1.1 TDD | | |
| 3 |  | CSI-RS.RRM.FR1.2 TDD | | | | CSI-RS.RRM.FR1.2 TDD | | |
| EPRE ratio of PSS to SSS | | 1~3 | dB | 0 | | | 0 | 0 | | 0 |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH DMRS | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
| Note2 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5 | 1~3 | dBm/15kHz | -94.65 | | | | ( for Channel 2 +8dB) | | -115 |
| NR\_FDD\_FR1\_B | -114.5 |
| NR\_TDD\_FR1\_C | -114 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -113.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -113 |
| NR\_FDD\_FR1\_F | -112.5 |
| NR\_FDD\_FR1\_G | -112 |
| NR\_FDD\_FR1\_H | -111.5 |
| Note2 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5, | 1,2 | dBm/SSB SCS | -94.65 | | | | ( for Channel 2 +8dB) | | -115 |
| NR\_FDD\_FR1\_B | -114.5 |
| NR\_TDD\_FR1\_C | -114 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -113.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -113 |
| NR\_FDD\_FR1\_F | -112.5 |
| NR\_FDD\_FR1\_G | -112 |
| NR\_FDD\_FR1\_H | -111.5 |
| NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5, | 3 | -91.65 | | | | ( for Channel 2 +8dB) | | -112.00 |
| NR\_FDD\_FR1\_B | -112.50 |
| NR\_TDD\_FR1\_C | -112.00 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -111.50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -111.00 |
| NR\_FDD\_FR1\_F | -110.50 |
| NR\_FDD\_FR1\_G | -110.00 |
| NR\_FDD\_FR1\_H | -110.50 |
|  | | 1~3 | dB | 10 | | | 10 | 13 | | -3 |
| CSI-RSRPNote3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5, | 1,2 | dBm/SCS | -84.65 | | | | (RSRP for Cell 2 +25dB) | | -118.00 |
| NR\_FDD\_FR1\_B | -117.50 |
| NR\_TDD\_FR1\_C | -117.00 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -116.50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -116.00 |
| NR\_FDD\_FR1\_F | -115.50 |
| NR\_FDD\_FR1\_G | -115.00 |
| NR\_FDD\_FR1\_H | -114.50 |
| NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5, | 3 | -81.65 | | | | (RSRP for Cell 2 +25dB) | | -115.00 |
| NR\_FDD\_FR1\_B | -114.50 |
| NR\_TDD\_FR1\_C | -114.00 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -113.50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -113.00 |
| NR\_FDD\_FR1\_F | -112.50 |
| NR\_FDD\_FR1\_G | -112.00 |
| NR\_FDD\_FR1\_H | -111.50 |
| IoNote3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5, | 1,2 | dBm/  9.36MHz | -56.28 | | | | Io for Channel 2 +19.75dB)T | | -85.28 |
| NR\_FDD\_FR1\_B | -84.78 |
| NR\_TDD\_FR1\_C | -84.28 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -83.78 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -83.28 |
| NR\_FDD\_FR1\_F | -82.78 |
| NR\_FDD\_FR1\_G | -82.28 |
| NR\_FDD\_FR1\_H | -81.78 |
| NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5, | 3 | dBm/  38.16MHz | -50.19 | | | | Io for Channel 2 +19.75dB)T | | -79.19 |
| NR\_FDD\_FR1\_B | -78.69 |
| NR\_TDD\_FR1\_C | -78.19 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -77.69 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -77.19 |
| NR\_FDD\_FR1\_F | -76.69 |
| NR\_FDD\_FR1\_G | -76.19 |
| NR\_FDD\_FR1\_H | -75.69 |
|  | | 1~3 | dB | 10 | | | 10 | 13 | | -3 |
| Propagation condition | | 1~3 | - | AWGN | | | | AWGN | | |
| Antenna configuration | | 1~3 |  | 1x2 | | | | 1x2 | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification. | | | | | | | | | | |

A.6.7.X.2.3 Test Requirements

The CSI-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirement in clause 10.1.4.3.1 and relative requirement in clause 10.1.4.3.2.

A.6.7.y CSI-RSRQ

A.6.7.y.1 SA: Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.y.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.7.2.

A.6.7.y.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.y.1.2-1. The absolute accuracy of CSI-RSRQ intra-frequency measurement is tested by using the parameters in Table A.6.7.y.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

