**3GPP TSG-RAN4 Meeting #98-bis-e** ***R4-2105771***

**Electronic meeting, 12th – 20th April, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **Draft** | **rev** | **-** | **Current version:** | **16.7.0** |  |
|  | | | | | | | | |
| *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 performance requirements | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | CATT | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_CSIRS\_L3meas-Perf | | | | |  | ***Date:*** | | | 2021-04-22 |
|  |  | | | |  | |  | | |  |
| ***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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The performance requirements for CSI-RS based L3 measurement need to be specified. It is a draft big CR to aggregate the endorsed CRs/draftCRs for CSI-RS based L3 measurement performance requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | * This Draft Big CR is based on the endorsed draft big CR R4-2101291 and R4-2101533, and * Merge the following endorsed draft CR in RAN4#98bis-e meeting   + R4-2105777 draftCR on the CSI-RSRP accuracy requirements   + R4-2105775 draftCR on the CSI-RSRP report mapping   + R4-2105776 draftCR on CSI-RSRQ performance requirements   + R4-2105778 draftCR on CSI-SINR accuracy requirements   + R4-2104739 draftCR on the CSI-SINR report mapping   + [R4-2105779](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104740.zip) draftCR on the test cases of intra-frequency measurement in FR2   + R4-2105780 draftCR on the test case of EN-DC event triggered reporting for intra-frequency CSI-RS based measurements in FR1   + R4-2105781 draftCR on CSI-RS based L3 measurement RRM test cases   + R4-2105782 Draft test case of CSI-RS based intra-frequency test for EN-DC event triggered reporting tests without gap for NR neighbor cell in FR2   + R4-2105783 Draft CR to 38.133 on SA event triggered reporting tests with gap for NR neighbor cell in FR2 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The performance requirements for CSI-RS based L3 measurement are missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | Modified clause:  10.1.6, 10.1.11, 10.1.16;  B.2.1.4, B.2.1.5  New clause:  10.1.2.3, 10.1.3.3, 10.1.4.3, 10.1.5.3, 10.1.7.2, 10.1.8.2, 10.1.9.2, 10.1.10.2, 10.1.12.2, 10.1.13.2, 10.1.14.2, 10.1.15.2;  A.3.25, A.4.6.6, A.4.6.7, A.4.7.7, A.4.7.8, A.4.7.9;  A.5.6.4, A.5.6.5, A.5.7.6, A.5.7.7, A.5.7.8;  A.6.6.7, A.6.6.8, A.6.7.9, A.6.7.10, A.6.7.11;  A.7.6.5, A.7.6.6, A.7.7.6, A.7.7.7, A.7.7.8;  B.2.8, B.2.9 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

## <Start of Change 1>

#### 10.1.2.3 Intra-frequency CSI-RSRP accuracy requirements

##### 10.1.2.3.1 Absolute CSI-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RSRP in this clause apply to a cell where the CSI-RS resources to be measured have the same center frequency as the CSI-RS resources indicated for measurement in the serving cell in FR1.

The accuracy requirements in Table 10.1.2.3.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each associated SSB.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.8 for a corresponding Band for each relevant CSI-RS to be measured.

- The bandwidth of CSI-RS resource is 48PRB when density is 3.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

Table 10.1.2.3.1-1: CSI-RSRP Intra frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 1 range | | | | | | |
| NR operating band groups Note 2 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSCSI-RS | | | dBm/BWChannel | dBm/BWChannel | |
| SCSCSI-RS = 15 kHz | SCSCSI-RS = 30 kHz | SCSCSI-RS = 60 kHz |
| ±4.5 | ±9 | ≥-6 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | -115 | N/A | -70 | |
| NR\_FDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -70 | |
| NR\_TDD\_FR1\_C | -120 | -117 | -114 | N/A | -70 | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -113.5 | N/A | -70 | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -113 | N/A | -70 | |
| NR\_FDD\_FR1\_F | -118.5 | -115.5 | -112.5 | N/A | -70 | |
| NR\_FDD\_FR1\_G | -118 | -115 | -112 | N/A | -70 | |
| NR\_FDD\_FR1\_H | -117.5 | -114.5 | -111.5 | N/A | -70 | |
| ±8 | ±11 | ≥-6 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A,  NR\_FDD\_FR1\_B, NR\_TDD\_FR1\_C, NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D, NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E, NR\_FDD\_FR1\_F,  NR\_FDD\_FR1\_G, NR\_FDD\_FR1\_H | N/A | N/A | N/A | -70 | -50 | |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | | | |

##### 10.1.2.3.2 Relative CSI-RSRP Accuracy

The relative accuracy of CSI-RSRP is defined as the CSI-RSRP measured from one cell compared to the CSI-RSRP measured from another cell on the same center frequency, or between any two CSI-RSRP levels measured on the same cell in FR1.

The accuracy requirements in Table 10.1.2.3.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each associated SSB.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.8 for a corresponding Band for each relevant CSI-RS to be measured.

- The bandwidth of CSI-RS resource is 48PRB when density is 3.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

Table 10.1.2.3.2-1: CSI-RSRP Intra frequency relative accuracy in FR1

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot Note 2 | Io Note 1 range | | | | | | | | |
| NR operating band groups Note 4 | Minimum Io | | | | | Maximum Io | | |
| dB | dB | dB |  | dBm / SCSCSI-RS | | | dBm/BWChannel | dBm/BWChannel | |
| SCSCSI-RS = 15 kHz | SCSCSI-RS = 30 kHz | SCSCSI-RS = 60 kHz |  |  | | |
| ±2 | ±3 | ≥-3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | -115 | N/A | -50 | | |
| NR\_FDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -50 | | |
| NR\_TDD\_FR1\_C | -120 | -117 | -114 | N/A | -50 | | |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -113.5 | N/A | -50 | | |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -113 | N/A | -50 | | |
| NR\_FDD\_FR1\_F | -118.5 | -115.5 | -112.5 | N/A | -50 | | |
| NR\_FDD\_FR1\_G | -118 | -115 | -112 | N/A | -50 | | |
| NR\_FDD\_FR1\_H | -117.5 | -114.5 | -111.5 | N/A | -50 | | |
| ±3 | ±3 | ≥-6 | Note 3 | Note 3 | Note 3 | Note 3 | N/A | Note 3 | | |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter CSI-RS Ês/Iot is the minimum CSI-RS Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | | | | | |

## <End of Change 1>

## <Start of Change 2>

#### 10.1.3.3 Intra-frequency CSI-RSRP accuracy requirements

##### 10.1.3.3.1 Absolute CSI-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RSRP in this clause apply to a cell where the CSI-RS resources to be measured have the same center frequency as the CSI-RS resources indicated for measurement in the serving cell in FR2.

The accuracy requirements in Table 10.1.3.3.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each associated SSB(s).

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.8 for a corresponding Band for each relevant CSI-RS to be measured.

- The bandwidth of CSI-RS resource is 48PRB when density is 3.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.3.3.1-1: CSI-RSRP Intra frequency absolute accuracy in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 2 range | | | |
| Minimum Io | | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 1 | | dBm/BWChannel | dBm/BWChannel |
| SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |
| ±6 | ±9 | ≥-6 | Same value as CSI-RS\_RP in Table B.2.8-2, according to UE Power class, operating band and angle of arrival | | N/A | -70 |
| ±8 | ±11 | N/A | | -70 | -50 |
| Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.  Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  Note 3: In the test cases, the CSI-RS Ês/Iot and related parameters may need to be adjusted to ensure Ês/Iot at UE baseband is above the value defined in this table. | | | | | | |

##### 10.1.3.3.2 Relative CSI-RSRP Accuracy

The relative accuracy of CSI-RSRP is defined as the CSI-RSRP measured from one cell compared to the CSI-RSRP measured from another cell on the same center frequency, or between any two CSI-RSRP levels measured on the same cell in FR2.

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each associated SSB(s).

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.8 for a corresponding Band for each CSI-RS to be measured.

- The bandwidth of CSI-RS resource is 48PRB when density is 3.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.3.3.2-1: CSI-RSRP Intra frequency relative accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 2 range | | |
| Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCS CSI-RS Note 1 | | dBm/BWChannel |
| SCS CSI-RS = 60kHz | SCS CSI-RS = 120kHz |
| ±6 | ±9 | ≥-6 | Same value as CSI-RS\_RP in Table B.2.8-2, according to UE Power class, operating band and angle of arrival | | -50 |
| Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.  Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  Note 3: In the test cases, the CSI-RS Ês/Iot and related parameters may need to be adjusted to ensure Ês/Iot at UE baseband is above the value defined in this table.  Note 4: The parameter CSI-RS Ês/Iot is the minimum CSI-RS Ês/Iot of the pair of cells to which the requirement applies. | | | | | |

## <End of Change 2>

## <Start of Change 3>

#### 10.1.4.3 Inter-frequency CSI-RSRP accuracy requirements

##### 10.1.4.3.1 Absolute Accuracy of CSI-RSRP in FR1

The requirements for absolute accuracy of CSI-RSRP in this clause apply to a cell where the CSI-RS resources to be measured have the different center frequency as the CSI-RS resources indicated for measurement in the serving cell in FR1.

The accuracy requirements in Table 10.1.4.3.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band for each relevant CSI-RS to be measured.

- The bandwidth of CSI-RS resource is 48PRB when density is 3.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

Table 10.1.4.3.1-1: CSI-RSRP Inter frequency Absolute accuracy in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 1 range | | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSCSI-RS | | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSCSI-RS = 15 kHz | SCSCSI-RS = 30 kHz | SCSCSI-RS = 60 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | -115 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -70 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | -114 | N/A | -70 |
| ±4.5 | ±9 | ≥-6 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -113.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -113 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | -112.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | -112 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | -111.5 | N/A | -70 |
| ±8 | ±11 | ≥-6 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A,  NR\_FDD\_FR1\_B, NR\_TDD\_FR1\_C, NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D, NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E, NR\_FDD\_FR1\_F,  NR\_FDD\_FR1\_G, NR\_FDD\_FR1\_H | N/A | N/A | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | | |

##### 10.1.4.3.2 Relative Accuracy of CS-RSRP in FR1

The relative accuracy of CSI-RSRP in inter frequency case is defined as the CSI-RSRP measured from one cell on a frequency in FR1compared to the CSI-RSRP measured from another cell on a different frequency in FR1.

The accuracy requirements in Table 10.1.4.3.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] Clause 7.3 for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band for each relevant CSI-RS to be measured.

