# 10 Measurement Performance requirements

## 10.1 NR measurements

### 10.1.1 Introduction

The requirements in clause 10.1 apply as follows:

- intra-frequency requirements apply for PCell measurements in SA, NR-DC, or NE-DC operaion mode,

- intra-frequency requirements apply for PSCell measurements in NR-DC or EN-DC operaion mode,

- intra-frequency requirements apply for SCell measurements in SA operation mode with NR CA or any MR-DC operaion mode with NR CA,

- inter-frequency requirements apply for non-serving cell measurements on NR carrier frequencies.

- inter-frequency requirements apply for measurements from one cell on a frequency compared to the measurement from another cell on a different frequency.

In the requirements of clause 10.1, the exceptions for side conditions apply as follows:

- for the UE capable of CA but not configured with any SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.1 for UE supporting CA in FR1, and clause B.3.2.3 for UE supporting CA in FR2, respectively;

- for the UE capable of CA and configured with at least one SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.2 for UE configured with CA in FR1, and clause B.3.2.4 for UE supporting CA in FR2 respectively;

- for the UE capable of SUL but not configured with SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.1 for UE supporting SUL in FR1;

- for the UE capable of SUL and configured with at least one SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.2 for UE configured with SUL in FR1.

### 10.1.2 Intra-frequency RSRP accuracy requirements for FR1

#### 10.1.2.1 Intra-frequency SS-RSRP accuracy requirements

##### 10.1.2.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on the same frequency as that of the serving cell in FR1. The accuracy requirements in this clause are also applicable when *highSpeedMeasFlag-r16* or *highSpeedMeasCA-Scell-r17* is configured.

The accuracy requirements in Table 10.1.2.1.1-1 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 relevant SSB.

Table 10.1.2.1.1-1: SS-RSRP Intra frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -70 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -70 |
| ±4.5 | ±9 | ≥-6 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | 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 | -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. | | | | | | | |

##### 10.1.2.1.2 Relative SS-RSRP Accuracy

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell compared to the SS-RSRP measured from another cell on the same frequency, or between any two SS-RSRP levels measured on the same cell in FR1. The accuracy requirements in this clause are also applicable when *highSpeedMeasFlag-r16* or *highSpeedMeasCA-Scell-r17* is configured.

The accuracy requirements in Table 10.1.2.1.2-1 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 relevant SSB.

Table 10.1.2.1.2-1: SS-RSRP Intra frequency relative accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±2 | ±3 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±3 | ±3 | ≥-6 | 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 SSB Ês/Iot is the minimum SSB 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. | | | | | | | |

#### 10.1.2.2 Void

#### 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 is 48 PRBs and the density is 3. The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.2.3.1-1.- The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

Note: The reference measurement timing for one layer for intra-frequency measurement is serving cell timing.

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 is 48 PRBs and the density is 3. The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.2.3.2-1. - The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.

Note: The reference measurement timing for one layer for intra-frequency measurement is serving cell timing.

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. | | | | | | | | | | | |

### 10.1.2B Intra-frequency RSRP accuracy requirements for FR1 for CA/DC Idle Mode Measurements

#### 10.1.2B.1 Intra-frequency SS-RSRP accuracy requirements

The requirements in this clause are applicable for a UE:

- in state RRC\_IDLE or RRC INACTIVE

- that is synchronised to the cell that is measured.

The requirements are for absolute accuracy of SS-RSRP.

##### 10.1.2B.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to the serving cell in FR1.

The accuracy requirements in Table 10.1.2B.1.1-1 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.1.2 for a corresponding Band for each relevant SSB.

Table 10.1.2B.1.1-1: SS-RSRP Intra frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -70 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -70 |
| ±6 | ±10.5 | ≥-4 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -70 |
| ±9.5 | ±12.5 | ≥-4 | 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 | -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. | | | | | | | |

### 10.1.2C Intra-frequency RSRP accuracy requirements for FR1 SAN

#### 10.1.2C.1 Intra-frequency SS-RSRP accuracy requirements

##### 10.1.2C.1.1 Absolute SS-RSRP Accuracy

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

The accuracy requirements in Table 10.1.2C.1.1-1 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 relevant SSB.

- Valid information for the SAN serving the target cell has been provided.

Table 10.1.2C.1.1-1: SS-RSRP Intra frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±[4.5] | ±[9] | ≥-6 | NR\_FDD\_SAB\_FR1\_A | -121 | -118 | N/A | -70 |
| ±[8] | ±[11] | ≥-6 | NR\_FDD\_SAB\_FR1\_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. | | | | | | | |

##### 10.1.2C.1.2 Relative SS-RSRP Accuracy

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

The accuracy requirements in Table 10.1.2C.1.2-1 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 relevant SSB.

- Valid information for the SAN serving the target cell has been provided.

Table 10.1.2C.1.2-1: SS-RSRP Intra frequency relative accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±[2] | ±[3] | ≥-3 | NR\_FDD\_SAB\_FR1\_A | -121 | -118 | N/A | -50 |
| ±[3] | ±[3] | ≥-6 | 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 SSB Ês/Iot is the minimum SSB 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. | | | | | | | |

### 10.1.3 Intra-frequency RSRP accuracy requirements for FR2

#### 10.1.3.1 Intra-frequency SS-RSRP accuracy requirements

##### 10.1.3.1.1 Absolute SS-RSRP Accuracy

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

The accuracy requirements in Table 10.1.3.1.1-1 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.

- 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 10.1.3.1.1-1: SS-RSRP Intra frequency absolute accuracy in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 2 range | | | |
|  |  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 1 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |  |
| ±6 | ±9 | ≥-6 | Same value as SSB\_RP in Table B.2.2-2, 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 SSB 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. | | | | | | |

##### 10.1.3.1.2 Relative SS-RSRP Accuracy

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell compared to the SS-RSRP measured from another cell on the same frequency, or between any two SS-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 relevant SSB.