**Table A.6.7.y.1.2-1: Intra frequency CSI-RSRQ supported test configurations**

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

**Table A.6.7.y.1.2-2: CSI-RSRQ Intra frequency test parameters**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | | **Unit** | **Test 1** | | | | | **Test 2** | | | | **Test 3** | | |
| **Cell 1** | | | **Cell 2** | | **Cell 1** | | **Cell 2** | | **Cell 1** | | **Cell 2** |
| Duplex mode | | | | | Config 1 |  | FDD | | | | | | | | | | | |
| Config 2,3 | TDD | | | | | | | | | | | |
| TDD configuration | | | | | Config 1 |  | Not Applicable | | | | | | | | | | | |
| Config 2 | TDDConf.1.1 | | | | | | | | | | | |
| Config 3 | TDDConf.2.1 | | | | | | | | | | | |
| BWchannel | | | | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | | | | | | |
| Config 2 | 10: NRB,c = 52 | | | | | | | | | | | |
| Config 3 | 40: NRB,c = 106 | | | | | | | | | | | |
| Gap Pattern ID | | | | |  |  | 0 | | | | | | | | | | | |
| BWP configuration | | | | | Initial DL BWP |  | DLBWP.0.1 | | | | | | | | | | | |
| Dedicated DL BWP | DLBWP.1.1 | | | | | | | | | | | |
| Initial UL BWP | ULBWP.0.1 | | | | | | | | | | | |
| Dedicated UL BWP |  | ULBWP.1.1 | | | | | | | | | | | |
| DRX Cycle | | | | | | ms | Not Applicable | | | | | | | | | | | |
| PDSCH Reference measurement channel | | | | | Config 1 |  | SR.1.1 FDD | | - | | | SR.1.1 FDD | | - | | SR.1.1 FDD | | - |
| Config 2 | SR.1.1 TDD | | SR.1.1 TDD | | SR.1.1 TDD | |
| Config 3 | SR2.1 TDD | | SR2.1 TDD | | SR2.1 TDD | |
| RMSI CORESET Reference Channel | | | | | Config 1 |  | CR.1.1 FDD | | - | | | CR.1.1 FDD | | - | | CR.1.1 FDD | |  |
| Config 2 | CR.1.1 TDD | | CR.1.1 TDD | | CR.1.1 TDD | |
| Config 3 | CR.2.1 TDD | | CR.2.1 TDD | | CR.2.1 TDD | |
| Control Channel RMC | | | | | Config 1 |  | CCR.1.1 FDD | | - | | | CCR.1.1 FDD | | - | | CCR.1.1 FDD | | - |
| Config 2 | CCR.1.1 TDD | | CCR.1.1 TDD | | CCR.1.1 TDD | |
| Config 3 | CCR.2.1 TDD | | CCR.2.1 TDD | | CCR.2.1 TDD | |
| TRS Configuration | | | | | Config 1 |  | TRS.1.1 FDD | | - | | | TRS.1.1 FDD | | - | | TRS.1.1 FDD | | - |
| Config 2 | TRS.1.1 TDD | | TRS.1.1 TDD | | TRS.1.1 TDD | |
| Config 3 | TRS.1.2 TDD | | TRS.1.2 TDD | | TRS.1.2 TDD | |
| OCNG Patterns | | | | | |  | OP. 1 | | | | | | | | | | | |
| Time offset with Cell 1 | | | Config 1 | | | ms | - | 3 | | | - | | 3 | | - | | 3 | |
| Config 2,3 | | | μs | - | TBD | | | - | | TBD | | - | | TBD | |
| CSI-RS configuration for mobility | | | Config 1 | | |  | CSI-RS-L3 1.1 FDD | | | | | | | | | | | |
| Config 2 | | |  | CSI-RS-L3 1.1 TDD | | | | | | | | | | | |
| Config 3 | | |  | CSI-RS-L3 1.2 TDD | | | | | | | | | | | |
| SSB configuration | | | | | Config 1,2 |  | SSB.1 FR1 | | | | | | | | | | | |
| Config 3 | SSB.2 FR1 | | | | | | | | | | | |
| CSI-RS configuration | | | | | Config 1 |  | CSI-RS.1.2 FDD | | | | | | | | | | | |
| Config 2 |  | CSI-RS.1.2 TDD | | | | | | | | | | | |
| Config 3 |  | CSI-RS.2.2 TDD | | | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | | | Config 1,2 | kHz | 15 kHz | | | | | | | | | | | |
| Config 3 | 30kHz | | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | | | | dB | 0 | | 0 | | | 0 | | 0 | | 0 | | 0 |
| EPRE ratio of PBCH DMRS to SSS | | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | | | | |
| EPRE ratio of PDSCH to PDSCH | | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | | | |
| Note2 | Config 1,2 | | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/15kHz | -85 | | | | | -101 | | | | -114 | | |
| NR\_FDD\_FR1\_B | -113.5 | | |
| NR\_TDD\_FR1\_C | -113 | | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -112.5 | | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -112 | | |
| NR\_FDD\_FR1\_F | -111.5 | | |
| NR\_FDD\_FR1\_G | -111 | | |
| NR\_FDD\_FR1\_H | -110.5 | | |
| Config 3 | | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | -91 | | | | | - | | | | -114 | | |
| NR\_FDD\_FR1\_B | -113.5 | | |
| NR\_TDD\_FR1\_C | -113 | | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -112.5 | | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -112 | | |
| NR\_FDD\_FR1\_F | -111.5 | | |
| NR\_FDD\_FR1\_G | -111 | | |
| NR\_FDD\_FR1\_H | -110.5 | | |
| Note2 | Config 1,2 | | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/SCS | -85 | | | | | -101 | | | | -114  -113.5  -113  -112.5  -112  -111.5  -111  -110.5 | | |
| NR\_FDD\_FR1\_B |
| NR\_TDD\_FR1\_C |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |
| NR\_FDD\_FR1\_F |
| NR\_FDD\_FR1\_G |
| NR\_FDD\_FR1\_H |
| Config 3 | | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | -88 | | | | | - | | | | -111 | | |
| NR\_FDD\_FR1\_B | -110.5 | | |
| NR\_TDD\_FR1\_C | -110 | | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -109.5 | | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -109 | | |
| NR\_FDD\_FR1\_F | -108.5 | | |
| NR\_FDD\_FR1\_G | -108 | | |
| NR\_FDD\_FR1\_H | -107.5 | | |
|  | | | | | | dB | -1.76 | | | | | -4.7 | | | | -5..46 | | -5.46 |
|  | | | | | | dB | 3 | | 3 | | | -2.9 | | -2.9 | | -4 | | -4 |
| SS-RSRP/CSI-RSRPNote3 | Config 1,2 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | | dBm/SCS | -82 | | -82 | | | -103.9 | | -103.9 | | -118 | | -118 |
| NR\_FDD\_FR1\_B | | -117.5 | | -117.5 |
| NR\_TDD\_FR1\_C | | -117 | | -117 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | | -116.5 | | -116.5 |
| NR\_FDD\_FR1\_E,  NR\_TDD\_FR1\_E | | -116 | | -116 |
| NR\_FDD\_FR1\_F | | -115.5 | | -115.5 |
| NR\_FDD\_FR1\_G | | -115 | | -115 |
| NR\_FDD\_FR1\_H | | -114.5 | | -114.5 |
| Config 3 | | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | -85 | | -85 | | | - | | - | | -115 | | -115 |
| NR\_FDD\_FR1\_B | -114.5 | | -114.5 |
| NR\_TDD\_FR1\_C | -114 | | -114 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -113.5 | | -113.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -113 | | -113 |
| NR\_FDD\_FR1\_F | -112.5 | | -112.5 |
| NR\_FDD\_FR1\_G | -112 | | -112 |
| NR\_FDD\_FR1\_H | -111.5 | | -111.5 |
| SS-RSRQ/CSI-RSRQ Note3 | | | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dB | -14.77 | | -14.77 | | | -16.76 | | -16.76 | | -17.34 | | -17.34 |
| NR\_FDD\_FR1\_B |
| NR\_TDD\_FR1\_C |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |
| NR\_FDD\_FR1\_F |
| NR\_FDD\_FR1\_G |
| NR\_FDD\_FR1\_H |
| IoNote3 | | Config 1,2 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/  9.36MHz | -50 | | | | | -70 | | | | -83.5 | | |
| NR\_FDD\_FR1\_B | -83 | | |
| NR\_TDD\_FR1\_C | -82.5 | | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -82 | | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -81.5 | | |
| NR\_FDD\_FR1\_F | -81 | | |
| NR\_FDD\_FR1\_G | -80.5 | | |
| NR\_FDD\_FR1\_H | -80 | | |
| Config 3 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/  38.16MHz | -50 | | | | | - | | | | -77.4 | | |
| NR\_FDD\_FR1\_B | -76.9 | | |
| NR\_TDD\_FR1\_C | -76.4 | | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -75.9 | | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -75.4 | | |
| NR\_FDD\_FR1\_F | -74.9 | | |
| NR\_FDD\_FR1\_G | -74.4 | | |
| NR\_FDD\_FR1\_H | -73.9 | | |
| Propagation condition | | | | | | - | AWGN | | AWGN | | | AWGN | | AWGN | | AWGN | | AWGN |
| Antenna configuration | | | | | |  | 1x2 | | 1x2 | | | 1x2 | | 1x2 | | 1x2 | | 1x2 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: 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-RSRQ/CSI-RSRQ, SS-RSRP/CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRQ/CSI-RSRQ, SS-RSRP/CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3.5.2.  Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification. | | | | | | | | | | | | | | | | | | |

A.6.7.y.1.3 Test Requirements

The CSI-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.7.2.

A.6.7.y.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.y.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.9.2.1 and 10.1.9.2.2.

A.6.7.y.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.y.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-RSRQ inter-frequency measurement are tested by using test parameters in Table A.6.7.y.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