- The bandwidth of CSI-RS resource is 48PRB when density is 3.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

- |CSI\_RP1dBm - CSI\_RP2dBm| ≤ 27 dB

- | Channel 1\_Io ‑Channel 2\_Io | ≤ 20 dB

Table 10.1.4.3.2-1: CSI-RSRP Inter frequency relative accuracy in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot Note 2 | Io Note 1 range | | | | | |
|  |  |  | NR operating band groups Note 4 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSCSI-RS | | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSCSI-RS = 15 kHz | SCSCSI-RS = 30 kHz | SCSCSI-RS = 60 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | -114 | N/A | -50 |
| ±4.5 | ±6 | ≥-6 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -113.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -113 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | -112.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | -112 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | -111.5 | N/A | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter CSI-RS Ês/Iot is the minimum CSI-RS Ês/Iot of the pair of CSI-RS resources to which the requirement applies.  NOTE 3: Void  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | | |

## <End of Change 3>

## <Start of Change 4>

#### 10.1.5.3 Inter-frequency CSI-RSRP accuracy requirements

##### 10.1.5.3.1 Absolute CSI-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RSRP in this clause apply to a cell on a frequency in FR2 where the CSI-RS resources to be measured have the different center frequency as the CSI-RS resources indicated for measurement in the serving cell.

The accuracy requirements in Table 10.1.5.3.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant associated SSB.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band for each relevant CSI-RS to be measured.

- The bandwidth of CSI-RS resource is 48PRB when density is 3.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

**Table 10.1.5.3.1-1: CSI-RSRP Inter frequency absolute accuracy in FR2**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 2 range | | | |
|  |  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 1 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |  |
| ±6 | ±9 | ≥-4 | Same value as CSI\_RP in Table B.2.9-2, according to UE Power class, operating band and angle of arrival | | N/A | -70 |
| ±8 | ±11 |  | N/A | | -70 | -50 |
| Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.  Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  Note 3: In the test cases, the CSI-RS Ês/Iot and related parameters may need to be adjusted to ensure Ês/Iot at UE baseband is above the value defined in this table. | | | | | | |

##### 10.1.5.3.2 Relative CSI-RSRP Accuracy

The relative accuracy of CSI-RSRP in inter frequency case is defined as the CSI-RSRP measured from one cell on a frequency in FR2 compared to the CSI-RSRP measured from another cell on another frequency in FR2.

The accuracy requirements in Table 10.1.5.3.2-1 are valid under the following conditions:

- Conditions defined in 38.101-2 [19] Clause 7.3 for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant associated SSB.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band for each relevant CSI-RS to be measured.

- The bandwidth of CSI-RS resource is 48PRB when density is 3.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

- |CSI\_RP1dBm - CSI\_RP2dBm| ≤ 27dB

- | Channel 1\_Io ‑Channel 2\_Io | ≤ 20 dB

- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.5.3.2-1: CSI-RSRP Inter frequency relative accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 1 | | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |
| ±6 | ±9 | ≥-4 | Same value as CSI\_RP in Table B.2.9-2, according to UE Power class, operating band and angle of arrival | | -50 |
| Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.  Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  Note 3: In the test cases, the CSI-RS Ês/Iot and related parameters may need to be adjusted to ensure Ês/Iot at UE baseband is above the value defined in this table.  Note 4: The parameter CSI-RS Ês/Iot is the minimum CSI-RS Ês/Iot of the pair of cells to which the requirement applies. | | | | | |

## <End of Change 4>

## <Start of Change 5>

### 10.1.6 RSRP Measurement Report Mapping

The reporting range of SS-RSRP and CSI-RSRP for L3 reporting is defined from -156 dBm to -31 dBm with 1 dB resolution. The reporting range of SS-RSRP and CSI-RSRP for L1 reporting is defined from -140 to -44 dBm with 1 dB resolution.

The mapping of measured quantity is defined in Table 10.1.6.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

The reporting range of differential SS-RSRP and CSI-RSRP for L1 reporting and L3 reporting is defined from 0 dB to -30 dB with 2 dB resolution.

The mapping of measured quantity is defined in Table 10.1.6.1-2. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.6.1-1: SS-RSRP and CSI-RSRP measurement report mapping

|  |  |  |  |
| --- | --- | --- | --- |
| Reported value | Measured quantity value (L3 SS-RSRP and CSI-RSRP) | Measured quantity value (L1 SS-RSRP and CSI-RSRP) | Unit |
| RSRP\_0 | RSRP<-156 | Not valid | dBm |
| RSRP\_1 | -156≤RSRP<-155 | Not valid | dBm |
| RSRP\_2 | -155≤RSRP<-154 | Not valid | dBm |
| RSRP\_3 | -154≤RSRP<-153 | Not valid | dBm |
| RSRP\_4 | -153≤RSRP<-152 | Not valid | dBm |
| RSRP\_5 | -152≤RSRP<-151 | Not valid | dBm |
| RSRP\_6 | -151≤RSRP<-150 | Not valid | dBm |
| RSRP\_7 | -150≤RSRP<-149 | Not valid | dBm |
| RSRP\_8 | -149≤RSRP<-148 | Not valid | dBm |
| RSRP\_9 | -148≤RSRP<-147 | Not valid | dBm |
| RSRP\_10 | -147≤RSRP<-146 | Not valid | dBm |
| RSRP\_11 | -146≤RSRP<-145 | Not valid | dBm |
| RSRP\_12 | -145≤RSRP<-144 | Not valid | dBm |
| RSRP\_13 | -144≤RSRP<-143 | Not valid | dBm |
| RSRP\_14 | -143≤RSRP<-142 | Not valid | dBm |
| RSRP\_15 | -142≤RSRP<-141 | Not valid | dBm |
| RSRP\_16 | -141≤RSRP<-140 | RSRP<-140 | dBm |
| RSRP\_17 | -140≤RSRP<-139 | -140≤RSRP<-139 | dBm |
| RSRP\_18 | -139≤RSRP<-138 | -139≤ RSRP<-138 | dBm |
| … | … |  | … |
| RSRP\_111 | -46≤RSRP<-45 | -46≤ RSRP<-45 | dBm |
| RSRP\_112 | -45≤RSRP<-44 | -45≤ RSRP<-44 | dBm |
| RSRP\_113 | -44≤RSRP<-43 | -44≤ RSRP | dBm |
| RSRP\_114 | -43≤RSRP<-42 | Not valid | dBm |
| RSRP\_115 | -42≤RSRP<-41 | Not valid | dBm |
| RSRP\_116 | -41≤RSRP<-40 | Not valid | dBm |
| RSRP\_117 | -40≤RSRP<-39 | Not valid | dBm |
| RSRP\_118 | -39≤RSRP<-38 | Not valid | dBm |
| RSRP\_119 | -38≤RSRP<-37 | Not valid | dBm |
| RSRP\_120 | -37≤RSRP<-36 | Not valid | dBm |
| RSRP\_121 | -36≤RSRP<-35 | Not valid | dBm |
| RSRP\_122 | -35≤RSRP<-34 | Not valid | dBm |
| RSRP\_123 | -34≤ RSRP<-33 | Not valid | dBm |
| RSRP\_124 | -33≤RSRP<-32 | Not valid | dBm |
| RSRP\_125 | -32≤RSRP<-31 | Not valid | dBm |
| RSRP\_126 | -31≤RSRP | Not valid | dBm |
| RSRP\_127 (Note) | Infinity | Infinity | dBm |
| Note: The value of RSRP\_127 is applicable for RSRP threshold configured by the network as defined in TS 38.331 [2], but not for the purpose of measurement reporting. | | | |

Table 10.1.6.1-2: Differential SS-RSRP and CSI-RSRP measurement (for L1 reporting and L3 reporting) report mapping

|  |  |  |
| --- | --- | --- |
| Reported value | Measured quantity value (difference in measured RSRP from strongest RSRP) | Unit |
| DIFFRSRP\_0 | 0≥ΔRSRP>-2 | dB |
| DIFFRSRP\_1 | -2≥ΔRSRP>-4 | dB |
| DIFFRSRP\_2 | -4≥ΔRSRP>-6 | dB |
| DIFFRSRP\_3 | -6≥ΔRSRP>-8 | dB |
| DIFFRSRP\_4 | -8≥ΔRSRP>-10 | dB |
| DIFFRSRP\_5 | -10≥ΔRSRP>-12 | dB |
| DIFFRSRP\_6 | -12≥ΔRSRP>-14 | dB |
| DIFFRSRP\_7 | -14≥ΔRSRP>-16 | dB |
| DIFFRSRP\_8 | -16≥ΔRSRP>-18 | dB |
| DIFFRSRP\_9 | -18≥ΔRSRP>-20 | dB |
| DIFFRSRP\_10 | -20≥ΔRSRP>-22 | dB |
| DIFFRSRP\_11 | -22≥ΔRSRP>-24 | dB |
| DIFFRSRP\_12 | -24≥ΔRSRP>-26 | dB |
| DIFFRSRP\_13 | -26≥ΔRSRP>-28 | dB |
| DIFFRSRP\_14 | -28≥ΔRSRP>-30 | dB |
| DIFFRSRP\_15 | -30≥ΔRSRP | dB |

## <End of Change 5>

## <Start of Change 6>

#### 10.1.7.2 Intra-frequency CSI-RSRQ accuracy requirements

##### 10.1.7.2.1 Absolute CSI-RSRQ Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RSRQ in this clause apply to the intra-frequency measurement defined in 9.10.2.1 in FR1.

The accuracy requirements in Table 10.1.7.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for associated SSB.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.8 for a corresponding Band for each relevant CSI-RS.

- The configuration of CSI-RS resource is {D=3 with PRB≥48}.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

**Table 10.1.7.2.1-1: CSI-RSRQ Intra frequency absolute accuracy in FR1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 1 range | | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSCSI-RS | | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSCSI-RS = 15 kHz | SCSCSI-RS = 30 kHz | SCSCSI-RS = 60 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | -114 | N/A | -50 |
| ±2.5 | ±4 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -113.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -113 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | -112.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | -112 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | -111.5 | N/A | -50 |
| ±3.5 | ±4 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | | |

## <End of Change 6>

## <Start of Change 7>

#### 10.1.8.2 Intra-frequency CSI-RSRQ accuracy requirements

##### 10.1.8.2.1 Absolute CSI-RSRQ Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RSRQ in this clause apply to the intra-frequency measurement defined in 9.10.2.1 in FR2.

The accuracy requirements in Table 10.1.8.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.8 for a corresponding Band for each relevant CSI-RS.