- 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 10.1.3.1.2-1: SS-RSRP Intra frequency relative accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 1 | | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |
| ±6 | ±9 | ≥-6 | Same value as SSB\_RP in Table B.2.2-2, 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 SSB 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 SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies. | | | | | |

#### 10.1.3.2 Void

#### 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 is 48 PRBs and the density is 3. The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.3.3.1-1.

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

Note: The reference measurement timing for one layer for intra-frequency measurement is serving cell timing.

- 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 is 48 PRBs and the density is 3. The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.3.3.2-1.

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

Note: The reference measurement timing for one layer for intra-frequency measurement is serving cell timing.

- 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. | | | | | |

### 10.1.3B Intra-frequency RSRP accuracy requirements for FR2 for CA/DC Idle Mode Measurements

#### 10.1.3B.1 Intra-frequency SS-RSRP accuracy requirements

The requirements in this clause are applicable for a UE:

- in state RRC\_IDLE or RRC INACTIVE

- that is synchronised to the cell that is measured.

The requirements are for absolute accuracy of SS-RSRP.

##### 10.1.3B.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to the serving cell in FR2.

The accuracy requirements in Table 10.1.3B.1.1-1 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.1.2 for a corresponding Band for each relevant SSB.

- 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 10.1.3B.1.1-1: SS-RSRP Intra frequency absolute accuracy in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 2 range | | | |
|  |  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 1 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |  |
| ±7.5 | ±10.5 | ≥-4 | Same value as SSB\_RP in Table B.2.2-2, according to UE Power class, operating band and angle of arrival | | N/A | -70 |
| ±9.5 | ±12.5 |  | 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 SSB 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. | | | | | | |

### 10.1.4 Inter-frequency RSRP accuracy requirements for FR1

#### 10.1.4.1 Inter-frequency SS-RSRP accuracy requirements

##### 10.1.4.1.1 Absolute Accuracy of SS-RSRP in FR1

The requirements for absolute accuracy of SS-RSRP 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 this clause are also applicable when *highSpeedMeasInterFreq-r17* is configured.

The accuracy requirements in Table 10.1.4.1.1-1 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.

Table 10.1.4.1.1-1: SS-RSRP Inter frequency Absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -70 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -70 |
| ±4.5 | ±9 | ≥-6 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | 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 | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: Void  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

##### 10.1.4.1.2 Relative Accuracy of SS-RSRP in FR1

The relative accuracy of SS-RSRP in inter frequency case is defined as the RSRP measured from one cell on a frequency in FR1compared to the RSRP measured from another cell on a different frequency in FR1. The accuracy requirements in this clause are also applicable when *highSpeedMeasInterFreq-r17* is configured.

The accuracy requirements in Table 10.1.4.1.2-1 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.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

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

Table 10.1.4.1.2-1: SS-RSRP Inter frequency relative accuracy in FR1

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

#### 10.1.4.2 Void

#### 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 is 48 PRBs and the density is 3. The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.4.3.1-1.

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

Note: The reference measurement timing for one layer for inter-frequency measurement is up to UE implementation and shall be based on the timing of one of the target cells.

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 is 48 PRBs and the density is 3. The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.4.3.2-1.

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

• Note: The reference measurement timing for one layer for inter-frequency measurement is up to UE implementation and shall be based on the timing of one of the target cells.

- |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. | | | | | | | | |

### 10.1.4B Inter-frequency RSRP accuracy requirements for FR1 for CA/DC Idle Mode Measurements

#### 10.1.4B.1 Inter-frequency SS-RSRP accuracy requirements

The requirements in this clause are applicable for a UE:

- in state RRC\_IDLE or RRC INACTIVE

- that is synchronised to the cell that is measured.

The requirements are for absolute accuracy of SS-RSRP.

##### 10.1.4B.1.1 Absolute Accuracy of SS-RSRP in FR1

The requirements for absolute accuracy of SS-RSRP 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 10.1.4B.1.1-1 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.1.3 for a corresponding Band for each relevant SSB.

Table 10.1.4B.1.1-1: SS-RSRP Inter frequency Absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -70 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -70 |
| ±6 | ±10.5 | ≥-4 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -70 |
| ±9.5 | ±12.5 | ≥-4 | 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 | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: Void  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

### 10.1.4C Inter-frequency RSRP accuracy requirements for FR1 SAN

#### 10.1.4C.1 Inter-frequency SS-RSRP accuracy requirements

##### 10.1.4C.1.1 Absolute Accuracy of SS-RSRP in FR1

The requirements for absolute accuracy of SS-RSRP 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 10.1.4C.1.1-1 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.

- Valid information for the SAN serving the target cell has been provided.

Table 10.1.4C.1.1-1: SS-RSRP Inter frequency Absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±[4.5] | ±[9] | ≥-6 | NR\_FDD\_SAB\_FR1\_A | -121 | -118 | N/A | -70 |
| ±[8] | ±[11] | ≥-6 | NR\_FDD\_SAB\_FR1\_A | N/A | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: Void  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

##### 10.1.4C.1.2 Relative Accuracy of SS-RSRP in FR1

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

The accuracy requirements in Table 10.1.4C.1.2-1 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.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

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

- Valid information for the SAN serving the target cell has been provided.

Table 10.1.4C.1.2-1: SS-RSRP Inter frequency relative accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±[4.5] | ±[6] | ≥-6 | NR\_FDD\_SAB\_FR1\_A | -121 | -118 | N/A | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

### 10.1.5 Inter-frequency RSRP accuracy requirements for FR2

#### 10.1.5.1 Inter-frequency SS-RSRP accuracy requirements

##### 10.1.5.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on a frequency in FR2 that is on a different frequency than the serving cell.

The accuracy requirements in Table 10.1.5.1.1-1 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 SSB.

- 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 10.1.5.1.1-1: SS-RSRP Inter frequency absolute accuracy in FR2**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 2 range | | | |
|  |  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 1 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |  |
| ±6 | ±9 | ≥-4 | Same value as SSB\_RP in Table B.2.3-2, 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 SSB 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. | | | | | | |

##### 10.1.5.1.2 Relative SS-RSRP Accuracy

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

The accuracy requirements in Table 10.1.5.1.2-1 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 SSB.