**Table A.6.7.y.2.2-1: CSI-RSRQ Inter frequency CSI-RSRQ supported test configurations**

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

**Table A.6.7.y.2.2-2: CSI-RSRQ Inter frequency test parameters**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Test 1** | | | | **Test 2** | | | | | **Test 3** | | | |
| **Cell 1** | | **Cell 2** | | **Cell 1** | | | **Cell 2** | | **Cell 1** | | **Cell 2** | |
| Duplex mode | | Config 1 | |  | FDD | | | | | | | | | | | | |
| Config 2,3 | | TDD | | | | | | | | | | | | |
| TDD configuration | | Config 1 | |  | Not Applicable | | | | | | | | | | | | |
| Config 2 | | TDDConf.1.1 | | | | | | | | | | | | |
| Config 3 | | TDDConf.2.1 | | | | | | | | | | | | |
| BWchannel | | Config 1 | | MHz | 10: NRB,c = 52 | | | | | | | | | | | | |
| Config 2 | | 10: NRB,c = 52 | | | | | | | | | | | | |
| Config 3 | | 40: NRB,c = 106 | | | | | | | | | | | | |
| Gap pattern ID | | Config 1,2,3 | |  | 0 | | | | | | | | | | | | |
| BWP BW | | Config 1 | |  | 10: NRB,c = 52 | | | | | | | | | | | | |
| Config 2 | | 10: NRB,c = 52 | | | | | | | | | | | | |
| Config 3 | | 40: NRB,c = 106 | | | | | | | | | | | | |
| DRX Cycle | | | | ms | Not Applicable | | | | | | | | | | | | |
| PDSCH Reference measurement channel | | Config 1,4 | |  | SR.1.1 FDD | - | | | SR.1.1 FDD | | | - | | SR.1.1 FDD | | - | |
| Config 2,5 | | SR.1.1 TDD | SR.1.1 TDD | | | SR.1.1 TDD | |
| Config 3,6 | | SR2.1 TDD | SR2.1 TDD | | | SR2.1 TDD | |
| RMSI CORESET Reference Channel | | Config 1 | |  | CR.1.1 FDD | - | | | R.1.1 FDD | | | - | | CR.1.1 FDD | |  | |
| Config 2 | |  | CR.1.1 TDD |  | | | CR.1.1 TDD | | |  | | CR.1.1 TDD | |  | |
| Config 3 | |  | CR2.1 TDD |  | | | CR2.1 TDD | | |  | | CR2.1 TDD | |  | |
| Dedicated CORESET Reference Channel | | Config 1 | |  | CCR.1.1 FDD | - | | | CCR.1.1 FDD | | | - | | CCR.1.1 FDD | | - | |
| Config 2 | | CCR.1.1 TDD | CCR.1.1 TDD | | | CCR.1.1 TDD | |
| Config 3 | | CCR2.1 TDD | CCR2.1 TDD | | | CCR2.1 TDD | |
| TRS Configuration | | Config 1 | |  | TRS.1.1 FDD | - | | | TRS.1.1 FDD | | | - | | TRS.1.1 FDD | | - | |
| Config 2 | | TRS.1.1 TDD | TRS.1.1 TDD | | | TRS.1.1 TDD | |
| Config 3 | | TRS.1.2 TDD | TRS.1.2 TDD | | | TRS.1.2 TDD | |
| OCNG Patterns | | | |  | OCNG pattern 1 | | | | | | | | | | | | |
| Time offset with Cell 1 | | Config 1 | | ms | - | | | 3 | | - | 3 | | - | | 3 | | |
| Config 2,3 | | μs | - | | | 3 | | - | 3 | | - | | 3 | | |
| CSI-RS configuration for mobility | | Config 1 | |  | CSI-RS-L3 1.1 FDD | | | | | | | | | | | | |
| Config 2 | | CSI-RS-L3 1.1 TDD | | | | | | | | | | | | |
| Config 3 | | CSI-RS-L3 1.2 TDD | | | | | | | | | | | | |
| CSI-RS configuration | | Config 1 | |  | CSI-RS.1.2 FDD | | | | | | | | | | | | |
| Config 2 | | CSI-RS.1.2 TDD | | | | | | | | | | | | |
| Config 3 | | CSI-RS.2.2 TDD | | | | | | | | | | | | |
| SSB configuration | | Config 1,2 | |  | SSB pattern 1 in FR1 | | | | | | | | | | | | |
| Config 3 | | SSB pattern 2 in FR1 | | | | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | | kHz | 15 kHz | | | | | | | | | | | | |
| Config 3 | | 30 kHz | | | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | | dB | 0 | 0 | | | 0 | | | 0 | | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | |
| EPRE ratio of PDSCH DMRS to SSS | | | |
| EPRE ratio of PDSCH to PDSCH | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | |
| Note2 | Config 1,2 | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dBm/15kHz | -80.18 | | | | -106 | | | | | -116 | | | |
| NR\_FDD\_FR1\_B | -115.5 | | | |
| NR\_TDD\_FR1\_C | -115 | | | |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D | -114.5 | | | |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E | -114 | | | |
| NR\_FDD\_FR1\_F | -113.5 | | | |
| NR\_FDD\_FR1\_G | -113 | | | |
| NR\_FDD\_FR1\_H | -112.5 | | | |
| Note2 | Config 3 | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dBm/15kHz | -86.27 | | | | -113 | | | | | -116 | | | |
| NR\_FDD\_FR1\_B | -115.5 | | | |
| NR\_TDD\_FR1\_C | -115 | | | |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D | -114.5 | | | |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E | -114 | | | |
| NR\_FDD\_FR1\_F | -113.5 | | | |
| NR\_FDD\_FR1\_G | -113 | | | |
| NR\_FDD\_FR1\_H | -112.5 | | | |
| Note2 | Config 1,2 | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dBm/15kHz | -80.18 | | | | -106 | | | | | -116 | | | |
| NR\_FDD\_FR1\_B | -115.5 | | | |
| NR\_TDD\_FR1\_C | -115 | | | |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D | -114.5 | | | |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E | -114 | | | |
| NR\_FDD\_FR1\_F | -113.5 | | | |
| NR\_FDD\_FR1\_G | -113 | | | |
| NR\_FDD\_FR1\_H | -112.5 | | | |
| Config 3 | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | -83.27 | | | | -110 | | | | | -113 | | | |
| NR\_FDD\_FR1\_B | -112.5 | | | |
| NR\_TDD\_FR1\_C | -112 | | | |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D | -111.5 | | | |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E | -111 | | | |
| NR\_FDD\_FR1\_F | -110.5 | | | |
| NR\_FDD\_FR1\_G | -110 | | | |
| NR\_FDD\_FR1\_H | -109.5 | | | |
|  | | | | dB | -1.75 | | | | -1.75 | | | | | 3 | | -1.75 | |
|  | | | | dB | -1.75 | | | | -1.75 | | | | | 3 | | -1.75 | |
| SS-RSRP/CSI-RSRPNote3 | Config 1,2 | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dBm/SCS | -81.93 | -81.93 | | | -107.75 | | | -107.75 | | -113 | | | -117.75 |
| NR\_FDD\_FR1\_B | -112.5 | | | -117.25 |
| NR\_TDD\_FR1\_C | -112 | | | -116.75 |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D | -111.5 | | | -116.25 |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E | -111 | | | -115.75 |
| NR\_FDD\_FR1\_F | -110.5 | | | -115.2 |
| NR\_FDD\_FR1\_G | -110 | | | -114.75 |
| NR\_FDD\_FR1\_H | -109.5 | | | -114.25 |
| Config 3 | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | -85.02 | -85.02 | | | -111.75 | | | -111.75 | | -110 | | | -114.75 |
| NR\_FDD\_FR1\_B | -109.5 | | | -114.25 |
| NR\_TDD\_FR1\_C | -109 | | | -113.75 |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D | -108.5 | | | -113.25 |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E | -108 | | | -112.75 |
| NR\_FDD\_FR1\_F | -107.5 | | | -112.2 |
| NR\_FDD\_FR1\_G | -107 | | | -111.75 |
| NR\_FDD\_FR1\_H | -106.5 | | | -111.25 |
| SS-RSRQ/CSI-RSRQNote3 | | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dB | -14.77 | -14.77 | | | -40.59 | | | -40.59 | | 12.56T | | | 14.76T |
| NR\_FDD\_FR1\_B |
| NR\_TDD\_FR1\_C |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |
| NR\_FDD\_FR1\_F |
| NR\_FDD\_FR1\_G |
| NR\_FDD\_FR1\_H |
| IoNote3 | Config 1,2 | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dBm/SCS | -50 | | | | -75.83 | | | | | -83.28 | | | -85.83 |
| NR\_FDD\_FR1\_B | -82.78 | | | -85.33 |
| NR\_TDD\_FR1\_C | -82.28 | | | -84.83 |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D | -81.78 | | | -84.33 |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E | -81.28 | | | -83.83 |
| NR\_FDD\_FR1\_F | -80.78 | | | -83.33 |
| NR\_FDD\_FR1\_G | -80.28 | | | -82.83 |
| NR\_FDD\_FR1\_H | -79.78 | | | -82.33 |
| Config 3 | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | -50 | | | | -76.73 | | | | | -77.19 | | | -79.73 |
| NR\_FDD\_FR1\_B | -76.69 | | | -79.23 |
| NR\_TDD\_FR1\_C | -76.19 | | | -78.73 |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D | -75.69 | | | -78.23 |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E | -75.19 | | | -77.73 |
| NR\_FDD\_FR1\_F | -74.69 | | | -77.23 |
| NR\_FDD\_FR1\_G | -74.19 | | | -76.73 |
| NR\_FDD\_FR1\_H | -73.69 | | | -76.53 |
| Propagation condition | | | | - | AWGN | AWGN | | | AWGN | | | AWGN | | AWGN | | AWGN | |
| Antenna configuration | | | |  | 1x2 | 1x2 | | | 1x2 | | | 1x2 | | 1x2 | | 1x2 | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: 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-RSRQ/CSI-RSRQ, SS-RSRP/CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRQ/CSI-RSRQ, SS-RSRP/CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3.5.2.  Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification. | | | | | | | | | | | | | | | | | |

A.6.7.y.2.3 Test Requirements

The CSI-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.9.2.1 and 10.1.9.2.2.

A.6.7.Z CSI-SINR

A.6.7.Z.1 SA intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.Z.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.12.2.1.