- The configuration of CSI-RS resource is {D=3 with PRB≥48}.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.8.2.1-1: CSI-RSRQ Intra frequency absolute accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 1 | | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |
| ±2.5 | ±4 | ≥-3 | Same value as CSI\_RP in Table B.2.8-2, according to UE Power class, operating band and angle of arrival | | -50 |
| ±3.5 | ±4 | ≥-6 |  | |  |
| Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.  Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  Note 3: In the test cases, the CSI-RS Ês/Iot and related parameters may need to be adjusted to ensure Ês/Iot at UE baseband is above the value defined in this table. | | | | | |

## <End of Change 7>

## <Start of Change 8>

#### 10.1.9.2 Inter-frequency CSI-RSRQ accuracy requirements

##### 10.1.9.2.1 Absolute CSI-RSRQ Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RSRQ in this clause apply to the inter-frequency measurement defined in 9.10.3.1 in FR1.

The accuracy requirements in Table 10.1.9.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for associated SSB.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band for each relevant CSI-RS.

- The configuration of CSI-RS resource is {D=3 with PRB≥48}.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

Table 10.1.9.2.1-1: CSI-RSRQ Inter frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 1 range | | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSCSI-RS | | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSCSI-RS = 15 kHz | **SCSCSI-RS = 30 kHz** | **SCSCSI-RS = 60 kHz** |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | -114 | N/A | -50 |
| ±2.5 | ±4 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -113.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -113 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | -112.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | -112 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | -111.5 | N/A | -50 |
| ±3.5 | ±4 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | | |

##### 10.1.9.2.2 Relative CSI-RSRQ Accuracy

The relative accuracy of CSI-RSRQ is defined as the CSI-RSRQ measured from one cell compared to the CSI-RSRQ measured from another cell with the same center frequency, or between any two CSI-RSRQ levels measured on the same cell in FR1.

The accuracy requirements in Table 10.1.9.2.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for the associated SSB.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band for each relevant CSI-RS.

- The configuration of CSI-RS resource is {D=3 with PRB≥48}.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

Table 10.1.9.2.2-1: CSI-RSRQ Inter frequency relative accuracy in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 1 range | | | | | |
|  |  | Note 2 | NR operating band groups Note 4 | Minimum Io | | | | Maximum Io |
| **dB** | **dB** | **dB** |  | **dBm / SCSCSI-RS** | | | **dBm/BWChannel** | **dBm/BWChannel** |
|  |  |  |  | **SCSCSI-RS = 15 kHz** | **SCSCSI-RS = 30 kHz** | **SCSCSI-RS = 60 kHz** |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | -114 | N/A | -50 |
| ±3 | ±4 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -113.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -113 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | -112.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | -112 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | -111.5 | N/A | -50 |
| ±4 | ±4 | ≥-6 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter CSI-RS Ês/Iot is the minimum CSI-RS Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | | |

## <End of Change 8>

## <Start of Change 9>

#### 10.1.10.2 Inter-frequency CSI-RSRQ accuracy requirements

##### 10.1.10.2.1 Absolute CSI-RSRQ Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RSRQ in this clause apply the inter-frequency measurement defined in 9.10.3.1 in FR2.

The accuracy requirements in Table 10.1.10.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for associated SSB.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band for each relevant CSI-RS.

- The configuration of CSI-RS resource is {D=3 with PRB≥48}.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

Table 10.1.10.2.1-1: CSI-RSRQ Inter frequency absolute accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 1 | | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |
| ±2.5 | ±4 | ≥-3 | Same value as CSI\_RP in Table B.2.9-2, according to UE Power class, operating band and angle of arrival | | -50 |
| ±3.5 | ±4 | ≥-4 |  | |  |
| Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.  Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  Note 3: In the test cases, the CSI-RS Ês/Iot and related parameters may need to be adjusted to ensure Ês/Iot at UE baseband is above the value defined in this table. | | | | | |

##### 10.1.10.2.2 Relative CSI-RSRQ Accuracy

The relative accuracy of CSI-RSRQ is defined as the CSI-RSRQ measured from one cell compared to the CSI-RSRQ measured from another cell with the same center frequency, or between any two CSI-RSRQ levels measured on the same cell in FR2.

The accuracy requirements in Table 10.1.10.2.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for the associated SSB.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band for each relevant CSI-RS.

- The configuration of CSI-RS resource is {D=3 with PRB≥48}.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

Table 10.1.10.2.2-1: CSI-RSRQ Inter frequency relative accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 1 | | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |
| ±3 | ±4 | ≥-3 | Same value as CSI\_RP in Table B.2.9-2, according to UE Power class, operating band and angle of arrival | | -50 |
| ±4 | ±4 | ≥-4 |  | |  |
| Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.  Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  Note 3: The parameter CSI-RS Ês/Iot is the minimum CSI-RS Ês/Iot of the pair of cells to which the requirement applies.  Note 4: In the test cases, the CSI-RS Ês/Iot and related parameters may need to be adjusted to ensure Ês/Iot at UE baseband is above the value defined in this table. | | | | | |

## <End of Change 9>

## <Start of Change 10>

### 10.1.11 RSRQ report mapping

10.1.11.1 SS-RSRQ and CSI-RSRQ measurement report mapping

The reporting range of SS-RSRQ and CSI-RSRQ measurement is defined from -43 dB to 20 dB with 0.5 dB resolution. The mapping of measured quantity is defined in Table 10.1.11.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.11.1-1: SS-RSRQ and CSI-RSRQ measurement report mapping

|  |  |  |
| --- | --- | --- |
| Reported value | Measured quantity value | Unit |
| RSRQ\_0 | RSRQ<-43 | dB |
| RSRQ\_1 | -43≤RSRQ<-42.5 | dB |
| RSRQ\_2 | -42.5≤RSRQ<-42 | dB |
| RSRQ\_3 | -42≤RSRQ<-41.5 | dB |
| RSRQ\_4 | -41.5≤RSRQ<-41 | dB |
| .. | .. | … |
| RSRQ\_122 | 17.5≤RSRQ<18 | dB |
| RSRQ\_123 | 18≤RSRQ<18.5 | dB |
| RSRQ\_124 | 18.5≤RSRQ<19 | dB |
| RSRQ\_125 | 19≤RSRQ<19.5 | dB |
| RSRQ\_126 | 19.5≤RSRQ<20 | dB |
| RSRQ\_127 | 20 ≤RSRQ | dB |



## <End of Change 10>

## <Start of Change 11>

10.1.12.2 Intra-frequency CSI-SINR accuracy requirements in FR1

10.1.12.2.1 Absolute CSI-SINR Accuracy in FR1

Unless otherwise specified, the requirements for absolute accuracy of CSI-SINR in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 10.1.12.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.8 for a corresponding Band.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than [0.5]\*CP

- The bandwidth of the CSI-RS resource is no less than 48 PRBs

- The resource density of the CSI-RS resource in frequency domain D=3

Table 10.1.12.2.1-1: CSI-SINR Intra frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | | **Conditions** | | | | | | |
| **Normal condition** | **Extreme condition** | **CSI-RS Ês/Iot** | **Io Note 1 range** | | | | | |
| **NR operating band groups** | **Minimum Io** | | | | **Maximum Io** |
| **dB** | **dB** | **dB** |  | **dBm / SCS** | | | **dBm/BW Channel** | **dBm/BW Channel** |
| **SCS (kHz)** | | |
| ±3 | ±4 | ≥-3 | **15** | **30** | **60** |
| NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | -115 | N/A | -70 |
| NR\_FDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -70 |
| NR\_TDD\_FR1\_C | -120 | -117 | -114 | N/A | -70 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -113.5 | N/A | -70 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -113 | N/A | -70 |
| NR\_FDD\_FR1\_F | -118.5 | -115.5 | -112.5 | N/A | -70 |
| NR\_FDD\_FR1\_G | -118 | -115 | -112 | N/A | -70 |
| NR\_FDD\_FR1\_H | -117.5 | -114.5 | -111.5 | N/A | -70 |
| ±3.5 | ±4 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | N/A | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 4: The requirements apply for CSI-RS Ês/Iot ≤ 15 dB. | | | | | | | | |

## <End of Change 11>

## <Start of Change 12>

10.1.13.2 Intra-frequency CSI-SINR accuracy requirements in FR2

10.1.13.2.1 Absolute CSI-SINR Accuracy in FR2

Unless otherwise specified, the requirements for absolute accuracy of CSI-SINR in this clause apply to a cell on the same frequency as that of the serving cell in FR2.

The accuracy requirements in Table 10.1.13.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.8 for a corresponding Band.

- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than [0.5]\*CP

- The bandwidth of the CSI-RS resource is no less than 48 PRBs

- The resource density of the CSI-RS resource in frequency domain D=3

Table 10.1.13.2.1-1: CSI-SINR Intra frequency absolute accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 1 | | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |
| ±3 | ±4 | ≥-3 | Same value as CSI\_RP in Table B.2.8-2, according to UE Power class, operating band and angle of arrival | | -50 |
| ±3.5 | ±4 | ≥-6 |
| Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.  Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  Note 3: In the test cases, the CSI-RS Ês/Iot and related parameters may need to be adjusted to ensure Ês/Iot at UE baseband is above the value defined in this table.  Note 4: The requirements apply for CSI-RS Ês/Iot ≤ 15 dB. | | | | | |

## <End of Change 12>

## <Start of Change 13>

10.1.14.2 Inter-frequency CSI-SINR accuracy requirements in FR1

10.1.14.2.1 Aboslute Accuracy of CSI-SINR in FR1

The requirements for absolute accuracy of CSI-SINR in this clause apply to a cell on a frequency in FR1 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.14.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band.

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than [0.5]\*CP

- The bandwidth of the CSI-RS resource is no less than 48 PRBs

- The resource density of the CSI-RS resource in frequency domain D=3

Table 10.1.14.2.1-1: CSI-SINR Inter frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | | **Conditions** | | | | | | |
| **Normal condition** | **Extreme condition** | **CSI-RS Ês/Iot** | **Io Note 1 range** | | | | | |
| **NR operating band groups** | **Minimum Io** | | | | **Maximum Io** |
| **dB** | **dB** | **dB** |  | **dBm / SCS** | | | **dBm/BW Channel** | **dBm/BW Channel** |
| **SCS (kHz)** | | |
| ±3 | ±4 | ≥-3 | **15** | **30** | **60** |
| NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | -115 | N/A | -70 |
| NR\_FDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -70 |
| NR\_TDD\_FR1\_C | -120 | -117 | -114 | N/A | -70 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -113.5 | N/A | -70 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -113 | N/A | -70 |
| NR\_FDD\_FR1\_F | -118.5 | -115.5 | -112.5 | N/A | -70 |
| NR\_FDD\_FR1\_G | -118 | -115 | -112 | N/A | -70 |
| NR\_FDD\_FR1\_H | -117.5 | -114.5 | -111.5 | N/A | -70 |
| ±3.5 | ±4 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | N/A | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 4: The requirements apply for CSI-RS Ês/Iot ≤ 15 dB. | | | | | | | | |

10.1.14.2.2 Relative Accuracy of CSI-SINR in FR1

The relative accuracy of CSI-SINR in inter frequency case is defined as the CSI-SINR measured from one cell on a frequency in FR1 compared to the CSI-SINR measured from another cell on a different frequency in FR1.