- |SSB\_RP1dBm - SSB\_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 10.1.5.1.2-1: SS-RSRP Inter frequency relative accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 1 | | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |
| ±6 | ±9 | ≥-4 | Same value as SSB\_RP in Table B.2.3-2, 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 SSB 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 SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies. | | | | | |

#### 10.1.5.2 Void

#### 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 is 48 PRBs and the density is 3. The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.5.3.1-1.

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

Note: The reference measurement timing for one layer for inter-frequency measurement is up to UE implementation and shall be based on the timing of one of the target cells.

- 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 is 48 PRBs and the density is 3. The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.5.3.2-1.

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

Note: The reference measurement timing for one layer for inter-frequency measurement is up to UE implementation and shall be based on the timing of one of the target cells.

- |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. | | | | | |

### 10.1.5B Inter-frequency RSRP accuracy requirements for FR2 for CA/DC Idle Mode Measurements

#### 10.1.5B.1 Inter-frequency SS-RSRP accuracy requirements

The requirements in this clause are applicable for a UE:

- in state RRC\_IDLE or RRC INACTIVE

- that is synchronised to the cell that is measured.

The requirements are for absolute accuracy of SS-RSRP.

##### 10.1.5B.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on a frequency in FR2 that is on a different frequency than the serving cell.

The accuracy requirements in Table 10.1.5B.1.1-1 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.1.3 for a corresponding Band for each relevant SSB.

- 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 10.1.5B.1.1-1: SS-RSRP Inter frequency absolute accuracy in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 2 range | | | |
|  |  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 1 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |  |
| ±7.5 | ±10.5 | ≥-4 | Same value as SSB\_RP in Table B.2.3-2, according to UE Power class, operating band and angle of arrival | | N/A | -70 |
| ±9.5 | ±12.5 |  | 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 SSB 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. | | | | | | |

### 10.1.6 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 | SS-RSRP<-156 | Not valid | dBm |
| RSRP\_1 | -156≤ SS-RSRP<-155 | Not valid | dBm |
| RSRP\_2 | -155≤ SS-RSRP<-154 | Not valid | dBm |
| RSRP\_3 | -154≤ SS-RSRP<-153 | Not valid | dBm |
| RSRP\_4 | -153≤ SS-RSRP<-152 | Not valid | dBm |
| RSRP\_5 | -152≤ SS-RSRP<-151 | Not valid | dBm |
| RSRP\_6 | -151≤ SS-RSRP<-150 | Not valid | dBm |
| RSRP\_7 | -150≤ SS-RSRP<-149 | Not valid | dBm |
| RSRP\_8 | -149≤ SS-RSRP<-148 | Not valid | dBm |
| RSRP\_9 | -148≤ SS-RSRP<-147 | Not valid | dBm |
| RSRP\_10 | -147≤ SS-RSRP<-146 | Not valid | dBm |
| RSRP\_11 | -146≤ SS-RSRP<-145 | Not valid | dBm |
| RSRP\_12 | -145≤ SS-RSRP<-144 | Not valid | dBm |
| RSRP\_13 | -144≤ SS-RSRP<-143 | Not valid | dBm |
| RSRP\_14 | -143≤ SS-RSRP<-142 | Not valid | dBm |
| RSRP\_15 | -142≤ SS-RSRP<-141 | Not valid | dBm |
| RSRP\_16 | -141≤ SS-RSRP<-140 | RSRP<-140 | dBm |
| RSRP\_17 | -140≤ SS-RSRP<-139 | -140≤RSRP<-139 | dBm |
| RSRP\_18 | -139≤ SS-RSRP<-138 | -139≤ RSRP<-138 | dBm |
| … | … |  | … |
| RSRP\_111 | -46≤ SS-RSRP<-45 | -46≤ RSRP<-45 | dBm |
| RSRP\_112 | -45≤ SS-RSRP<-44 | -45≤ RSRP<-44 | dBm |
| RSRP\_113 | -44≤ SS-RSRP<-43 | -44≤ RSRP | dBm |
| RSRP\_114 | -43≤ SS-RSRP<-42 | Not valid | dBm |
| RSRP\_115 | -42≤ SS-RSRP<-41 | Not valid | dBm |
| RSRP\_116 | -41≤ SS-RSRP<-40 | Not valid | dBm |
| RSRP\_117 | -40≤ SS-RSRP<-39 | Not valid | dBm |
| RSRP\_118 | -39≤ SS-RSRP<-38 | Not valid | dBm |
| RSRP\_119 | -38≤ SS-RSRP<-37 | Not valid | dBm |
| RSRP\_120 | -37≤ SS-RSRP<-36 | Not valid | dBm |
| RSRP\_121 | -36≤ SS-RSRP<-35 | Not valid | dBm |
| RSRP\_122 | -35≤ SS-RSRP<-34 | Not valid | dBm |
| RSRP\_123 | -34≤ SS-RSRP<-33 | Not valid | dBm |
| RSRP\_124 | -33≤ SS-RSRP<-32 | Not valid | dBm |
| RSRP\_125 | -32≤ SS-RSRP<-31 | Not valid | dBm |
| RSRP\_126 | -31≤ SS-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 |

### 10.1.7 Intra-frequency RSRQ accuracy requirements for FR1

#### 10.1.7.1 Intra-frequency SS-RSRQ accuracy requirements in FR1

##### 10.1.7.1.1 Absolute SS-RSRQ Accuracy in FR1

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on the same frequency as that of the serving cell in FR1. The accuracy requirements in this clause are also applicable when *highSpeedMeasFlag-r16* or *highSpeedMeasCA-Scell-r17* is configured.

The accuracy requirements in Table 10.1.7.1.1-1 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 relevant SSB.

Table 10.1.7.1.1-1: SS-RSRQ Intra frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±2.5 | ±4 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±3.5 | ±4 | ≥-6 | 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. | | | | | | | |

#### 10.1.7.2 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 bandwidth of CSI-RS is 48 PRBs and the density is 3.

• The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.7.2.1-1.