A.6.7.Z.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.Z.1.2-1. The absolute accuracy of CSI-SINR intra-frequency measurement is tested by using the parameters in Table A.6.7.Z.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

**Table A.6.7.Z.1.2-1: CSI-SINR Intra frequency CSI-SINR supported test configurations**

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

**Table A.6.7.Z.1.2-2: CSI-SINR Intra frequency test parameters**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| SSB ARFCN | | | |  | freq1 | | freq1 | |
| Duplex mode | | | Config 1 |  | FDD | | | |
| Config 2,3 | TDD | | | |
| TDD configuration | | | Config 1 |  | Not Applicable | | | |
| Config 2 | TDDConf.1.1 | | | |
| Config 3 | TDDConf.2.1 | | | |
| Downlink initial BWP configuration | | | |  | DLBWP.0.1 | | | |
| Downlink dedicated BWP configuration | | | |  | DLBWP.1.1 | | | |
| Uplink initial BWP configuration | | | |  | ULBWP.0.1 | | | |
| Uplink dedicated BWP configuration | | | |  | ULBWP.1.1 | | | |
| DRX Cycle configuration | | | | ms | Not Applicable | | | |
| TRS configuration | | | Config 1 |  | TRS.1.1 FDD | | | |
| Config 2 |  | TRS.1.1 TDD | | | |
| Config 3 |  | TRS.1.2 TDD | | | |
| PDSCH Reference measurement channel | | | Config 1 |  | SR.1.1 FDD | - | SR.1.1 FDD | - |
| Config 2 | SR.1.1 TDD | SR.1.1 TDD |
| Config 3 | SR.2.1 TDD | SR2.1 TDD |
| RMSI 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 | CR.2.1 TDD | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | | | Config 1 |  | CCR.1.1 FDD | - | CCR.1.1 FDD | - |
| Config 2 | CCR.1.1 TDD | CCR.1.1 TDD |
| Config 3 | CCR.2.1 TDD | CCR.2.1 TDD |
| OCNG Patterns | | | |  | OP.1 | | | |
| CSI-RSSI-Measurement | | | |  | Not Applicable | | | |
| SMTC configruation | | | |  | SMTC.1 | | | |
| SSB configuration | | | Config 1,2 |  | SSB.1 FR1 | | | |
| Config 3 | SSB.2 FR1 | | | |
| CSI-RS for mobility | | | Config 1 |  | CSI-RS.RRM.FR1.1 FDD | | | |
| Config 2 |  | CSI-RS.RRM.FR1.1 TDD | | | |
| Config 3 |  | CSI-RS.RRM.FR1.2 TDD | | | |
| PDSCH/PDCCH subcarrier spacing | | | Config 1,2 | kHz | 15 | | | |
| Config 3 | 30 | | | |
| EPRE ratio of PSS to SSS | | | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | |
| EPRE ratio of PDSCH DMRS to SSS | | | |
| EPRE ratio of PDSCH to PDSCH | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | |
| Note2 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/15kHz | -93 | | -116 | |
| NR\_FDD\_FR1\_B | -115.5 | |
| NR\_TDD\_FR1\_C | -115 | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -114.5 | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -114 | |
| NR\_FDD\_FR1\_F | -113.5 | |
| NR\_FDD\_FR1\_G | -113 | |
| NR\_FDD\_FR1\_H | -112.5 | |
| Note2 | Config 1,2 | | | dBm/SCS | -93 | | Same as Noc for 15 kHz | |
| Config 3 | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | -90 | | -113 | |
| NR\_FDD\_FR1\_B | -112.5 | |
| NR\_TDD\_FR1\_C | -112 | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -111.5 | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -111 | |
| NR\_FDD\_FR1\_F | -110.5 | |
| NR\_FDD\_FR1\_G | -110 | |
| NR\_FDD\_FR1\_H | -109.5 | |
|  | | | | dB | 0 | -3.19 | -5.46 | -5.46 |
|  | | | | dB | 4.54 | 2.66 | -4 | -4 |
| CSI-RSRPNote3 | Config 1,2 | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/SCS | -88.46 | -90.34 | -120 | -120 |
| NR\_FDD\_FR1\_B | -119.5 | -119.5 |
| NR\_TDD\_FR1\_C | -119 | -119 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -118.5 | -118.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -118 | -118 |
| NR\_FDD\_FR1\_F | -117.5 | -117.5 |
| NR\_FDD\_FR1\_G | -117 | -117 |
| NR\_FDD\_FR1\_H | -116.5 | -116.5 |
| Config 3 | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | -85.46 | -87.34 | -117 | -117 |
| NR\_FDD\_FR1\_B | -116.5 | -116.5 |
| NR\_TDD\_FR1\_C | -116 | -116 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -115.5 | -115.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -115 | -115 |
| NR\_FDD\_FR1\_F | -114.5 | -114.5 |
| NR\_FDD\_FR1\_G | -114 | -114 |
| NR\_FDD\_FR1\_H | -113.5 | -113.5 |
| CSI-SINR Note3 | | | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dB | 0 | -3.19 | -5.46 | -5.46 |
| NR\_FDD\_FR1\_B |
| NR\_TDD\_FR1\_C |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |
| NR\_FDD\_FR1\_F |
| NR\_FDD\_FR1\_G |
| NR\_FDD\_FR1\_H |
| IoNote3 | | Config 1,2 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/  9.36MHz | -57.5 | | -85.51 | |
| NR\_FDD\_FR1\_B | -85.01 | |
| NR\_TDD\_FR1\_C | -84.51 | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -84.01 | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -83.51 | |
| NR\_FDD\_FR1\_F | -83.01 | |
| NR\_FDD\_FR1\_G | -82.51 | |
| NR\_FDD\_FR1\_H | -82.01 | |
| Config 3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6 | dBm/  38.16MHz | -51.41 | | -79.41 | |
| NR\_FDD\_FR1\_B | -78.91 | |
| NR\_TDD\_FR1\_C | -78.41 | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -77.91 | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -77.41 | |
| NR\_FDD\_FR1\_F | -76.91 | |
| NR\_FDD\_FR1\_G | -76.41 | |
| NR\_FDD\_FR1\_H | -75.91 | |
| Propagation condition | | | | - | AWGN | | | |
| Antenna configuration | | | | - | 1x2 | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-SINR, CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3.5.2.  Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification. | | | | | | | | |

A.6.7.Z.1.3 Test Requirements

The CSI-SINR measurement accuracy shall fulfil the requirements in clause 10.1.12.2.1.

A.6.7.Z.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.Z.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.14.2.1 and 10.1.14.2.2.

A.6.7.Z.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.Z.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-SINR inter-frequency measurement are tested by using test parameters in Table A.6.7.Z.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