The accuracy requirements in Table 10.1.14.2.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band.

- |CSI\_RP1dBm - CSI\_RP2dBm| ≤ 27 dB

- | Channel 1\_Io ‑Channel 2\_Io | ≤ 20 dB

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than [0.5]\*CP

- The bandwidth of the CSI-RS resource is no less than 48 PRBs

- The resource density of the CSI-RS resource in frequency domain D=3

Table 10.1.14.2.2-1: CSI-SINR Inter frequency relative accuracy in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | | **Conditions** | | | | | | |
| **Normal condition** | **Extreme condition** | **CSI-RS Ês/Iot****Note 3** | **Io Note 1 range** | | | | | |
| **NR operating band groups** | **Minimum Io** | | | | **Maximum Io** |
| **dB** | **dB** | **dB** |  | **dBm / SCS** | | | **dBm/BW Channel** | **dBm/BW Channel** |
| **SCS (kHz)** | | |
| ±3.5 | ±4 | ≥-3 | **15** | **30** | **60** |
| NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | -115 | N/A | -70 |
| NR\_FDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -70 |
| NR\_TDD\_FR1\_C | -120 | -117 | -114 | N/A | -70 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -113.5 | N/A | -70 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -113 | N/A | -70 |
| NR\_FDD\_FR1\_F | -118.5 | -115.5 | -112.5 | N/A | -70 |
| NR\_FDD\_FR1\_G | -118 | -115 | -112 | N/A | -70 |
| NR\_FDD\_FR1\_H | -117.5 | -114.5 | -111.5 | N/A | -70 |
| ±4 | ±4 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | N/A | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: The parameter CSI-RS Ês/Iot is the minimum CSI-RS Ês/Iot of the pair of cells to which the requirement applies.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: The requirements apply for CSI-RS Ês/Iot ≤ 15 dB. | | | | | | | | |

## <End of Change 13>

## <Start of Change 14>

10.1.15.2 Inter-frequency CSI-SINR accuracy requirements in FR2

10.1.15.2.1 Aboslute Accuracy of CSI-SINR in FR2

The requirements for absolute accuracy of CSI-SINR in this clause apply to a cell on a frequency in FR2 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.15.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band.

- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than [0.5]\*CP

- The bandwidth of the CSI-RS resource is no less than 48 PRBs

- The resource density of the CSI-RS resource in frequency domain D=3

Table 10.1.15.2.1-1: CSI-SINR Inter frequency absolute accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 1 | | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |
| ±3 | ±4 | ≥-3 | Same value as CSI\_RP in Table B.2.9-2, according to UE Power class, operating band and angle of arrival | | -50 |
| 3.5 | ±4 | ≥-4 |
| Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.  Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  Note 3: In the test cases, the CSI-RS Ês/Iot and related parameters may need to be adjusted to ensure Ês/Iot at UE baseband is above the value defined in this table.  Note 4: The requirements apply for CSI-RS Ês/Iot ≤ 15 dB. | | | | | |

10.1.15.2.2 Relative Accuracy of CSI-SINR in FR2

The relative accuracy of CSI-SINR in inter frequency case is defined as the CSI-SINR measured from one cell on a frequency in FR2 compared to the CSI-SINR measured from another cell on a different frequency in FR2.

The accuracy requirements in Table 10.1.15.2.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.y for a corresponding Band.

- |CSI\_RP1dBm - CSI\_RP2dBm| ≤ 27 dB

- | Channel 1\_Io ‑Channel 2\_Io | ≤ 20 dB

- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than [0.5]\*CP

- The bandwidth of the CSI-RS resource is no less than 48 PRBs

- The resource density of the CSI-RS resource in frequency domain D=3

Table 10.1.15.2.2-1: CSI-SINR Inter frequency relative accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 1 | | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |
| ±3.5 | ±4 | ≥-3 | Same value as CSI\_RP in Table B.2.9-2, according to UE Power class, operating band and angle of arrival | | -50 |
| ±4 | ±4 | ≥-6 |
| Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.  Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  Note 3: In the test cases, the CSI-RS Ês/Iot and related parameters may need to be adjusted to ensure Ês/Iot at UE baseband is above the value defined in this table.  Note 4: The requirements apply for CSI-RS Ês/Iot ≤ 15 dB. | | | | | |

## <End of Change 14>

## <Start of Change 15>

### 10.1.16 SINR report mapping

10.1.16.1 SS-SINR and CSI-SINR measurement report mapping

The reporting range of SS-SINR and CSI-SINR for L3 reporting and L1 reporing is defined from -23 dB to 40 dB with 0.5 dB resolution. The mapping of measured quantity is defined in Table 10.1.16.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

The reporting range of differential SS-SINR and CSI-SINR for L1 reporting and L3 reporting is defined from -15 dB to 0 dB with 1 dB resolution.

The mapping of measured quantity is defined in Table 10.1.16.1-2. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.16.1-1: SS-SINR and CSI-SINR measurement report mapping

|  |  |  |  |
| --- | --- | --- | --- |
| Reported value | Measured quantity value (L3 SS-SINR and L3 CSI-SINR) | Measured quantity value (L1 SS-SINR and L1 CSI-SINR) | Unit |
| SINR\_0 | SINR<-23 | SINR<-23 | dB |
| SINR\_1 | -23≤SINR<-22.5 | -23≤SINR<-22.5 | dB |
| SINR\_2 | -22.5≤SINR<-22 | -22.5≤SINR<-22 | dB |
| SINR\_3 | -22≤SINR<-21.5 | -22≤SINR<-21.5 | dB |
| SINR\_4 | -21.5≤SINR<-21 | -21.5≤SINR<-21 | dB |
| .. | .. | .. | … |
| SINR\_123 | 38≤SINR<38.5 | 38≤SINR<38.5 | dB |
| SINR\_124 | 38.5≤SINR<39 | 38.5≤SINR<39 | dB |
| SINR\_125 | 39≤SINR<39.5 | 39≤SINR<39.5 | dB |
| SINR\_126 | 39.5≤SINR<40 | 39.5≤SINR<40 | dB |
| SINR\_127 | 40≤SINR | 40≤SINR | dB |

Table 10.1.16.1-2: Differential SS-SINR and CSI-SINR measurement (for L1 reporting and L3 reporting) report mapping

|  |  |  |
| --- | --- | --- |
| Reported value | Measured quantity value (difference in measured SINR from largest SINR) | Unit |
| DIFFSINR\_0 | 0≥ΔSINR>-1 | dB |
| DIFFSINR\_1 | -1≥ΔSINR>-2 | dB |
| DIFFSINR\_2 | -2≥ΔSINR>-3 | dB |
| DIFFSINR\_3 | -3≥ΔSINR>-4 | dB |
| DIFFSINR\_4 | -4≥ΔSINR>-5 | dB |
| DIFFSINR\_5 | -5≥ΔSINR>-6 | dB |
| DIFFSINR\_6 | -6≥ΔSINR>-7 | dB |
| DIFFSINR\_7 | -7≥ΔSINR>-8 | dB |
| DIFFSINR\_8 | -8≥ΔSINR>-9 | dB |
| DIFFSINR\_9 | -9≥ΔSINR>-10 | dB |
| DIFFSINR\_10 | -10≥ΔSINR>-11 | dB |
| DIFFSINR\_11 | -11≥ΔSINR>-12 | dB |
| DIFFSINR\_12 | -12≥ΔSINR>-13 | dB |
| DIFFSINR\_13 | -13≥ΔSINR>-14 | dB |
| DIFFSINR\_14 | -14≥ΔSINR>-15 | dB |
| DIFFSINR\_15 | -15≥ΔSINR | dB |

## <End of Change 15>

<Start of Change #16>

A.3 RRM test configurations

## A.3.25 CSI-RS configurations for RRM

### A.3.25.1 FDD

**Table A.3.25.1-1: 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.3.25.2 TDD

**Table A.3.25.2-1: 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.3.25.2-2: 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.3.25.2-3: 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 #16>

<Start of Change #17>

## A.4.6 Measurement procedure

A.4.6.6 CSI-RS based intra-frequency Measurement

A.4.6.6.1 EN-DC event triggered reporting tests without gap under DRX

A.4.6.6.1.1 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 CSI-RS based L3 intra-frequency requirements in clause 9.10.2.

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.4.6.6.1.1-1, A.4.6.6.1.1-2, A.4.6.6.1.1-3 and A.4.6.6.1.1-4 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 be able to acquire the timing information of cell 3 and detect associatedSSB.

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.4.6.6.1.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB and CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB and 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 Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2 | |

**Table A.4.6.6.1.1-2: 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** |  |
| 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 |  |
| 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.5 |  |
| Time offset between PCell and PSCell | μs | 1, 2, 3, 4, 5, 6 | 3 | Synchronous EN-DC |
| Time offset between serving and neighbour cells | μs | 1, 4 | 4.7 | Asynchronous cells.  The timing of Cell 3 is CP later than the timing of Cell 2. |
|  | 2, 5 | 4.7 | Synchronous cells |
|  | 3, 6 | 2.35 | Synchronous cells |
| T1 | s | 1, 2, 3, 4, 5, 6 | 5 |  |
| T2 | s | 1, 2, 3, 4, 5, 6 | 7 |  |

**Table A.4.6.6.1.1-3: 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 | |
| SSB parameters |  | 1,4 | SSB.1 FR1 | | SSB.5 FR1 | |
| 2,5 | SSB.1 FR1 | | SSB.5 FR1 | |
| 3,6 | SSB.2 FR1 | | SSB.6 FR1 | |
| CSI-RS configuration for RRM |  | 1,4 | CSI-RS.RRM.FR1.1 FDD | | | |
| 2,5 | CSI-RS.RRM.FR1.1 TDD | | | |
| 3,6 | CSI-RS.RRM.FR1.2 TDD | | | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1,2,4,5 | -98 | | | |
| 3, 6 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 2, 3, 4, 5, 6 | -98 | | | |
| for SSB | dB | 1, 2, 3, 4, 5, 6 | -1.46 | -1.46 | -1.46 | -1.46 |
| for CSI-RS | dB | 1, 2, 3, 4, 5, 6 | 4 | -1.46 | -Infinity | -1.46 |
| for SSB | dB | 1, 2, 3, 4, 5, 6 | 4 | 4 | 4 | 4 |
| for CSI-RS | dB | 1, 2, 3, 4, 5, 6 | 4 | 4 | -Infinity | 4 |
| 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.4.6.6.1.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 4800 ms from the beginning of time period T2. The UE is not 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.4.6.7 CSI-RS based inter-frequency Measurement

A.4.6.7.1 EN-DC event triggered reporting tests for FR1 cell when non-DRX is used

A.4.6.7.1.1 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.4.6.7.1.1-1, A.4.6.7.1.1-2, and A.4.6.7.1.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.4.6.7.1.1-2 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.4.6.7.1.1-1.