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

Note: The reference measurement timing for one layer for intra-frequency measurement is serving cell timing.

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. | | | | | | | | |

### 10.1.7B Intra-frequency RSRQ accuracy requirements for FR1 for CA/DC Idle Mode Measurements

#### 10.1.7B.1 Intra-frequency SS-RSRQ accuracy requirements in FR1

The requirements in this clause are applicable for a UE:

- in state RRC\_IDLE or RRC INACTIVE

- that is synchronised to the cell that is measured.

The requirements are for absolute accuracy of SS-RSRQ.

##### 10.1.7B.1.1 Absolute SS-RSRQ Accuracy in FR1

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRQ in this clause apply to the serving cell in FR1.

The accuracy requirements in Table 10.1.7B.1.1-1 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.1.2 for a corresponding Band for each relevant SSB.

Table 10.1.7B.1.1-1: SS-RSRQ Intra frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±4 | ±5.5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±5 | ±5.5 | ≥-4 | 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. | | | | | | | |

### 10.1.7C Intra-frequency RSRQ accuracy requirements for FR1 SAN

#### 10.1.7C.1 Intra-frequency SS-RSRQ accuracy requirements in FR1

##### 10.1.7C.1.1 Absolute SS-RSRQ Accuracy in FR1

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

The accuracy requirements in Table 10.1.7C.1.1-1 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 relevant SSB.

- Valid information for the SAN serving the target cell has been provided.

Table 10.1.7C.1.1-1: SS-RSRQ Intra frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±[2.5] | ±[4] | ≥-3 | NR\_FDD\_SAB\_FR1\_A | -121 | -118 | N/A | -50 |
| ±[3.5] | ±[4] | ≥-6 | 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. | | | | | | | |

### 10.1.8 Intra-frequency RSRQ accuracy requirements for FR2

#### 10.1.8.1 Intra-frequency SS-RSRQ accuracy requirements in FR2

##### 10.1.8.1.1 Absolute SS-RSRQ Accuracy in FR2

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

The accuracy requirements in Table 10.1.8.1.1-1 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.

- 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 10.1.8.1.1-1: SS-RSRQ Intra frequency absolute accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 1 | | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |
| ±2.5 | ±4 | ≥-3 | Same value as SSB\_RP in Table B.2.2-2, 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 SSB 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. | | | | | |

#### 10.1.8.2 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 bandwidth of CSI-RS is 48 PRBs and the density is 3.

• The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.8.2.1-1.

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

Note: The reference measurement timing for one layer for intra-frequency measurement is serving cell timing.

- 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. | | | | | |

### 10.1.8B Intra-frequency RSRQ accuracy requirements for FR2 for CA/DC Idle Mode Measurements

#### 10.1.8B.1 Intra-frequency SS-RSRQ accuracy requirements in FR2

The requirements in this clause are applicable for a UE:

- in state RRC\_IDLE or RRC INACTIVE

- that is synchronised to the cell that is measured.

The requirements are for absolute accuracy of SS-RSRQ.

##### 10.1.8B.1.1 Absolute SS-RSRQ Accuracy in FR2

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRQ in this clause apply to the serving cell in FR2.

The accuracy requirements in Table 10.1.8B.1.1-1 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.1.2 for a corresponding Band for each relevant SSB.

- 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 10.1.8B.1.1-1: SS-RSRQ Intra frequency absolute accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 1 | | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |
| ±4 | ±5.5 | ≥-3 | Same value as SSB\_RP in Table B.2.2-2, according to UE Power class, operating band and angle of arrival | | -50 |
| ±5 | ±5.5 | ≥-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 SSB 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. | | | | | |

### 10.1.9 Inter-frequency RSRQ accuracy requirements for FR1

#### 10.1.9.1 Inter-frequency SS-RSRQ accuracy requirements in FR1

##### 10.1.9.1.1 Absolute Accuracy of SS-RSRQ in FR1

The requirements for absolute accuracy of SS-RSRQ 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 this clause are also applicable when *highSpeedMeasInterFreq-r17* is configured.

The accuracy requirements in Table 10.1.9.1.1-1 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.

Table 10.1.9.1.1-1: SS-RSRQ Inter frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±2.5 | ±4 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±3.5 | ±4 | ≥-6 | 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. | | | | | | | |

##### 10.1.9.1.2 Relative Accuracy of SS-RSRQ in FR1

The relative accuracy of SS-RSRQ in inter frequency case is defined as the RSRQ measured from one cell on a frequency in FR1 compared to the RSRP measured from another cell on a different frequency in FR1. The accuracy requirements in this clause are also applicable when *highSpeedMeasInterFreq-r17* is configured.

The accuracy requirements in Table 10.1.9.1.2-1 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 each relevant SSB.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

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

Table 10.1.9.1.2-1: SS-RSRQ Inter frequency relative accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 2 | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±3 | ±4 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±4 | ±4 | ≥-6 | 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 SSB Ês/Iot is the minimum SSB 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. | | | | | | | |

#### 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 bandwidth of CSI-RS is 48 PRBs and the density is 3.

• The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.9.2.1-1.

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

Note: The reference measurement timing for one layer for inter-frequency measurement is up to UE implementation and shall be based on the timing of one of the target cells.

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 bandwidth of CSI-RS is 48 PRBs and the density is 3.

• The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.9.2.2-1.

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

Note: The reference measurement timing for one layer for inter-frequency measurement is up to UE implementation and shall be based on the timing of one of the target cells.

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. | | | | | | | | |

### 10.1.9B Inter-frequency RSRQ accuracy requirements for FR1 for CA/DC Idle Mode Measurements

#### 10.1.9B.1 Inter-frequency SS-RSRQ accuracy requirements in FR1

The requirements in this clause are applicable for a UE:

- in state RRC\_IDLE or RRC INACTIVE

- that is synchronised to the cell that is measured.

The requirements are for absolute accuracy of SS-RSRQ.

##### 10.1.9B.1.1 Absolute Accuracy of SS-RSRQ in FR1

The requirements for absolute accuracy of SS-RSRQ 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 10.1.9B.1.1-1 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.1.3 for a corresponding Band for each relevant SSB.