**Table A.6.7.Z.2.2-1: CSI-SINR Inter frequency CSI-SINR supported test configurations**

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

**Table A.6.7.Z.2.2-2: CSI-SINR Inter frequency test parameters**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Test 1** | | | **Test 2** | | | | | **Test 3** | | | |
| **Cell 1** | **Cell 2** | | **Cell 1** | | | **Cell 2** | | **Cell 1** | | | **Cell 2** |
| SSB ARFCN | | | | |  | freq1 | freq2 | | freq1 | | | freq2 | | freq1 | | freq2 | |
| Duplex mode | | | Config 1 | |  | FDD | | | | | | | | | | | |
| Config 2,3 | | TDD | | | | | | | | | | | |
| TDD configuration | | | Config 1 | |  | Not Applicable | | | | | | | | | | | |
| Config 2 | | TDDConf.1.1 | | | | | | | | | | | |
| Config 3 | | TDDConf.2.1 | | | | | | | | | | | |
| Downlink initial BWP configuration | | | | |  | DLBWP.0.1 | | | | | | | | | | | |
| Downlink dedicated BWP configuration | | | | |  | DLBWP.1.1 | | | | | | | | | | | |
| Uplink initial BWP configuration | | | | |  | ULBWP.0.1 | | | | | | | | | | | |
| Uplink dedicated BWP configuration | | | | |  | ULBWP.1.1 | | | | | | | | | | | |
| DRX Cycle configuration | | | | | ms | Not Applicable | | | | | | | | | | | |
| TRS configuration | | Config 1 | | |  | TRS.1.1 FDD | | | | | | | | | | | |
| Config 2 | | |  | TRS.1.1 TDD | | | | | | | | | | | |
| Config 3 | | |  | TRS.1.2 TDD | | | | | | | | | | | |
| PDSCH Reference measurement channel | | | Config 1 | |  | SR.1.1 FDD | - | | SR.1.1 FDD | | | - | | SR.1.1 FDD | | | - |
| Config 2 | | SR.1.1 TDD | SR.1.1 TDD | | | SR.1.1 TDD | | |
| Config 3 | | SR2.1 TDD | SR2.1 TDD | | | SR2.1 TDD | | |
| RMSI CORESET Reference Channel | | | Config 1 | |  | CR.1.1 FDD | - | | R.1.1 FDD | | | - | | CR.1.1 FDD | | |  |
| Config 2 | |  | CR.1.1 TDD |  | | CR.1.1 TDD | | |  | | CR.1.1 TDD | | |  |
| Config 3 | |  | CR2.1 TDD |  | | CR2.1 TDD | | |  | | CR2.1 TDD | | |  |
| Dedicated CORESET Reference Channel | | | Config 1 | |  | CCR.1.1 FDD | - | | CCR.1.1 FDD | | | - | | CCR.1.1 FDD | | | - |
| Config 2 | | CCR.1.1 TDD | CCR.1.1 TDD | | | CCR.1.1 TDD | | |
| Config 3 | | CCR2.1 TDD | CCR2.1 TDD | | | CCR2.1 TDD | | |
| OCNG Patterns | | | | |  | OP.1 | | | | | | | | | | | |
| CSI-RSSI-Measurement | | | | |  | Not Applicable | | | | | | | | | | | |
| Time offset with Cell 1 | | | Config 1 | | ms | - | | TBD | | - | TBD | | - | | TBD | | |
| Config 2,3 | | μs | - | | TBD | | - | TBD | | - | | TBD | | |
| SMTC configuration | | | Config 1 | |  | SMTC pattern 2 | | | | | | | | | | | |
| Config 2,3 | |  | SMTC pattern 1 | | | | | | | | | | | |
| SSB configuration | | | Config 1,2 | |  | SSB.1 FR1 | | | | | | | | | | | |
| Config 3 | | SSB.2 FR1 | | | | | | | | | | | |
| CSI-RS for mobility | | | Config 1 | |  | CSI-RS.RRM.FR1.1 FDD | | | | | | | | | | | |
| Config 2 | |  | CSI-RS.RRM.FR1.1 TDD | | | | | | | | | | | |
| Config 3 | |  | CSI-RS.RRM.FR1.2 TDD | | | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | Config 1,2 | | kHz | 15 | | | | | | | | | | | |
| Config 3 | | 30 | | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | | | dB | 0 | 0 | | 0 | | | 0 | | 0 | | | 0 |
| EPRE ratio of PBCH DMRS to SSS | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | | | |
| EPRE ratio of PDSCH to PDSCH | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | | |
| Note2 | Config 1,2 | | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dBm/15kHz | -88 | | | -108.5 | | | | | -119.5 | | | |
| NR\_FDD\_FR1\_B | -119 | | | |
| NR\_TDD\_FR1\_C | -118.5 | | | |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D | -118 | | | |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E | -117.5 | | | |
| NR\_FDD\_FR1\_F | -117 | | | |
| NR\_FDD\_FR1\_G | -116.5 | | | |
| NR\_FDD\_FR1\_H | -116 | | | |
| Note2 | Config 1,2  N | | | | dBm/15kHz | -88 | | | -108.5 | | | | | Same as Noc for 15kHz T | | | |
| Config 3 | | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | -85 | | | -105.5 | | | | | -116.5 | | | |
| NR\_FDD\_FR1\_B | -116 | | | |
| NR\_TDD\_FR1\_C | -115.5 | | | |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D | -115 | | | |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E | -114.5 | | | |
| NR\_FDD\_FR1\_F | -114 | | | |
| NR\_FDD\_FR1\_G | -114.5 | | | |
| NR\_FDD\_FR1\_H | -113 | | | |
|  | | | | | dB | -1.75 | -1.75 | | 20 | | | 20 | | -4.0 | | | -4.0 |
|  | | | | | dB | -1.75 | | | 20 | | | | | -4.0 | | | |
| CSI-RSRP Note3 | Config 1,2 | | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dBm/SCS | -89.75 | | | -88.5 | | | | | -123.5 | | | |
| NR\_FDD\_FR1\_B | -123 | | | |
| NR\_TDD\_FR1\_C | -122.5 | | | |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D | -122 | | | |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E | -121.5 | | | |
| NR\_FDD\_FR1\_F | -121 | | | |
| NR\_FDD\_FR1\_G | -120.5 | | | |
| NR\_FDD\_FR1\_H | -120 | | | |
| Config 3 | | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | -86.75 | | | -85.5 | | | | | -120.5 | | | |
| NR\_FDD\_FR1\_B | -120 | | | |
| NR\_TDD\_FR1\_C | -119.5 | | | |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D | -119 | | | |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E | -118.5 | | | |
| NR\_FDD\_FR1\_F | -118 | | | |
| NR\_FDD\_FR1\_G | -117.5 | | | |
| NR\_FDD\_FR1\_H | -117 | | | |
| CSI-SINRNote3 | | | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dB | -1.75 | | | 20 | | | | | -4.0 | | | |
| NR\_FDD\_FR1\_B |
| NR\_TDD\_FR1\_C |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E |
| NR\_FDD\_FR1\_F |
| NR\_FDD\_FR1\_G |
| NR\_FDD\_FR1\_H |
| IoNote3 | Config 1,2 | | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dBm/  9.36MHz | -57.83 | | | -60.5 | | | | | -90.09 | | | |
| NR\_FDD\_FR1\_B | -89.59 | | | |
| NR\_TDD\_FR1\_C | -89.09 | | | |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D | -88.59 | | | |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E | -88.09 | | | |
| NR\_FDD\_FR1\_F | -87.59 | | | |
| NR\_FDD\_FR1\_G | -87.09 | | | |
| NR\_FDD\_FR1\_H | -86.59 | | | |
| Config 3 | | | NR\_FDD\_FR1\_A  NR\_TDD\_FR1\_A NOTE 6 | dBm/  38.16MHz | -51.73 | | | -54.41 | | | | | -84 | | | |
| NR\_FDD\_FR1\_B | -83.5 | | | |
| NR\_TDD\_FR1\_C | -83 | | | |
| NR\_FDD\_FR1\_D  NR\_TDD\_FR1\_D | -82.5 | | | |
| NR\_FDD\_FR1\_E  NR\_TDD\_FR1\_E | -82 | | | |
| NR\_FDD\_FR1\_F | -81.5 | | | |
| NR\_FDD\_FR1\_G | -81 | | | |
| NR\_FDD\_FR1\_H | -80.5 | | | |
| Propagation condition | | | | | - | AWGN | | | | | | | | | | | |
| Antenna configuration | | | | | - | 1x2 | | | | | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-SINR, CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: NR operating band groups are as defined in clause 3.5.2.  Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification. | | | | | | | | | | | | | | | | | |

A.6.7.Z.2.3 Test Requirements

The CSI-SINR measurement accuracy shall fulfil the requirements in clause 10.1.14.2.1 and 10.1.14.2.2.

<End of Change #7>

<Start of Change #8>

A.7 NR standalone tests with one or more NR cells in FR2

## A.7.6 Measurement procedure

A.7.6.x CSI-RS based intra-frequency Measurements

A.7.6.x.1 SA event triggered reporting test without gap under DRX for CSI-RS based intra-frequency measurement

A.7.6.x.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency measurement requirements in clause 9.10.2 and 9.10.3. Supported test configurations are shown in table A.7.6.x.1.1-1.