**Table A.4.6.7.1.1-1: EN-DC event triggered reporting tests with SSB index reading for FR1-FR1**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB and CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB and 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.4.6.7.1.1-2: General test parameters for EN-DC inter-frequency event triggered reporting**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Value** | | **Comment** |
|  |  | **configuration** | **Test 1** | **Test 2** |  |
| 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 are 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 | μs | Config 1,2,3,4,5,6 | 3 | | Synchronous EN-DC |
| Time offset between serving and neighbour cells | μs | Config 1,4 | 4.7 | | Asynchronous cells.  The timing of Cell 3 is CP later than the timing of Cell 2. |
| Config 2,5 | 4.7 | | Synchronous EN-DC |
| Config 3,6 | 2.35 | | Synchronous EN-DC |
| T1 | s | Config 1,2,3,4,5,6 | 5 | |  |
| T2 | s | Config 1,2,3,4,5,6 | 1.1 | 1.1 |  |

**Table A.4.6.7.1.1-3: 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 | SR.2.1 TDD | |  | |
| CORESET Reference |  | Config 1,4 | CR.1.1 FDD | | - | |
| Channel |  | Config 2,5 | CR.1.1 TDD | |  | |
|  |  | Config 3,6 | CR.2.1 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 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 | 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.4.6.7.1.2 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 [1040] 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 [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 1 and 2 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 #17>

<Start of Change #18>

A.4.7.7 CSI-RSRP

A.4.7.7.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.7.1.1 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 intra-frequency CSI-RS based L3 measurements.

A.4.7.7.1.2 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.4.7.7.1.2-1. Both absolute and relative accuracy of CSI-RSRP intra-frequency measurements are tested by using the parameters in A.4.7.7.1.2-2. 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.4.7.7.1.2-1: CSI-RSRP Intra frequency CSI-RSRP supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30kHz SSB and CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, 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 for each supported band | |

**Table A.4.7.7.1.2-2: 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 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 | | | | | | | | | | | |
| Time offset with Cell 2 | | | | Config 1,2,4,5 | μs | - | | | 4.7 | | | - | 4.7 | | - | | 4.7 |
|  | | | | Config 3,6 | μs | - | | | 2.35 | | | - | 2.35 | | - | | 2.35 |
| 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.4.7.7.1.3 Test Requirements

The CSI-RSRP measurement accuracy for cell 2 and cell 3 shall fulfill absolute requirement in clause 10.1.2.3.1 and relative requirement in clause 10.1.2.3.2.

A.4.7.7.2 EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.7.2.1 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 inter-frequency measurements with the testing configurations in Table A.4.7.7.2.1-1.

**Table A.4.7.7.2.1-1: Applicable NR configurations for FR1 inter-frequency CSI-RSRP accuracy test**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB and CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, 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 on each supported band | |

A.4.7.7.2.2 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.4.7.7.2.2-1 below. Both absolute and relative accuracy of CSI-RSRP inter-frequency measurements are tested by using the parameters in Table A.4.7.7.2.2-1. The inter-frequency measurements are supported by a measurement gap.

**Table A.4.7.7.2.2-1: 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 RRM | | 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 | | 1,2,4,5 | μs | - | 4.7 | | | - | 4.7 | | |
|  | | 3,6 | μs | - | 2.35 | | | - | 2.35 | | |
| 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.4.7.7.2.3 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.4.7.8 CSI-RSRQ

A.4.7.8.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.8.1.1 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.4.7.8.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.4.7.8.1.2-1. The absolute accuracy of CSI-RSRQ intra-frequency measurement is test by using the parameters in Table A.4.7.8.1.2-2. 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.4.7.8.1.2-1: CSI-RSRQ Intra frequency CSI-RSRQ supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30kHz SSB and CSI-RS SCS, 40MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30kHz SSB and 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.4.7.8.1.2-2: 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 |  | | 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 | |  |
| 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 1,2,4,5 | μs | - | | 4.7 | - | | 4.7 | | - | 4.7 |
| Cell 2 | | Config 3,6 | μs | - | | 2.35 | - | | 2.35 | | - | 2.35 |
| 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.4.7.8.1.3 Test Requirements

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

A.4.7.8.2 EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.8.2.1 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.4.7.8.2.2 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.4.7.8.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-RSRQ inter-frequency measurement are tested by using test parameters in Table A.4.7.8.2.2-2. 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.4.7.8.2.2-1: CSI-RSRQ Inter frequency CSI-RSRQ supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30kHz SSB and CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, 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 | |

**Table A.4.7.8.2.2-2: 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 1,2,4,5 | μs | - | 4.7 | - | 4.7 | - | 4.7 |
|  | | Config 3,6 | μs | - | 2.35 | - | 2.35 | - | 2.35 |
| 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 | | | | | |
| 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.4.7.9 CSI-SINR

A.4.7.9.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.9.1.1 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.

A.4.7.9.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.4.7.9.1.2-1. The absolute accuracy of CSI-SINR intra-frequency measurement is tested by using the parameters in Table A.4.7.9.1.2-2. 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.4.7.9.1.2-1: CSI-SINR Intra frequency CSI-SINR supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB and CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, 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 | |

**Table A.4.7.9.1.2-2: 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 |  | SR.2.1 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 1,2,4,5 | μs | 2.35 | 2.35 | | 2.35 | 2.35 | |
|  | | | | Config 3.6 | μs | 1.17 | 1.17 | | 1.17 | 1.17 | |
| 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.4.7.9.1.3 Test Requirements

The CSI-SINR measurement accuracy shall fulfil the requirements in clause 10.1.12.

A.4.7.9.2 EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.9.2.1 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 10.1.14.2.1 and 10.1.14.2.2 for inter-frequency measurement.

A.4.7.9.2.2 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.4.7.9.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-SINR inter-frequency measurement are tested by using test parameters in Table A.4.7.9.2.2-2. 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.4.7.9.2.2-1: CSI-SINR Inter frequency CSI-SINR supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB and CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, 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 | |

**Table A.4.7.9.2.2-1: 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 1,2,4,5 | μs | - | | 2.35 | | - | | 2.35 | | - | | 2.35 |
|  | | | Config 3,6 | μs | - | | 1.17 | | - | | 1.17 | | - | | 1.17 |
| 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.4.7.9.2.3 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 #18>

<Start of Change #19>

## A.5.6 Measurement procedure

A.5.6.4 CSI-RS based Intra-frequency Measurements

A.5.6.4.1 EN-DC event triggered reporting test without gap under non-DRX

A.5.6.4.1.1 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 intra-frequency cell identification requirements in clause e. Supported test configurations are shown in table A.5.6.4.1.1-1.

**Table 5.6.4.1.1-1: 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 |
| 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.5.6.4.1.1-2, A.5.6.4.1.1-3 and A.5.6.4.1.1-4 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.5.6.4.1.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with PSCell in FR2 without gap without DRX**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Value** | **Comment** |
| Active cell |  | 1,2 | E-UTRAN PCell (Cell 1)  PSCell (Cell 2) |  |
| Neighbour cell |  | 1,2 | Cell 3 | Cell to be identified. |
| RF Channel Number |  | 1,2 | 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 |  | 1,2 | SMTC.1 |  |
| 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 | OFF |  |
| Time offset between Cell 1 and Cell 2 | μs | 1,2 | 3 | Synchronous EN-DC |
| Time offset between Cell 2 and Cell 3 | μs | 1,2 | 0.58 | Synchronous cells |
| T1 | s | 1,2 | 5 |  |
| T2 | s | 1,2 | 5 |  |

**Table A.5.6.4.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with PSCell in FR2 without gap without DRX**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 2** | | **Cell 3** | |
|  |  |  | **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 | |
| OCNG Patterns |  | 1,2 | OP.1 | | OP.1 | |
| TRS configuration |  | 1,2 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI state |  | 1,2 | TCI.State.2 | | N/A | |
| SSB configuration |  | 1, 2 | SSB.3 FR2 | | SSB.3 FR2 | |
| CSI-RS RRM configuration |  | 1,2 | CSI-RS.RRM.FR2.1 TDD | | CSI-RS.RRM.FR2.1 TDD | |
|  |  |  |  | |  | |
| Propagation Condition |  | 1,2 | AWGN | | | |

**Table A.5.6.4.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with PSCell in FR2 without gap without DRX**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 2** | | **Cell 3** | |
|  |  |  | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | 1,2 | Setup 3 defined in A.3.15.3 | | | |
|  |  |  | **AoA1** | | **AoA2** | |
| Assumption for UE beamsNote 4 |  | 1,2 | Rough | | Rough | |
|  | dB | 1,2 | 4 | 4 | -Infinity | 8 |
| Note 2 | dBm/15 KHz | 1,2 | -102 | | | |
| Note 2 | dBm/SCS | 1, 2 | -93 | | | |
| SS-RSRP | dBm/SCS | 1, 2 | -89 | -89 | -Infinity | -85 |
| CSI-RSRP | dBm/SCS | 1, 2 | -89 | -89 | -Infinity | -85 |
|  | dB | 1,2 | 4 | 4 | -Infinity | 8 |
|  | dBm/95.04MHz | 1,2 | -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.5.6.4.1.2 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

- 3.2s for a UE supporting power class 1,

- 2.16s 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 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.5.6.5 CSI-RS based Inter-frequency Measurements

A.5.6.5.1 EN-DC event triggered reporting tests for NR FR2 cell when DRX is used

A.5.6.5.1.1 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. 5.6.5.1.1-1, A. 5.6.5.1.1-2, and A. 5.6.5.1.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A. 5.6.5.1.1-2 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. 5.6.5.1.1-2 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 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. 5.6.5.1.1-1.