Table 10.1.9B.1.1-1: SS-RSRQ Inter frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±4 | ±5.5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±5 | ±5.5 | ≥-4 | 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. | | | | | | | |

### 10.1.9C Inter-frequency RSRQ accuracy requirements for FR1 SAN

#### 10.1.9C.1 Inter-frequency SS-RSRQ accuracy requirements in FR1

##### 10.1.9C.1.1 Absolute Accuracy of SS-RSRQ in FR1

The requirements for absolute accuracy of SS-RSRQ 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 10.1.9C.1.1-1 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.

- Valid information for the SAN serving the target cell has been provided.

Table 10.1.9C.1.1-1: SS-RSRQ Inter frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±[2.5] | ±[4] | ≥-3 | NR\_FDD\_SAB\_FR1\_A | -121 | -118 | N/A | -50 |
| ±[3.5] | ±[4] | ≥-6 | 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. | | | | | | | |

##### 10.1.9C.1.2 Relative Accuracy of SS-RSRQ in FR1

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

The accuracy requirements in Table 10.1.9C.1.2-1 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 each relevant SSB.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

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

- Valid information for the SAN serving the target cell has been provided.

Table 10.1.9C.1.2-1: SS-RSRQ Inter frequency relative accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 2 | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±[3] | ±[4] | ≥-3 | NR\_FDD\_SAB\_FR1\_A | -121 | -118 | N/A | -50 |
| ±[4] | ±[4] | ≥-6 | 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 SSB Ês/Iot is the minimum SSB 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. | | | | | | | |

### 10.1.10 Inter-frequency RSRQ accuracy requirements for FR2

#### 10.1.10.1 Inter-frequency SS-RSRQ accuracy requirements in FR2

##### 10.1.10.1.1 Absolute Accuracy of SS-RSRQ in FR2

The requirements for absolute accuracy of SS-RSRQ 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 10.1.10.1.1-1 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 SSB.

- 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 10.1.10.1.1-1: SS-RSRQ Inter frequency absolute accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 1 | | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |
| ±2.5 | ±4 | ≥-3 | Same value as SSB\_RP in Table B.2.2-2, 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 SSB 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. | | | | | |

##### 10.1.10.1.2 Relative Accuracy of SS-RSRQ in FR2

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

The accuracy requirements in Table 10.1.10.1.2-1 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 each relevant SSB.

- |SSB\_RP1dBm - SSB\_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].

Table 10.1.10.1.2-1: SS-RSRQ Inter frequency relative accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 1 | | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |
| ±3 | ±4 | ≥-3 | Same value as SSB\_RP in Table B.2.2-2, 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 SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  Note 4: In the test cases, the SSB 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 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 bandwidth of CSI-RS is 48 PRBs and the density is 3.

• The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.10.2.1-1.

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

Note: The reference measurement timing for one layer for inter-frequency measurement is up to UE implementation and shall be based on the timing of one of the target cells.

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 bandwidth of CSI-RS is 48 PRBs and the density is 3.

• The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.10.2.2-1.

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

Note: The reference measurement timing for one layer for inter-frequency measurement is up to UE implementation and shall be based on the timing of one of the target cells.

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. | | | | | |

### 10.1.10B Inter-frequency RSRQ accuracy requirements for FR2 for CA/DC Idle Mode Measurements

#### 10.1.10B.1 Inter-frequency SS-RSRQ accuracy requirements in FR2

The requirements in this clause are applicable for a UE:

- in state RRC\_IDLE or RRC INACTIVE

- that is synchronised to the cell that is measured.

The requirements are for absolute accuracy of SS-RSRQ.

##### 10.1.10B.1.1 Absolute Accuracy of SS-RSRQ in FR2

The requirements for absolute accuracy of SS-RSRQ 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 10.1.10B.1.1-1 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.1.3 for a corresponding Band for each relevant SSB.

- 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 10.1.10B.1.1-1: SS-RSRQ Inter frequency absolute accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 1 | | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |
| ±4 | ±5.5 | ≥-3 | Same value as SSB\_RP in Table B.2.2-2, according to UE Power class, operating band and angle of arrival | | -50 |
| ±5 | ±5.5 | ≥-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 SSB 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. | | | | | |

### 10.1.11 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 |
| SS-RSRQ\_0 | SS-RSRQ<-43 | dB |
| SS-RSRQ\_1 | -43≤ SS-RSRQ<-42.5 | dB |
| SS-RSRQ\_2 | -42.5≤ SS-RSRQ<-42 | dB |
| SS-RSRQ\_3 | -42≤ SS-RSRQ<-41.5 | dB |
| SS-RSRQ\_4 | -41.5≤ SS-RSRQ<-41 | dB |
| .. | .. | … |
| SS-RSRQ\_122 | 17.5≤ SS-RSRQ<18 | dB |
| SS-RSRQ\_123 | 18≤ SS-RSRQ<18.5 | dB |
| SS-RSRQ\_124 | 18.5≤ SS-RSRQ<19 | dB |
| SS-RSRQ\_125 | 19≤ SS-RSRQ<19.5 | dB |
| SS-RSRQ\_126 | 19.5≤ SS-RSRQ<20 | dB |
| SS-RSRQ\_127 | 20 ≤ SS-RSRQ | dB |

### 10.1.12 Intra-frequency SINR accuracy requirements for FR1

#### 10.1.12.1 Intra-frequency SS-SINR accuracy requirements in FR1

##### 10.1.12.1.1 Absolute SS-SINR Accuracy in FR1

Unless otherwise specified, the requirements for absolute accuracy of SS-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 10.1.12.1.1-1 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.

Table 10.1.12.1.1-1: SS-SINR Intra frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 3 | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±3.0 | ±4 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±3.5 | ±4 | ≥-6 | 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: The requirements apply for SSB Ês/Iot ≤ 25 dB under non-HST scenarios.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: The requirements apply for SSB Ês/Iot ≤5 dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | |

#### 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 CP.

• Note: The reference measurement timing for intra-frequency measurement is serving cell timing.

- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

• The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.12.2.1-1.

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 ≤XdB. X=15 if timing offset between the reference measurement timing and the target CSI-RS is no larger than 0.5\*CP, and X=4 if timing offset between the reference measurement timing and the target CSI-RS is larger than 0.5\*CP but no larger than CP. | | | | | | | | |

### 10.1.12C Intra-frequency SINR accuracy requirements for FR1 SAN

#### 10.1.12C.1 Intra-frequency SS-SINR accuracy requirements in FR1

##### 10.1.12C.1.1 Absolute SS-SINR Accuracy in FR1

Unless otherwise specified, the requirements for absolute accuracy of SS-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 10.1.12C.1.1-1 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.

- Valid information for the SAN serving the target cell has been provided.

Table 10.1.12C.1.1-1: SS-SINR Intra frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 3 | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±[3] | ±[4] | ≥-3 | NR\_FDD\_SAB\_FR1\_A | -121 | -118 | N/A | -50 |
| ±[3.5] | ±[4] | ≥-6 | 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: The requirements apply for SSB Ês/Iot ≤ 25 dB under non-HST scenarios.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: The requirements apply for SSB Ês/Iot ≤5 dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | |

### 10.1.13 Intra-frequency SINR accuracy requirements for FR2

#### 10.1.13.1 Intra-frequency SS-SINR accuracy requirements in FR2

##### 10.1.13.1.1 Absolute SS-SINR Accuracy in FR2

Unless otherwise specified, the requirements for absolute accuracy of SS-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 10.1.13.1.1-1 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.

- 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 10.1.13.1.1-1: SS-SINR Intra frequency absolute accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 1 | | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |
| ±3 | ±4 | ≥-3 | Same value as SSB\_RP in Table B.2.2-2, 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 SSB 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 SSB Ês/Iot ≤ 25 dB. | | | | | |

#### 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 CP.

• Note: The reference measurement timing for intra-frequency measurement is serving cell timing.

- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

• The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.13.2.1-1.

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 ≤XdB. X=15 if timing offset between the reference measurement timing and the target CSI-RS is no larger than 0.5\*CP, and X=4 if timing offset between the reference measurement timing and the target CSI-RS is larger than 0.5\*CP but no larger than CP. | | | | | |

### 10.1.14 Inter-frequency SINR accuracy requirements for FR1

#### 10.1.14.1 Inter-frequency SS-SINR accuracy requirements in FR1

##### 10.1.14.1.1 Aboslute Accuracy of SS-SINR in FR1

The requirements for absolute accuracy of SS-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 10.1.14.1.1-1 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.

Table 10.1.14.1.1-1: SS-SINR Inter frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 3 | Io Note 1 range | | | | |
|  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±3.0 | ±4 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±3.5 | ±4 | ≥-6 | 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: The requirements apply for SSB Ês/Iot ≤ 25 dB.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: The requirements apply for SSB Ês/Iot ≤ [5] dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | |

##### 10.1.14.1.2 Relative Accuracy of SS-SINR in FR1

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

The accuracy requirements in Table 10.1.14.1.2-1 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.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

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

Table 10.1.14.1.2-1: SS-SINR Inter frequency relative accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 2,4 | NR operating band groups Note 5 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 120 kHz | SCSSSB = 240 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±3.5 | ±4 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±4 | ±4 | ≥-6 | 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 SSB Ês/Iot is the minimum SSB 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: The requirements apply for SSB Ês/Iot ≤ [25] dB.  NOTE 5: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 6: The requirements apply for SSB Ês/Iot ≤ [5] dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | |

#### 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 CP.

• Note: The reference measurement timing for inter-frequency measurement is up to UE implementation and shall be based on the timing of one of the target cells.

- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

• The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.14.2.1-1.

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 ≤XdB. X=15 if timing offset between the reference measurement timing and the target CSI-RS is no larger than 0.5\*CP, and X=4 if timing offset between the reference measurement timing and the target CSI-RS is larger than 0.5\*CP but no larger than CP. | | | | | | | | |

##### 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 CP.

* Note: The reference measurement timing for inter-frequency measurement is up to UE implementation and shall be based on the timing of one of the target cells.

- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

• The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.14.2.2-1.

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 ≤ XdB. X=15 if timing offset between the reference measurement timing and the target CSI-RS is no larger than 0.5\*CP, and X=4 if timing offset between the reference measurement timing and the target CSI-RS is larger than 0.5\*CP but no larger than CP. | | | | | | | | |

### 10.1.14C Inter-frequency SINR accuracy requirements for FR1 SAN

#### 10.1.14C.1 Inter-frequency SS-SINR accuracy requirements in FR1

##### 10.1.14C.1.1 Aboslute Accuracy of SS-SINR in FR1

The requirements for absolute accuracy of SS-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 10.1.14C.1.1-1 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.

- Valid information for the SAN serving the target cell has been provided.

Table 10.1.14C.1.1-1: SS-SINR Inter frequency absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 3 | Io Note 1 range | | | | |
|  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±[3] | ±[4] | ≥-3 | NR\_FDD\_SAB\_FR1\_A | -121 | -118 | N/A | -50 |
| ±[3.5] | ±[4] | ≥-6 | 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: The requirements apply for SSB Ês/Iot ≤ 25 dB.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

##### 10.1.14C.1.2 Relative Accuracy of SS-SINR in FR1

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

The accuracy requirements in Table 10.1.14C.1.2-1 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.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

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

- Valid information for the SAN serving the target cell has been provided.

Table 10.1.14C.1.2-1: SS-SINR Inter frequency relative accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 2,4 | NR operating band groups Note 5 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 120 kHz | SCSSSB = 240 kHz |  |  |
| ±[3.5] | ±[4] | ≥-3 | NR\_FDD\_SAB\_FR1\_A | -121 | -118 | N/A | -50 |
| ±[4] | ±[4] | ≥-6 | 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 SSB Ês/Iot is the minimum SSB 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: The requirements apply for SSB Ês/Iot ≤ [25] dB.  NOTE 5: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

### 10.1.15 Inter-frequency SINR accuracy requirements for FR2

#### 10.1.15.1 Inter-frequency SS-SINR accuracy requirements in FR2

##### 10.1.15.1.1 Aboslute Accuracy of SS-SINR in FR2

The requirements for absolute accuracy of SS-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 10.1.15.1.1-1 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.