**Table A.7.6.x.1.1-1: supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 60 kHz CSI-RS SCS, TDD duplex mode |
| 2 | 120 kHz CSI-RS SCS, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.x.1.1-2 ~ 6.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.7.6.x.1.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Value** | | **Comment** |
| **Test 1** | **Test 2** |
| Active cell |  | 1, 2 | PCell (Cell 1) | |  |
| Neighbour cell |  | 1, 2 | Cell 2 | | Cell to be identified. |
| RF Channel Number |  | 1, 2 | 1: Cell 1 and Cell 2 | | One TDD carrier frequency is used for the NR cells. |
| CSI-RS resource configuration |  | 1, 2 | CSI-RS-L3 2.1 TDD | |  |
| A3-Offset | dB | 1, 2 | -6 | |  |
| CP length |  | 1, 2 | Normal | |  |
| Hysteresis | dB | 1, 2 | 0 | |  |
| Time To Trigger | s | 1, 2 | 0 | |  |
| Filter coefficient |  | 1, 2 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2 | DRX.1 | DRX.2 | DRX related parameters are defined in Table A.3.3 |
| Time offset between Cell 1 and Cell 2 |  | 1, 2 |  | |  |
| T1 | s | 1, 2 | 5 | |  |
| T2 | s | 1, 2 | 10 | 52 |  |

**Table A.7.6.x.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Intial BWP configuration |  | 1, 2 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2 | SSB | | SSB | |
| PDSCH RMC configuration |  | 1, 2 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1, 2 | CR.3.1 TDD | | CR.3.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1, 2 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| TRS configuration |  | 1, 2 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1, 2 | TCI.State.2 | | N/A | |
| OCNG Patterns |  | 1, 2 | OP.1 | | OP.1 | |
| SSB |  | 1 | SSB.3 FR2 | | SSB.3 FR2 | |
| 2 | SSB.4 FR2 | | SSB.4 FR2 | |
| CSI-RS |  | 1, 2 | CSI-RS.3.2 TDD | | | |
| Propagation Condition |  | 1, 2 | AWGN | | | |

**Table A.7.6.x.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | | |
| Beam assumptionNote 4 |  | 1,2 | Fine | | Fine | |
|  | dB | 1, 2 | 4 | -1.46 | -Infinity | -1.46 |
| Note 2 | dBm/15 KHz | 1, 2 | -98 | | | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
|  |  | 2 | -86 | | | |
| CSI-RSRP | dBm/SCS | 1 | -85 | -85 | -Infinity | -85 |
| 2 | -82 | -82 | -Infinity | -82 |
|  | dB | 1, 2 | 4 | 4 | -Infinity | 4 |
|  | dBm/95.04MHz | 1 | -54.53 | -52.18 | -54.53 | -52.18 |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: CSI-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1, and does not limit UE implementation or test system implementation. | | | | | | |

A.7.6.x.1.2 Test Requirements

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

- 7.2s for a UE supporting power class 1,

- 4.32s for a UE supporting power class 2, 3 and 4

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

- 51.2s for a UE supporting power class 1,

- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

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

A.7.6.y CSI-RS based inter-frequency Measurements

A.7.6.y.1 SA event triggered reporting tests for FR2 CSI-RS based measurement when non-DRX is used (PCell in FR2)

A.7.6.y.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event for CSI-RS based L3 measurement. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.10.3.5.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.y.1.1-1, A.7.6.y.1.1-2, and A.7.6.y.1.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6.y.1.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.y.1.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.7.6.y.1.1-1: SA event triggered reporting tests for CSI-RS based L3 measurement for FR2-FR2**

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

**Table A.7.6.y.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 CSI-RS based L3 measurement**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| NR RF Channel Number |  | Config 1 | 1, 2 | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1 | NR cell 2 | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| A3-Offset | dB | Config 1 | -6 |  |
| Hysteresis | dB | Config 1 | 0 |  |
| CP length |  | Config 1 | Normal |  |
| TimeToTrigger | s | Config 1 | 0 |  |
| Filter coefficient |  | Config 1 | 0 | L3 filtering is not used |
| DRX |  | Config 1 | OFF | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1 | 3μs | Synchronous cells. |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 7 for PC1;  4.5 for other PC |  |

**Table A.7.6.y.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 CSI-RS based L3 measurement**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| NR RF Channel Number | |  | Config 1 | 1 | | 2 | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | N/A | |
| TCI configuration | |  | Config 1 | CSI-RS.Config.0 | | N/A | |
| CSI-RS configuration | |  |  | - | | CSI-RS.RRM.FR2.1 TDD | |
| EPRE ratio of PSS to SSS | |  | Config 1 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |
| EPRE ratio of PDSCH to PDSCH | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |
| Note2 | | dBm/15kHz Note5 |  | -104.7 | | -104.7 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -95.7 | | -95.7 | |
| CSI-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -Infinity | -86.7 |
|  | | dB | Config 1 | 6 | 6 | -Infinity | 9 |
|  | | dB | Config 1 | 6 | 6 | -Infinity | 9 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -59.7 | -59.7 | -66.7 | -57.2 |
| Propagation Condition | |  | Config 1 | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

A.7.6.2.2.2 Test Requirements

In the test the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

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

<End of Change #8>

<Start of Change #9>

A.7.7.x CSI-RSRP

A.7.7.x.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.x.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.3.2.1 and 10.1.3.2.2 for intra-frequency measurements.

A.7.7.x.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.x.1.2-1. Both absolute and relative accuracy of CSI-RSRP intra-frequency measurements are tested by using the parameters in Table A.7.7.x.1.2-2 and A.7.7.x.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1. The test consists of two time phases T1 and T2.

**Table A.7.7.x.1.2-1: CSI-RSRP Intra frequency CSI-RSRP supported test configurations**

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

**Table A.7.7.x.1.2-2: CSI-RSRP Intra frequency general test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **T1** | | **T2** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 24 | | 100: NRB,c = 24 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | - | DLBWP.1.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - | ULBWP.1.1 | - |
| DRX cycle configuration |  | Not applicable | - | Not applicable | - |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 | OP.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| CSI-RS configuration for mobility |  | CSI-RS-L3 2.1 TDD | | | |
| CSI-RS configuration |  | CSI-RS.3.2 TDD | | | |
| Time offset with Cell 1 | μs | - | TBD | - | TBD |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | AWGN | AWGN | AWGN | AWGN |
| Antenna configuration |  | 1x2 | 1x2 | 1x2 | 1x2 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | |

**Table A.7.7.x.1.2-3: CSI-RSRP Intra frequency OTA related test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **T1** | | **T2** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 7 |  | Rough | | Assumption for UE beamsNote 7 | |
| Note1 | dBm/15kHzNote4 | -91.6 | | N/A | |
| Note1 | dBm/SCSNote4 | -82.6 | | N/A | |
|  | dB | 6.0 | 1.0 | N/A | N/A |
| Es | dBm/SCSNote4 |  |  | (Table B.2.2.2-2 Rx Beam Peak +2.1dB) | (Table B.2.2.2-2 Rx Beam Peak +2.1dB) |
| CSI-RS\_RPNote2 | dBm/SCS | -76.6 | -81.6 | (Table B.2.2.2-2 Rx Beam Peak +2.1dB) | (Table B.2.2.2-2 Rx Beam Peak +2.1dB) |
| BB Note6 | dB | 2.44 | -5.98 | -5.98 | -5.98 |
| IoNote2 | dBm/95.04 MHz Note4 | -50.05 | | (Table B.2.2.2-2 Rx Beam Peak +29.70dB) | |
| Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: CSI-RS\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.7.7.x.1.3 Test Requirements

The CSI-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.2.1 and relative accuracy requirements in clause 10.1.3.2.2. The following requirements are to be verified:

During T1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported CSI-RSRP is in the range shown in table A.7.7.x.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in Table 10.1.3.2.2-1.

During T2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported CSI-RSRP is in the range shown in table A.7.7.x.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in Table 10.1.3.2.2-1.

During T1 and T2:

Relative accuracy of Cell 1 during T2 compared with Cell 1 during T1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in Table 10.1.3.2.2-1

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in Table 10.1.3.2.2-1.

**Table A.7.7.x.1.3-1: CSI-RSRP absolute accuracy test requirement**

|  |  |
| --- | --- |
|  | **Test requirement Notes1,2,3** |
| Cell 1 | CSI-RS\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ CSI-RS\_RP1 +δ +Gmax |
| Cell 2 | CSI-RS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ CSI-RS\_RP2 +δ +Gmax |
| Note 1: CSI-RS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.3.2.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class | |

A.7.7.x.2 SA inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.x.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.2.1 and 10.1.5.2.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.7.7.x.2.1-1.