**Table A.** **5.6.5.1.1-1 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.** **5.6.5.1.1-2: 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 3** |  |
| 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 | μs | Config 1,2 | 3 | | Synchronous EN-DC |
| Time offset between serving and neighbour cells | μs | Config 1,2 | 0.58 | | Synchronous cells |
| T1 | s | Config 1,2 | 5 | |  |
| T2 | s | Config 1,2 | 11 for PC1; 6.5 for other PC | 11 for PC1; 6.5 for other PC |  |

**Table A. 5.6.5.1.1-3: 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.5.6.5.1.2 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

10080ms for UE supporting power class 1, or

6240ms for UE supporting other power class.

In test 1, and 2 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 #19>

<Start of Change #20>

A.5.7 Measurement Performance requirements

A.5.7.6 CSI-RSRP

A.5.7.6.1 EN-DC intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.5.7.6.1.1 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 10.1.3.1.1 and 10.1.3.1.2 for intra-frequency measurements.

A.5.7.6.1.2 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.5.7.6.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table A.5.7.6.1.2-2 and A.5.7.6.1.2-3. 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.5.7.6.1.2-1: 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.5.7.6.1.2-2: 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 | - | 0.58 | - | 0.58 |
| 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.5.7.6.1.2-3: 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.5.7.6.1.3 Test Requirements

The CSI-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.1.1 and relative accuracy requirements in clause 10.1.3.1.2. 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.5.7.6.1.3-1.

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.5.7.6.1.3-1.

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.5.7.6.1.3-1: 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.5.7.6.2 EN-DC inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.5.7.6.2.1 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 10.1.5.3.1 and 10.1.5.3.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.5.7.6.2.1-1.

**Table A.5.7.6.2.1-1: 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 |

A.5.7.6.2.2 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.5.7.6.2.2-1 and Table A.5.7.6.2.2-2 below. Both absolute and relative accuracy of RSRP intrer-frequency measurements are tested by using the parameters in Table A.5.7.6.2.2-1 and Table A.5.7.6.2.2-2. The inter-frequency measurements are supported by a measurement gap.

**Table A.5.7.6.2.2-1: 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 | 1,2 |  | freq1 | freq2 | freq1 | freq2 |
| BWchannel | 1,2 |  | 100:  NRB,c = 66 | | 100:  NRB,c = 66 | |
| 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 | 1,2 |  | SSB.3 FR2 | | SSB.3 FR2 | |
| 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 | |
| SMTC configuration | 1,2 |  | SMTC.1 | | SMTC.1 | |
| CSI-RS configuration for RRM | 1,2 |  | 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 | 1,2 | μs | 0.58 | | 0.58 | |
| 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 | 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.5.7.6.2.2-2: 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.5.7.6.2.3 Test Requirements

The CSI-RSRP measurement accuracy for Cell 2 and Cell 3 shall fulfil the absolute requirements in clause 10.1.5.3.1 and the relative requirements in clause 10.1.5.3.2.

Test 1:

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.5.7.6.2.3-1.

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.5.7.6.2.3-2.

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.5.7.6.2.3-1.

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.5.7.6.2.3-2.

**Table A.5.7.6.2.3-1: 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.5.7.6.2.3-2: 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.5.7.7 CSI-RSRQ

A.5.7.7.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell

A.5.7.7.1.1 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.5.7.7.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.5.7.7.1.2-1. The absolute accuracy of CSI-RSRQ intra-frequency measurement is test by using the parameters in Table A.5.7.7.1.2-2. 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.5.7.7.1.2-1: 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.5.7.7.1.2-2: 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 | |
| Time offset with Cell 2 | | μs | - | 0.58 | - | 0.58 |
|  | |  |  |  |  |  | |
| 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.5.7.7.1.2-3: 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.5.7.7.1.3 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.5.7.7.1.2-3.

A.5.7.7.2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.7.2.1 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.5.7.7.2.2 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.5.7.7.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-RSRQ inter-frequency measurement are tested by using test setup in Table A.5.7.7.2.2-2 and Table A.5.7.7.2.2-3. 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.5.7.7.2.2-1: 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 |
| Time offset with Cell 2 | μs | | - | 0.58 | - | 0.58 |
| 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.5.7.8 CSI-SINR

A.5.7.8.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.8.1.1 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.5.7.8.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.8.1.2-1. The absolute accuracy of CSI-SINR intra-frequency measurement is test by using the parameters in Table A.5.7.8.1.2-2 and Table A.5.7.8.1.2-3. 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.5.7.8.1.2-1: CSI-SINR Intra frequency CSI-SINR supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | FDD LTE PCell, Cell 2&3 120 kHz SSB and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | TDD LTE PCell, Cell 2&3 120 kHz SSB and 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.5.7.8.1.2-2: 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 |
| Time offset with Cell 2 | μs | - | 0.29 | - | 0.29 |
| 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 |
|  | dB | 4.54 | 2.66 | -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-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.5.7.8.1.2-3: 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.5.7.8.1.3 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 10.13.2 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.5.7.8.1.2-3.

A.5.7.8.2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.8.2.1 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.5.7.8.2.2 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.5.7.8.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-SINR inter-frequency measurement are tested by using test setup in Table A.5.7.8.2.2-2 and Table A.5.7.8.2.2-3. 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.5.7.8.2.2-1: CSI-SINR Inter frequency CSI-SINR supported test configurations**

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

**Table A.5.7.8.2.2-2: 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 |
| Time offset with cell 2 | μs | - | 0.29 | - | 0.29 | - | 0.29 |
| 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 |
|  | dB | -0.5 | -0.5 | 11.0 | 11.0 | -3.0 | -3.0 |
| 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.5.7.8.2.2-3: 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.5.7.8.2.3 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 #20>

<Start of Change #21>

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

A.6.6 Measurement procedure

A.6.6.7 CSI-RS based intra-frequency Measurements

A.6.6.7.1 SA event triggered reporting tests without gap under non-DRX

A.6.6.7.1.1 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.

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.6.6.7.1.1-1 and A.6.6.7.1.1-2 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.6.6.7.1.1-1: 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.6.6.7.1.1-2: 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 for RRM |  | 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 | μs | 1 | 4.7 | Asynchronous cells.  The timing of Cell 2 is CP later than the timing of Cell 1. |
| 2 | 4.7 | Synchronous cells |
| 3 | 2.35 | Synchronous cells |
| T1 | s | 1, 2, 3 | 5 |  |
| T2 | s | 1, 2, 3 | 1 |  |

**Table A.6.6.7.1.1-3: 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.6.6.7.1.2 Test Requirements

In this test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index 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.6.6.8 CSI-RS based inter-frequency Measurements

A.6.6.8.1 SA event triggered reporting tests with gap under DRX

A.6.6.8.1.1 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.6.6.8.1.1-1, A.6.6.8.1.1-2 and A.6.6.8.1.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.8.1.1-2 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.6.6.8.1.1-2 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.6.6.8.1.1-1: SA event triggered reporting tests for FR1-FR1**

|  |  |
| --- | --- |
| **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 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.6.6.8.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | | **Comment** |
| **Test 1** | **Test 2** |
| 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 | DRX.5 | DRX.5 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells | μs | Config 1 | 4.7 | | Asynchronous cells.  The timing of Cell 2 is CP later than the timing of Cell 1. |
| Config 2 | 4.7 | | Synchronous cells. |
| Config 3 | 2.35 | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | |  |
| T2 | s | Config 1,2,3 | 10 | 10 |  |

**Table A.6.6.8.1.1-3: 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 for RRM | |  | 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.6.6.8.1.2 Test Requirements

In test 1 with per-UE gap and test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 9280 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 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 #21>

<Start of Change #22>

A.6.7 Measurement Performance requirements

A.6.7.9 CSI-RSRP

A.6.7.9.1 SA: intra-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.9.1.1 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.6.7.9.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.6.7.9.1.2-1. Both absolute and relative accuracy of CSI-RSRP intra-frequency measurements are tested by using the parameters in A.6.7.9.1.2-2. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

**Table A.6.7.9.1.2-1: 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.6.7.9.1.2-2: 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 | | SR.2.1 TDD | | SR.2.1 TDD | | SR.2.1 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 | | 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 1,2 | | | | μs | - | | 4.7 | - | | 4.7 | | | | - | | | | 4.7 | |
| Config 3 | | | | μs | - | | 2.35 | - | | 2.35 | | | | - | | | | 2.35 | |
| SMTC configuration | | Config 1 | | | |  | SMTC.2 | | | | | | | | | | | | | | |
| Config 2,3 | | | |  | SMTC.1 | | | | | | | | | | | | | | |
| CSI-RS configuration for RRM | | 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.6.7.9.1.3 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.6.7.9.2 SA inter-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.9.2.1 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.6.7.9.2.1-1.

**Table A.6.7.9.2.1-1: 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.6.7.9.2.2 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.6.7.9.2.2-1 below. Both absolute and relative accuracy of CSI-RSRP inter-frequency measurements are tested by using the parameters in Table A.6.7.9.2.2-1. The inter-frequency measurements are supported by a measurement gap.

**Table A.6.7.9.2.2-1: 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 | | 1,2 | μs | - | | 4.7 | - | 4.7 | |
| 3 | μs | - | | 2.35 | - | 2.35 | |
| SMTC configuration | | 1 |  | SMTC.2 | | | SMTC.2 | | |
| 2,3 |  | SMTC.1 | | | SMTC.1 | | |
| CSI-RS configuration for RRM | | 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 | | -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 | | -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.6.7.9.2.3 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.6.7.10 CSI-RSRQ

A.6.7.10.1 SA: Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.10.1.1 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.6.7.10.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.10.1.2-1. The absolute accuracy of CSI-RSRQ intra-frequency measurement is tested by using the parameters in Table A.6.7.10.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

**Table A.6.7.10.1.2-1: Intra frequency CSI-RSRQ 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 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.6.7.10.1.2-2: 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 | SR.2.1 TDD | SR.2.1 TDD | | | SR.2.1 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 | | | μs | - | 4.7 | | - | 4.7 | | - | | 4.7 | |
| Config 2,3 | | | μs | - | 2.35 | | - | 2.35 | | - | | 2.35 | |
| CSI-RS configuration for RRM | | Config 1 | | |  | CSI-RS.RRM.FR1.1 FDD | | | | | | | | | |
| Config 2 | | |  | CSI-RS.RRM.FR1.1 TDD | | | | | | | | | |
| Config 3 | | |  | CSI-RS.RRM.FR1.2 TDD | | | | | | | | | |
| SMTC configuration | | Config 1 | | |  | SMTC.2 | | | | | | | | | |
| Config 2,3 | | |  | SMTC.1 | | | | | | | | | |
| SSB configuration | | | | Config 1,2 |  | SSB.1 FR1 | | | | | | | | | |
| Config 3 | SSB.2 FR1 | | | | | | | | | |
| 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.6.7.10.1.3 Test Requirements