**Table A.7.7.x.2.1-1: Applicable NR configurations for FR2 inter-frequency CSI-RSRP accuracy test**

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

A.7.7.x.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.x.2.2-1 and Table A.7.7.x.2.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.x.2.2-1 and Table A.7.7.x.2.2-1. The inter-frequency measurements are supported by a measurement gap.

**Table A.7.7.x.2.2-1: CSI-RSRP inter-frequency test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| BWchannel | 1~2 |  | 100:  NRB,c = 24 | | 100:  NRB,c = 24 | |
| Gap pattern ID |  |  | 0 | | 0 | |
| Duplex mode | 1~2 |  | TDD | TDD | TDD | TDD |
| TDD configuration | 1~2 |  | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH Reference measurement channel | 1~2 |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel | 1~2 |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Reference Channel | 1~2 |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| SSB configuration | 1 |  | SSB.3 FR2 | | SSB.3 FR2 | |
| CSI-RS configuration | 1 |  | CSI-RS.3.2 TDD | | CSI-RS.3.2 TDD | |
| OCNG Patterns | 1~2 |  | OP.3 | | OP.3 | |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.3  ULBWP.1.3 | | DLBWP.1.3  ULBWP.1.3 | |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD | | TRS.2.1 TDD | |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 | | TCI.State.2 | |
| CSI-RS configuration for mobility | 1~2 |  | CSI-RS-L3 2.1 TDD | | CSI-RS-L3 2.1 TDD | |
| Time offset between Cell 2 and Cell 3 | 1~2 | μs | TBD | | TBD | |
| EPRE ratio of PSS to SSS | 1~2 | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation condition | 1~2 | - | AWGN | AWGN | AWGN | AWGN |
| Antenna configuration | 1~2 | - | 1x2 | 1x2 | 1x2 | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | | |

**Table A.7.7.x.2.2-2: SS-RSRP inter frequency OTA related test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| Angle of arrival configuration |  | Setup 4b according to clause A.3.15.4.2 | | Setup 4b according to clause A.3.15.4.2 | |
| AoA1  Spherical coverage | AoA2  Rx Beam Peak | AoA1  Spherical coverage | AoA2  Rx Beam Peak |
| Note1 | dBm/15kHzNote4 | -90.6 | -90.6 | (Table B.2.3.2-2 Rx Beam Peak +1.97dB) | (Table B.2.3.2-2 Rx Beam Peak -3.03dB) |
| Assumption for UE beamsNote 7 |  | Rough | | Rough | |
| Note1 | dBm/SCSNote4 | -81.6 | -81.6 | (Table B.2.3.2-2 Rx Beam Peak +11.0dB) | (Table B.2.3.2-2 Rx Beam Peak +6.0dB) |
|  | dB | 6.0 | 6.0 | 17.0 | -1.0 |
| CSI-RS\_RPNote2 | dBm/SCS | -75.60 | -75.60 | (Table B.2.3.2-2 Rx Beam Peak +28.0dB) | (Table B.2.3.2-2 Rx Beam Peak +5.0dB) |
| (CSI-RS\_RPCell 1 – CSI-RS\_RPCell 2) | dB | 0 | | 23.00 | |
| BB Note6 | dB | 5.29 | 5.96 | 8.86 | -3.92 |
| IoNote2 | dBm/95.04 MHz Note4 | -50.03 | -50.03 | (Table B.2.3.2-2 Rx Beam Peak +52.68dB) | (Table B.2.3.2-2 Rx Beam Peak +33.13dB) |
| (Iofreq 1 – Io freq 2) | dB | 0 | | 19.55 | |
| Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: CSI-RS\_RP, Es/Iot, Io, (CSI-RS\_RPCell 2 – CSI-RS\_RPCell 1) and (Iofreq 2 – Io freq 1) levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP or ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.7.7.x.2.3 Test Requirements

The CSI-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirements in clause 10.1.5.2.1 and the relative requirements in clause 10.1.5.2.2.

Test 1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported CSI-RSRP is in the range shown in Table A.7.7.x.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in A.7.7.x.2.3-2.

Test 2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported CSI-RSRP is in the range shown in Table A.7.7.x.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in A.7.7.x.2.3-2.

**Table A.7.7.x.2.3-1: CSI-RSRP absolute accuracy test requirement**

|  |  |
| --- | --- |
|  | **Test requirement Notes1,2,3,4** |
| Cell 1 | CSI-RS\_RP1 -δ +Gmin +X ≤ Reported RSRP(dBm) ≤ CSI-RS\_RP1 +δ +Gmax |
| Cell 2 | CSI-RS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ CSI-RS\_RP2 +δ+Gmax |
| Note 1: CSI-RS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.5.2.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class  Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value. | |

**Table A.7.7.x.2.3-2: CSI-RSRP relative accuracy test requirement**

|  |  |
| --- | --- |
|  | **Test requirement Notes1,2,3,4** |
| Cell 2 – Cell 1 | CSI-RS\_RP2 – CSI-RS\_RP1 -δ ≤ Reported RSRP(dB) ≤ CSI-RS\_RP2 – CSI-RS\_RP1 +δ–(X) |
| Note 1: CSI-RS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration  Note 2: δ is the RSRP relative accuracy requirement from Table 10.1.5.2.2-1  Note 3: Void  Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value. | |

A.7.7.Y CSI-RSRQ

A.7.7.Y.1 SA intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.Y.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.8.2.1.

A.7.7.Y.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.Y.1.2-1. The absolute accuracy of CSI-RSRQ intra-frequency measurement is tested by using the parameters in Table A.7.7.Y.1.2-2 and Table A.7.7.Y.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.7.7.Y.1.2-1: CSI-RSRQ Intra frequency CSI-RSRQ supported test configurations**

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

**Table A.7.7.Y.1.2-2: CSI-RSRQ Intra frequency test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| SSB ARFCN | |  | Freq1 | | Freq1 | |
| Duplex mode | |  | TDD | | TDD | |
| TDD configuration | |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | DLBWP.0.1 | | | |
| Dedicated DL BWP | DLBWP.1.1 | | | |
| Initial UL BWP | ULBWP.0.1 | | | |
| Dedicated UL BWP | ULBWP.1.1 | | | |
| TRS configuration | |  | TRS.2.1 TDD |  | TRS.2.1 TDD |  |
| TCI state | |  | TCI.State.0 |  | TCI.State.0 |  |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD |  | SR.3.1 TDD |  |
| RMSI CORESET Reference Channel | |  | CR.3.1 TDD | - | CR.3.1 TDD |  |
| Control channel RMC | |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns | |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration | |  | SMTC.1 | | | |
| SSB configuration | |  | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 |
| PDSCH/PDCCH subcarrier spacing | | kHz | 120 | 120 | 120 | 120 |
| CSI-RS configuration | |  | CSI-RS.RRM.FR2.1 TDD | | | |
| EPRE ratio of CSI-RS to SSS | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PSS to SSS | |
| EPRE ratio of PBCH\_DMRS to SSS | |
| EPRE ratio of PBCH to PBCH\_DMRS | |
| EPRE ratio of PDCCH\_DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |
| EPRE ratio of PDSCH\_DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
|  | | dB | 3 | 3 | -3 | -3 |
| Propagation condition | |  | AWGN | | AWGN | |
| Antenna configuration | |  | 1x2 | | 1x2 | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | | |

**Table A.7.7.Y.1.2-3: CSI-RSRQ Intra frequency OTA related test parameters**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Unit** | **Test 1** | | | **Test 2** | | | |
| **Cell 1** | **Cell 2** | | **Cell 1** | | **Cell 2** | |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | Setup 1according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 9 |  | Rough | | | | | | |
| Note1 | dBm/15kHzNote4 | -95 | | | | -95 | | |
| Note1 | dBm/SCSNote3 | -86 | | | | -86 | | |
| CSI-RSRPNote2 | dBm/SCS Note4 | -83 | | -83 | | -89 | | -89 |
| CSI-RSRQ Note2 | dB | -14.77 | | -14.77 | | -16.81 | | -16.81 |
|  | dB | -1.76 | | -1.76 | | -4.76 | | -4.76 |
| IoNote2 | dBm/95.04 MHz Note4 | -50 | | | | -54 | | -54 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: CSI-RSRQ, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: CSI-RSRQ and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: NR operating band groups are as defined in Clause 3.5.2.  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

A.7.7.Y.1.3 Test Requirements

The CSI-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal CSI-RSRQ+TBD dB to Nominal CSI-RSRQ-TBD dB and the CSI-RSRQ measurement accuracy in test 2 shall be within the range Nominal CSI-RSRQ+TBD dB to Nominal CSI-RSRQ-TBD dB according to the requirements in clause 10.1.8.2.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test. Nominal RSRQ is the value shown in table A.7.7.Y.1.2-3. Relative accuracy shall fulfil the requirements in clause 10.1.8.2.1.

A.7.7.Y.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.Y.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.10.2.1 and 10.1.10.2.2 for inter-frequency measurement.

A.7.7.Y.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.Y.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-RSRQ inter-frequency measurement are tested by using test parameters in Table A.7.7.Y.2.2-2 and Table A.7.7.Y.2.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

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

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

**Table A.7.7.Y.2.2-2: CSI-RSRQ Inter frequency general test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| SSB ARFCN |  | Freq1 | freq2 | freq1 | Freq2 |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| CSI-RS configuration |  | CSI-RS.RRM.FR2.1 TDD | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of CSI-RS to SSS |
|  | dB | -1.75 | -1.75 | -3 | -1.75 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | |

**Table A.7.7.Y.2.2-3: CSI-RSRQ Inter frequency OTA related test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| AoA setup |  | Setup 1 in clause A.3.15. | | Setup 1 in clause A.3.15. | |
| Assumption for UE beamsNote 8 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -94.03 | | -94.03 | |
| Note1 | dBm/SCSNote3 | -85.0 | | -85.0 | |
| CSI-RSRPNote2 | dBm/SCS Note4 | -86.75 | -86.75 | -88 | -88 |
| CSI-RSRQNote2 | dB | -14.75 | -14.75 | -15.56 | -15.56 |
|  | dB | -1.75 | -1.75 | -3 | -3 |
| IoNote2 | dBm/95.04 MHz Note4 | -53.8 | -53.8 | -54.25 | -54.25 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: CSI-RSRQ, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: CSI-RSRQ and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.7.7.Y.2.3 Test Requirements

The CSI-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal CSI-RSRQ+TBDdB to Nominal CSI-RSRQ -TBDdB and the CSI-RSRQ measurement accuracy in test 2 shall be within the range Nominal CSI-RSRQ +TBDdB to Nominal CSI-RSRQ -TBDdB according to the requirements in clause 10.1.10.2.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test.

The CSI-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.2.2.

A.7.7.X CSI-SINR

A.7.7.X.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.X.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.x.y.z.

A.7.7.X.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.X.1.2-1. . The absolute accuracy of CSI-SINR intra-frequency measurement is test by using the parameters in Table A.7.7.X.1.2-2 and Table A.7.7.X.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

**Table A.7.7.X.1.2-1: CSI-SINR Intra frequency CSI-SINR supported test configurations**

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

**Table A.7.7.X.1.2-2: CSI-SINR Intra frequency test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| SSB ARFCN |  | Freq2 | | Freq2 | |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | | | |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | | | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | | |
| DRX cycle configuration | ms | Not applicable | | | |
| TRS configuration |  | TRS.2.1 TDD | | | |
| TCI state |  | TCI.State.0 | | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD |  | SR.3.1 TDD |  |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD |  |
| Dedicated RMSI CORESET Reference Channel |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| Time offset with Cell 1 |  | - | TBD | - | TBD |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 | | | |
| SSB configuration |  | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 |
| CSI-RS configuration for mobility |  | CSI-RS.RRM.FR2.1 TDD | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| SS-RSSI-Measurement |  | Not Applicable | | | |
| EPRE ratio of PSS to SSS | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of CSI-RS to SSS |
| EPRE ratio of OCNG to SSSNote 1 |
|  | dB | 4.54 | 2.66 | -3 | -3 |
| Propagation conditions |  | AWGN | | | |
| Antenna configuration |  | 1x2 | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | |

**Table A.7.7.X.1.2-3: CSI-SINR Intra frequency OTA related test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 3** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 9 |  | Rough | | Rough | |
| Note1 | dBm/15kHz Note4 | -105 | | -105 | |
| Note1 | dBm/SCS Note3 | -96 | | -96 | |
| CSI-RSRPNote2 | dBm/SCS Note4 | -91.46 | -93.34 | -99 | -99 |
| CSI-SINR Note2 | dB | 0 | -3.2 | -4.76 | -4.76 |
|  | dB | 0 | -3.2 | -4.76 | -4.76 |
| IoNote2 | dBm/95.04 MHz Note4 | -59.2 | | -64 | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: NR operating band groups are as defined in clause 3.5.2.  Note 7: Void  Note 8: Void  Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.7.7.X.1.3 Test Requirements

The CSI-SINR absolute measurement accuracy in test 1 shall be within the range Nominal CSI-SINR+XdB to Nominal CSI-SINR –X-1dB and the CSI-SINR measurement accuracy in test 2 shall be within the range Nominal CSI-SINR +YdB to Nominal CSI-SINR –Y-1dB according to the requirements in clause 10.1.x.y.z with an additional -1dB margin reflecting the possible impact of UE self noise in the test. The relative CSI-SINR measurement accuracy shall fulfil the requirements in clause 10.1.x.y.z.

Editor’s note: The values of X and Y are pending on the accuracy requirement discussion

A.7.7.X.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.X.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.x.y.z and 10.1.x.y.z for inter-frequency measurement.

A.7.7.X.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.X.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-SINR inter-frequency measurement are tested by using test parameters in Table A.7.7.X.2.2-2 and Table A.7.7.X.2.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

**Table A.7.7.X.2.2-1: CSI-SINR Inter frequency CSI-SINR supported test configurations**

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

**Table A.7.7.X.2.2-2: CSI-SINR Inter frequency general test parameters**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | | **Test 3** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| SSB ARFCN |  | freq1 | freq2 | freq1 | freq2 | freq1 | freq2 |
| Duplex mode |  | TDD | | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | | | | | |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | | | | | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | | | | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | | | | |
| DRX cycle configuration | ms | Not applicable | | | | | |
| TRS configuration |  | TRS.2.1 TDD | | | | | |
| TCI state |  | TCI.State.0 | | | | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Time offset with Cell 1 |  | - | TBD | - | TBD | - | TBD |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| CSI-RS configuration for mobility |  | CSI-RS.RRM.FR2.1 TDD | | | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG to SSSNote 1 |
|  | dB | -0.5 | -0.5 | 11.0 | 11.0 | -3.0 | -3.0 |
| Propagation conditions |  | AWGN | | | | | |
| Antenna configuration |  | 1x2 | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: CSI-SINR, CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | |

**Table A.7.7.X.2.2-3: CSI-SINR Inter frequency OTA related test parameters**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | | **Test 3** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| Angle of arrival configuration | degrees | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 10 |  | Rough | | Rough | | Rough | |
| Note1 | dBm/15kHz Note4 | -105 | | -105 | | -105 | |
| Note1 | dBm/SCS Note3 | -96 | | -96 | | -96 | |
| CSI-RSRPNote2 | dBm/SCS Note4 | -96.5 | -96.5 | -85 | -85 | -99 | -99 |
| CSI-SINRNote2 | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
|  | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
| IoNote2 | dBm/95.04 MHz Note4 | -69.3 | | -55.4 | | -65.24 | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: NR operating band groups are as defined in clause 3.5.2.  Note 7: Void  Note 8: Void  Note 9: Void  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

A.7.7.X.2.3 Test Requirements

The CSI-SINR absolute measurement accuracy in test 1 shall be within the range Nominal CSI-SINR +XdB to Nominal CSI-SINR –X-1dB and the CSI-SINR measurement accuracy in test 2 shall be within the range Nominal CSI-SINR +YdB to Nominal CSI-SINR –Y-1dB according to the requirements in clause 10.1.x.y.z with an additional -1dB margin reflecting the possible impact of UE self noise in the test.

The CSI-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.x.y.z.

<End of Change #9>