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

A.6.7.10.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.10.2.1 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.6.7.10.2.2 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.6.7.10.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-RSRQ inter-frequency measurement are tested by using test parameters in Table A.6.7.10.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

**Table A.6.7.10.2.2-1: 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.6.7.10.2.2-2: 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 | | SR.2.1 TDD | SR.2.1 TDD | | | SR.2.1 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 1,2 | | μs | - | | | 4.7 | | - | 4.7 | | - | | 4.7 | | |
| Config 3 | | μs | - | | | 2.35 | | - | 2.35 | | - | | 2.35 | | |
| CSI-RS configuration for RRM | | Config 1 | |  | CSI-RS.RRM.FR1.1 FDD | | | | | | | | | | | | |
| Config 2 | | CSI-RS.RRM.FR1.1 TDD | | | | | | | | | | | | |
| Config 3 | | CSI-RS.RRM.FR1.2 TDD | | | | | | | | | | | | |
| SSB configuration | | Config 1,2 | |  | SSB.1 FR1 | | | | | | | | | | | | |
| Config 3 | | SSB.2 FR1 | | | | | | | | | | | | |
| SMTC configuration | | Config 1,2 | |  | SMTC.2 | | | | | | | | | | | | |
| Config 3 | |  | SMTC.1 | | | | | | | | | | | | |
| 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.6.7.10.2.3 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.6.7.11 CSI-SINR

A.6.7.11.1 SA intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.11.1.1 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.6.7.11.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.11.1.2-1. The absolute accuracy of CSI-SINR intra-frequency measurement is tested by using the parameters in Table A.6.7.11.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

**Table A.6.7.11.1.2-1: CSI-SINR Intra frequency CSI-SINR 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 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.6.7.11.1.2-2: 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 | | | | | | |
| Time offset with Cell 1 | | | Config 1,2 | | μs | - | | 2.35 | | - | 2.35 | |
| Config 3 | | μs | - | | 1.17 | | - | 1.17 | |
| SSB configuration | | | | Config 1,2 |  | SSB.1 FR1 | | | | | | |
| Config 3 | SSB.2 FR1 | | | | | | |
| SMTC configuration | | | | Config 1 |  | SMTC.2 | | | | | | |
| Config 2,3 | SMTC.1 | | | | | | |
| 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.6.7.11.1.3 Test Requirements

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

A.6.7.11.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.11.2.1 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.6.7.11.2.2 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.6.7.11.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-SINR inter-frequency measurement are tested by using test parameters in Table A.6.7.11.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

**Table A.6.7.11.2.2-1: CSI-SINR Inter frequency CSI-SINR 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 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.6.7.11.2.2-2: 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 | SR.2.1 TDD | SR.2.1 TDD | | | SR.2.1 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 |  | CR.2.1 TDD |  | | CR.2.1 TDD | | |  | | CR.2.1 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 | CCR.2.1 TDD | CCR.2.1 TDD | | | CCR.2.1 TDD | | |
| OCNG Patterns | | |  | OP.1 | | | | | | | | | | | |
| CSI-RSSI-Measurement | | |  | Not Applicable | | | | | | | | | | | |
| Time offset with Cell 1 | | Config 1,2 | μs | - | | 2.35 | | - | 2.35 | | - | | 2.35 | | |
| Config 3 | μs | - | | 1.17 | | - | 1.17 | | - | | 1.17 | | |
| SMTC configuration | | Config 1 |  | SMTC.2 | | | | | | | | | | | |
| Config 2,3 |  | 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 | | 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-RSRPNote3 | 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.6.7.11.2.3 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 #22>

<Start of Change #23>

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

## A.7.6 Measurement procedure

A.7.6.5 CSI-RS based intra-frequency Measurements

A.7.6.5.1 SA event triggered reporting test without gap under DRX for CSI-RS based intra-frequency measurement

A.7.6.5.1.1 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.7.6.5.1.1-1.

**Table A.7.6.5.1.1-1: supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 120 kHz SSB and 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.7.6.5.1.1-2 ~ 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.7.6.5.1.1-2: 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** |
| Active cell |  | 1 | PCell (Cell 1) |  |
| Neighbour cell |  | 1 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| CSI-RS resource configuration |  | 1 | CSI-RS.RRM.FR2.1 TDD |  |
| A3-Offset | dB | 1 | -6 |  |
| CP length |  | 1 | Normal |  |
| Hysteresis | dB | 1 | 0 |  |
| Time To Trigger | s | 1 | 0 |  |
| Filter coefficient |  | 1 | 0 | L3 filtering is not used |
| DRX |  | 1 | DRX.1 | DRX related parameters are defined in Table A.3.3 |
| Time offset between Cell 1 and Cell 2 | μs | 1 | 0.58 |  |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 10 |  |

**Table A.7.6.5.1.1-3: 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 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Intial BWP configuration |  | 1 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1 | SSB | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | CR.3.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1 | TCI.State.2 | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| SMTC |  | 1 | SMTC.1 | | | |
| SSB |  | 1 | SSB.3 FR2 | | SSB.3 FR2 | |
| CSI-RS |  | 1 | CSI-RS.RRM.FR2.1 TDD | | | |
| Propagation Condition |  | 1 | AWGN | | | |

**Table A.7.6.5.1.1-4: 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 | Setup 1 defined in A.3.15.1 | | | |
| Beam assumptionNote 4 |  | 1 | Fine | | Fine | |
|  | dB | 1 | 4 | -1.46 | -Infinity | -1.46 |
| Note 2 | dBm/15 KHz | 1 | -98 | | | |
| Note 2 | dBm/SCS | 1 | -86 | | | |
|  |  |  |  | | | |
| CSI-RSRP | dBm/SCS | 1 | -82 | -82 | -Infinity | -82 |
|  |  |  |  |  |
|  | dB | 1 | 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.7.6.5.1.2 Test Requirements

In this 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

- 9.6s for a UE supporting power class 1,

- 5.76s for a UE supporting power class 2, 3 and 4

The UE is required to read the neighbour cell SSB index in this test.

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

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

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

A.7.6.6 CSI-RS based inter-frequency Measurements

A.7.6.6.1 SA event triggered reporting tests for FR2 CSI-RS based measurement when non-DRX is used (PCell in FR2)

A.7.6.6.1.1 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.7.6.6.1.1-1, A.7.6.6.1.1-2, and A.7.6.6.1.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6.6.1.1-2 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.7.6.6.1.1-1.

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.7.6.6.1.1-1: SA event triggered reporting tests for CSI-RS based L3 measurement for FR2-FR2**

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

**Table A.7.6.6.1.1-2: 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 |  |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| SMTC configuration |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| 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 | μs | Config 1 | 0.58 | Synchronous cells. |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 7 for PC1;  4.5 for other PC |  |

**Table A.7.6.6.1.1-3: 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 for RRM | |  |  | - | | 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 #23>

<Start of Change #24>

A.7.7.6 CSI-RSRP

A.7.7.6.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.6.1.1 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.7.7.6.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.6.1.2-1. Both absolute and relative accuracy of CSI-RSRP intra-frequency measurements are tested by using the parameters in Table A.7.7.6.1.2-2 and A.7.7.6.1.2-3. 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.7.7.6.1.2-1: CSI-RSRP Intra frequency CSI-RSRP supported test configurations**

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

**Table A.7.7.6.1.2-2: 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 |
| SMTC configuration |  | SMTC.1 | | SMTC.1 | |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| CSI-RS configuration for RRM |  | CSI-RS.RRM.FR2.1 TDD | | | |
| Time offset with Cell 1 | μs | - | 0.58 | - | 0.58 |
| 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.7.7.6.1.2-3: 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.7.7.6.1.3 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.7.7.6.1.3-1.

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.7.7.6.1.3-1.

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.7.7.6.1.3-1: 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.7.7.6.2 SA inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.6.2.1 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.7.7.6.2.1-1.

**Table A.7.7.6.2.1-1: Applicable NR configurations for FR2 inter-frequency CSI-RSRP accuracy test**

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

A.7.7.6.2.2 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.7.7.6.2.2-1 and Table A.7.7.6.2.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.6.2.2-1 and Table A.7.7.6.2.2-1. The inter-frequency measurements are supported by a measurement gap.

**Table A.7.7.6.2.2-1: CSI-RSRP inter-frequency test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** |  | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| BWchannel |  |  | 100:  NRB,c = 24 | | 100:  NRB,c = 24 | |
| Gap pattern ID |  |  | 0 | | 0 | |
| Duplex mode |  |  | TDD | TDD | TDD | TDD |
| TDD configuration |  |  | TDDConf.3.1 | | TDDConf.3.1 | |
| 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 | - |
| SSB configuration |  |  | SSB.3 FR2 | | SSB.3 FR2 | |
| SMTC configuration |  |  | SMTC.1 | | SMTC.1 | |
| OCNG Patterns |  |  | OP.3 | | OP.3 | |
| Initial BWP Configuration |  |  | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP configuration |  |  | DLBWP.1.3  ULBWP.1.3 | | DLBWP.1.3  ULBWP.1.3 | |
| TRS Configuration |  |  | TRS.2.1 TDD | | TRS.2.1 TDD | |
| PDCCH/PDSCH TCI Configuration |  |  | TCI.State.2 | | TCI.State.2 | |
| CSI-RS configuration for RRM |  |  | CSI-RS.RRM.FR2.1 TDD | | CSI-RS.RRM.FR2.1 TDD | |
| Time offset between Cell 2 and Cell 3 |  | μs | 0.58 | | 0.58 | |
| 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 condition |  | - | 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.7.7.6.2.2-2: 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.7.7.6.2.3 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.7.7.6.2.3-1.

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.7.7.6.2.3-2.

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.7.7.6.2.3-1.

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.7.7.6.2.3-2.

**Table A.7.7.6.2.3-1: 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.7.7.6.2.3-2: 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.7.7.7 CSI-RSRQ

A.7.7.7.1 SA intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.7.1.1 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.7.7.7.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.7.1.2-1. The absolute accuracy of CSI-RSRQ intra-frequency measurement is tested by using the parameters in Table A.7.7.7.1.2-2 and Table A.7.7.7.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.7.7.7.1.2-1: CSI-RSRQ Intra frequency CSI-RSRQ supported test configurations**

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

**Table A.7.7.7.1.2-2: 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 |
| Time offset with Cell 1 | | μs | - | 0.58 | - | 0.58 |
| 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 for RRM | |  | 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.7.7.7.1.2-3: 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.7.7.7.1.3 Test Requirements

The CSI-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal CSI-RSRQ+2.5 dB to Nominal CSI-RSRQ-3.5 dB and the CSI-RSRQ measurement accuracy in test 2 shall be within the range Nominal CSI-RSRQ+3.5 dB to Nominal CSI-RSRQ-4.5 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.7.7.7.1.2-3.

A.7.7.7.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.7.2.1 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.7.7.7.2.2 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.7.7.7.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-RSRQ inter-frequency measurement are tested by using test parameters in Table A.7.7.7.2.2-2 and Table A.7.7.7.2.2-3. 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 and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |

**Table A.7.7.7.2.2-2: 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 |
| Time offset with Cell 1 | μs | - | 0.58 | - | 0.58 |
| 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 |
| 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.7.7.7.2.2-3: 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.7.7.7.2.3 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 10.1.10.2.1 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.7.7.8 CSI-SINR

A.7.7.8.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.8.1.1 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.7.7.8.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.8.1.2-1. . The absolute accuracy of CSI-SINR intra-frequency measurement is test by using the parameters in Table A.7.7.8.1.2-2 and Table A.7.7.8.1.2-3. 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.7.7.8.1.2-1: CSI-SINR Intra frequency CSI-SINR supported test configurations**

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

**Table A.7.7.8.1.2-2: 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 | μs | - | 0.29 | - | 0.29 |
| 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 RRM |  | 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.7.7.8.1.2-3: 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.7.7.8.1.3 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 10.1.13.2.1 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 10.1.13.2.1.

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

A.7.7.8.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.8.2.1 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.7.7.8.2.2 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.7.7.8.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-SINR inter-frequency measurement are tested by using test parameters in Table A.7.7.8.2.2-2 and Table A.7.7.8.2.2-3. 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.7.7.8.2.2-1: CSI-SINR Inter frequency CSI-SINR supported test configurations**

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

**Table A.7.7.8.2.2-2: 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 | μs | - | 0.29 | - | 0.29 | - | 0.29 |
| 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 RRM |  | 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.7.7.8.2.2-3: 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.7.7.8.2.3 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 10.1.15.2.1 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 10.1.15.2.2.

<End of Change #24>

## <Start of Change 25>

### B.2.1.4 Gain to SS-RSRP and CSI-RSRP measurement point for FR1

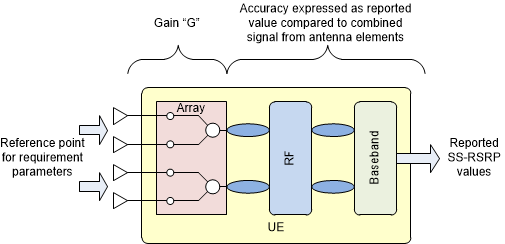
In FR1 conducted requirements are specified at the UE antenna connector, which is also the SS-RSRP and CSI-RSRP measurement point.

### B.2.1.5 Gain to SS-RSRP and CSI-RSRP measurement point for FR2

#### B.2.1.5.1 Gain to SS-RSRP and CSI-RSRP measurement point for Rx Beam Peak angle of arrival

In clause 5.1.1 of TS 38.215 [4] SS-RSRP and CSI-RSRP is defined to be measured based on the combined signal from antenna elements corresponding to a given receiver branch. The reference point for requirement parameters from the UE perspective is the input of the UE antenna array. The gain “G” relates the combined signal from antenna elements corresponding to a given receiver branch to the reference point for requirement parameters.

The gain “G” affects absolute signal level values reported by the UE.



**Figure B.2.1.5.1-1: Gain and Reference point for requirement parameters**

The gain range for each power class is specified in Table B.2.1.5.1-1.

Table B.2.1.5.1-1: UE gain G, Rx beam peak direction

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | UE Power class | | | |
|  | 1 | 2 | 3 | 4 |
| Minimum, dBi | FFS | FFS | -10 | FFS |
| Maximum, dBi | FFS | FFS | +20 | FFS |

Gain range in spherical coverage directions may be lower than in Rx beam peak direction, according to the difference between the EIS spherical coverage value specified in TS 38.101-2 [19] clause 7.3.4 and the Reference sensitivity level specified in TS 38.101-2 [19] clause 7.3.2.

## <End of Change 25>

## <Start of Change 26>

## B.2.8 Conditions for NR CSI-RS based intra-frequency measurements

This clause defines the following conditions for NR CSI-RS based intra-frequency measurements and corresponding procedures performed based on CSI-RS: CSI\_RP and CSI-RS Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.8-1 for FR1 NR cells.

The conditions are defined in Table B.2.8-2 for FR2 NR cells.

Table B.2.8-1: Conditions for CSI-RS based intra-frequency measurements in FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | NR operating band groups Note1 | Minimum CSI\_RP | | | CSI-RS Ês/Iot |
| dBm / SCSCSI-RS | | | dB |
| SCSCSI-RS = 15 kHz | SCSCSI-RS = 30 kHz | SCSCSI-RS = 60 kHz |
| Conditions | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -124 | -121 | ≥ -6 |
| NR\_FDD\_FR1\_B | -126.5 | -123.5 | -120.5 |
| NR\_TDD\_FR1\_C | -126 | -123 | -120 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -122.5 | -119.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -122 | -119 |
| NR\_FDD\_FR1\_F | -124.5 | -121.5 | -118.5 |
| NR\_FDD\_FR1\_G | -124 | -121 | -118 |
| NR\_FDD\_FR1\_H | -123.5 | -120.5 | -117.5 |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | | |

Table B.2.8-2: Conditions for CSI-RS based intra-frequency measurements in FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Angle of arrival | NR operating bands | Minimum CSI\_RP Note 2, Note 3 | | | | | CSI-RS Ês/Iot |
| dBm / SCSCSI-RS | | | | | dB |
| SCSCSI-RS = 120 kHz | | | | SCSCSI-RS = 60 kHz |
| UE power class | | | | UE power class |
| 1 | 2 | 3 | 4 | 1, 2, 3, 4 |
| Conditions | Rx Beam Peak | n257 | -128.3+Y1 | -113.8 | -112.1 | -127.8+Y4 | (Value for SCSCSI-RS = 120 kHz) - 3dB | ≥-6 |
| n258 | -128.3+Y1 | -113.8 | -112.1 | -127.8+Y4 |
| n259 |  |  | -108.5 |  |
| n260 | -125.3+Y1 |  | -109.5 | -125.8+Y4 |
| n261 | -128.3+Y1 | -113.8 | -112.1 | -127.8+Y4 |
| Spherical coverage Note 1 | n257 | -120.3+Z1 | -102.8 | -101.2 | -118.8+Z4 | (Value for SCSCSI-RS = 120 kHz) - 3dB | ≥-6 |
| n258 | -120.3+Z1 | -102.8 | -101.2 | -118.8+Z4 |
| n259 |  |  | -95.7 |  |
| n260 | -117.3+Z1 |  | -96.9 | -113.8+Z4 |
| n261 | -120.3+Z1 | -102.8 | -101.2 | -118.8+Z4 |
| Note 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.  Note 2: Values specified at the Reference point to give minimum CSI-RS Ês/Iot, with no applied noise.  Note 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ∆MBP,n and spherical coverage values are increased by ∆MBS,n, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19]. | | | | | | | | |

*Editor’s notes for Table B.2.8-2:*

*- The value of Y for power classes 1 and 4 is FFS, where Y1 and Y4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively*

*- The value of Z for power classes 1 and 4 is FFS, where Z1 and Z4 are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively*

## B.2.9 Conditions for NR CSI-RS based inter-frequency measurements

This clause defines the following conditions for NR CSI-RS based inter-frequency measurements and corresponding procedures performed based on CSI-RS: CSI\_RP and CSI-RS Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.9-1 for FR1 NR cells.

The conditions are defined in Table B.2.9-2 for FR2 NR cells.

Table B.2.9-1: Conditions for CSI-RS based inter-frequency measurements in FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | NR operating band groups Note1 | Minimum CSI\_RP | | | CSI-RS Ês/Iot |
| dBm / SCSCSI-RS | | | dB |
| SCSCSI-RS = 15 kHz | SCSCSI-RS = 30 kHz | SCSCSI-RS = 60 kHz |
| Conditions | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -125 | -122 | -119 | ≥ -6 |
| NR\_FDD\_FR1\_B | -124.5 | -121.5 | -118.5 |
| NR\_TDD\_FR1\_C | -124 | -121 | -118 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -124.5 | -120.5 | -117.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -123 | -120 | -117 |
| NR\_FDD\_FR1\_F | -122.5 | -119.5 | -116.5 |
| NR\_FDD\_FR1\_G | -122 | -119 | -116 |
| NR\_FDD\_FR1\_H | -121.5 | -118.5 | -115.5 |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | | |

**Table B.2.9-2: Conditions for CSI-RS based inter-frequency measurements in FR2**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Angle of arrival | NR operating bands | Minimum CSI\_RP Note 2, Note 3 | | | | | CSI-RS Ês/Iot |
| dBm / SCSCSI-RS | | | | | dB |
| SCSCSI-RS = 120 kHz | | | | SCSCSI-RS = 60 kHz |
| UE power class | | | | UE power class |
| 1 | 2 | 3 | 4 | 1, 2, 3, 4 |
| Conditions | Rx Beam Peak | n257 | -126.3+Y1 | -111.8 | -110.1 | -125.8+Y4 | (Value for SCSCSI-RS = 120 kHz) - 3dB | ≥-4 |
| n258 | -126.3+Y1 | -111.8 | -110.1 | -125.8+Y4 |
| n259 |  |  | -106.5 |  |
| n260 | -123.3+Y1 |  | -107.5 | -123.8+Y4 |
| n261 | -126.3+Y1 | -111.8 | -110.1 | -125.8+Y4 |
| Spherical coverage Note 1 | n257 | -118.3+Z1 | -100.8 | -99.2 | -116.8+Z4 | (Value for SCSCSI-RS = 120 kHz) - 3dB | ≥-4 |
| n258 | -118.3+Z1 | -100.8 | -99.2 | -116.8+Z4 |
| n259 |  |  | -93.7 |  |
| n260 | -115.3+Z1 |  | -94.9 | -111.8+Z4 |
| n261 | -118.3+Z1 | -100.8 | -99.2 | -116.8+Z4 |
| NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.  NOTE 2: Values specified at the Reference point to give minimum CSI-RS Ês/Iot, with no applied noise.  NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ∆MBP,n and Spherical coverage values are increased by ∆MBS,n, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19]. | | | | | | | | |

*Editor’s notes for Table B.2.9-2:*

*- The value of Y for power classes 1 and 4 is FFS, where Y1 and Y4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively*

*- The value of Z for power classes 1 and 4 is FFS, where Z1, and Z4 are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively.*

## <End of Change 26>