- 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 10.1.15.1.1-1: SS-SINR Inter frequency absolute accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 1 | | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |
| ±3 | ±4 | ≥-3 | Same value as SSB\_RP in Table B.2.2-2, 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 SSB 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 SSB Ês/Iot ≤ 25 dB. | | | | | |

##### 10.1.15.1.2 Relative Accuracy of SS-SINR in FR2

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

The accuracy requirements in Table 10.1.15.1.2-1 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.

- |SSB\_RP1dBm - SSB\_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].

Table 10.1.15.1.2-1: SS-SINR Inter frequency relative accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 1 | | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |
| ±3.5 | ±4 | ≥-3 | Same value as SSB\_RP in Table B.2.2-2, 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: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  Note 4: In the test cases, the SSB 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 5: The requirements apply for SSB Ês/Iot ≤ 25 dB. | | | | | |

#### 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 CP.

• Note: The reference measurement timing for inter-frequency measurement is up to UE implementation and shall be based on the timing of one of the target cells.

- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

• The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.15.2.1-1.

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 ≤XdB. X=15 if timing offset between the reference measurement timing and the target CSI-RS is no larger than 0.5\*CP, and X=4 if timing offset between the reference measurement timing and the target CSI-RS is larger than 0.5\*CP but no larger than CP. | | | | | |

##### 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 CP.

• Note: The reference measurement timing for inter-frequency measurement is up to UE implementation and shall be based on the timing of one of the target cells.

- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

• The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.15.2.2-1.

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 ≤XdB. X=15 if timing offset between the reference measurement timing and the target CSI-RS is no larger than 0.5\*CP, and X=4 if timing offset between the reference measurement timing and the target CSI-RS is larger than 0.5\*CP but no larger than CP. | | | | | |

### 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 |

### 10.1.17 Power Headroom

#### 10.1.17.1 Power Headroom Report

##### 10.1.17.1.1 Power Headroom Report Mapping

The power headroom reporting range is from -32 ...+38 dB. Table 10.1.17.1-1 defines the report mapping.

Table 10.1.17.1-1: Power headroom report mapping

|  |  |
| --- | --- |
| Reported value | Measured quantity value (dB) |
| POWER\_HEADROOM\_0 | PH < -32 |
| POWER\_HEADROOM\_1 | -32 ≤ PH < -31 |
| POWER\_HEADROOM\_2 | -31 ≤ PH < -30 |
| POWER\_HEADROOM\_3 | -30 ≤ PH < -29 |
| … | … |
| POWER\_HEADROOM\_53 | 20  PH  21 |
| POWER\_HEADROOM\_54 | 21  PH  22 |
| POWER\_HEADROOM\_55 | 22  PH  24 |
| POWER\_HEADROOM\_56 | 24  PH  26 |
| POWER\_HEADROOM\_57 | 26  PH  28 |
| POWER\_HEADROOM\_58 | 28  PH  30 |
| POWER\_HEADROOM\_59 | 30  PH  32 |
| POWER\_HEADROOM\_60 | 32  PH  34 |
| POWER\_HEADROOM\_61 | 34  PH  36 |
| POWER\_HEADROOM\_62 | 36  PH  38 |
| POWER\_HEADROOM\_63 | PH ≥ 38 |

### 10.1.18 PCMAX,c,f

The UE is required to report the UE configured maximum output power (PCMAX,c,f) together with the power headroom. This clause defines the requirements for the PCMAX,c,f reporting.

#### 10.1.18.1 Report Mapping

The PCMAX,c,f reporting range is defined from -29 dBm to 33 dBm with 1 dB resolution. Table 10.1.18.1-1 defines the reporting mapping.

Table 10.1.18.1-1 Mapping of PCMAX,c.f

|  |  |  |
| --- | --- | --- |
| Reported value | Measured quantity value | Unit |
| PCMAX\_C\_00 | PCMAX,c,f < -29 | dBm |
| PCMAX\_C\_01 | -29 ≤ PCMAX,c,f < -28 | dBm |
| PCMAX\_C\_02 | -28 ≤ PCMAX,c,f < -27 | dBm |
| … | … | … |
| PCMAX\_C\_61 | 31 ≤ PCMAX,c,f < 32 | dBm |
| PCMAX\_C\_62 | 32 ≤ PCMAX,c,f < 33 | dBm |
| PCMAX\_C\_63 | 33 ≤ PCMAX,c,f | dBm |

### 10.1.19 L1-RSRP accuracy requirements for FR1

#### 10.1.19.1 SSB based L1-RSRP accuracy requirements

Unless otherwise specified, the requirements for absolute accuracy and relative accuracy of SSB based L1-RSRP in this clause apply to all SSBs of the serving cell configured for L1-RSRP measurement and all SSBs of cell(s) with different PCI from serving cell configured for L1-RSRP measurement in FR1.

##### 10.1.19.1.1 Absolute Accuracy

The accuracy requirements in Table 10.1.19.1.1-1 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 L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

Table 10.1.19.1.1-1: SSB based L1-RSRP absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -121 | -118 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -70 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -70 |
| ±5.0 | ±9.5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -70 |
| ±8.5 | ±11.5 | ≥-3 | 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 | -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. | | | | | | | |

##### 10.1.19.1.2 Relative Accuracy

The relative accuracy of SSB based L1-RSRP is defined as the L1-RSRP measured from one SSB compared to the largest measured value of L1-RSRP among all SSBs of the cell (serving cell or cell with different PCI from serving cell) on which UE performs L1-RSRP measurements.

The accuracy requirements in Table 10.1.19.1.2-1 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 L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

Table 10.1.19.1.2-1: SSB based L1-RSRP relative accuracy in FR1

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

#### 10.1.19.2 CSI-RS based L1-RSRP accuracy requirements

##### 10.1.19.2.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RS based L1-RSRP in this clause apply to all CSI-RS resources of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.19.2.1-1 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 L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.

- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.19.2.1-1.

Table 10.1.19.2.1-1: CSI-RS based L1-RSRP 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 |
| ±5.0 | ±9.5 | ≥-3 | 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 |
| ±8.5 | ±11.5 | ≥-3 | 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. | | | | | | | | |

##### 10.1.19.2.2 Relative Accuracy

The relative accuracy of CSI-RS based L1-RSRP is defined as the L1-RSRP measured from one CSI-RS compared to the largest measured value of L1-RSRP among all CSI-RS resources of the serving cell.

The accuracy requirements in Table 10.1.19.2.2-1 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 L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.

- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.19.2.2-1.

Table 10.1.19.2.2-1: CSI-RS based L1-RSRP 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 |
| ±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 |
| 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. | | | | | | | | |

### 10.1.19C L1-RSRP accuracy requirements for FR1 SAN

#### 10.1.19C.1 SSB based L1-RSRP accuracy requirements

##### 10.1.19C.1.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SSB based L1-RSRP in this clause apply to all SSBs of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.19C.1.1-1 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 L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

- Valid information for the SAN serving the target cell has been provided.

Table 10.1.19C.1.1-1: SSB based L1-RSRP absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±[5] | ±[9.5] | ≥-3 | NR\_FDD\_SAB\_FR1\_A | -121 | -118 | N/A | -70 |
| ±[8.5] | ±[11.5] | ≥-3 | NR\_FDD\_SAB\_FR1\_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. | | | | | | | |

##### 10.1.19C.1.2 Relative Accuracy

The relative accuracy of SSB based L1-RSRP is defined as the L1-RSRP measured from one SSB compared to the largest measured value of L1-RSRP among all SSBs of the serving cell.

The accuracy requirements in Table 10.1.19C.1.2-1 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 L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

- Valid information for the SAN serving the target cell has been provided.

Table 10.1.19C.1.2-1: SSB based L1-RSRP relative accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±[3] | ±[4] | ≥-3 | NR\_FDD\_SAB\_FR1\_A | -121 | -118 | N/A | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of SSBs to which the requirement applies.  NOTE 3: Void  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

### 10.1.20 L1-RSRP accuracy requirements for FR2

#### 10.1.20.1 SSB based L1-RSRP accuracy requirements

Unless otherwise specified, the requirements for absolute accuracy and relative accuracy of SSB based L1-RSRP in this clause apply to all SSBs of the serving cell configured for L1-RSRP measurement and all SSBs of cell(s) with different PCI from serving cell configured for L1-RSRP measurement in FR2.

##### 10.1.20.1.1 Absolute Accuracy

The accuracy requirements in Table 10.1.20.1.1-1 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 L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

- 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 10.1.20.1.1-1: SSB based L1-RSRP absolute accuracy in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | |
|  |  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 2 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |  |
| ±6.5 | ±9.5 | ≥-3 | Same value as SSB\_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival | | N/A | -70 |
| ±8.5 | ±11.5 | ≥-3 | N/A | | -70 | -50 |
| NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  NOTE 2: 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 3: In the test cases, the SSB 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. | | | | | | |

##### 10.1.20.1.2 Relative Accuracy

The relative accuracy of SSB based L1-RSRP is defined as the L1-RSRP measured from one SSB compared to the largest measured value of L1-RSRP among all SSBs of the cell (serving cell or cell with different PCI from serving cell) on which UE performs L1-RSRP measurements.

The accuracy requirements in Table 10.1.20.1.2-1 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 L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

- 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 10.1.20.1.2-1: SSB based L1-RSRP relative accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 3 | | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |
| ±6.5 | ±9.5 | ≥-3 | Same value as SSB\_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival | | -50 |
| NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of SSBs to which the requirement applies.  NOTE 3: 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 4: In the test cases, the SSB 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. | | | | | |

#### 10.1.20.2 CSI-RS based L1-RSRP accuracy requirements

##### 10.1.20.2.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RS based L1-RSRP in this clause apply to all CSI-RS resources of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.20.2.1-1 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 L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.

- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

- 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 performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.20.2.1-1.

Table 10.1.20.2.1-1: CSI-RS based L1-RSRP absolute accuracy in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 1 range | | | |
|  |  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 2 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |  |
| ±6.5 | ±9.5 | ≥-3 | Same value as CSI-RS\_RP in Table B.2.4.2-2, according to UE Power class, operating band and angle of arrival | | N/A | -70 |
| ±8.5 | ±11.5 | ≥-3 | N/A | | -70 | -50 |
| NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  NOTE 2: 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 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. | | | | | | |

##### 10.1.20.2.2 Relative Accuracy

The relative accuracy of CSI-RS based L1-RSRP is defined as the L1-RSRP measured from one CSI-RS compared to the largest measured value of L1-RSRP among all CSI-RS resources of the serving cell.

The accuracy requirements in Table 10.1.20.2.2-1 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 L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.

- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

- 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 performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.20.2.2-1.

Table 10.1.20.2.2-1: CSI-RS based L1-RSRP relative accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 1 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS | | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |
| ±6.5 | ±9.5 | ≥-3 | Same value as CSI-RS RP in Table B.2.4.2-2, according to UE Power class, operating band and angle of arrival | | -50 |
| NOTE 1: Io specified at the Reference point, and 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: 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 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. | | | | | |

### 10.1.21 SFTD accuracy requirements

#### 10.1.21.1 SFTD acuracy requirements for NE-DC

The SFN and frame timing difference (SFTD) is measured between PCell and E-UTRAN PSCell under NE-DC.

The accuracy requirements in Table 10.1.21.1-4 are appilicable under the following conditions:

For FR1 PCell SFN and frame timing measurement:

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

- Io range deifined in Table 10.1.21.1-1.

Table 10.1.21.1-1: PCell Io range conditions in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Io Note 1 range | | | |
|  | NR operating band groups Note 4, 5 | Minimum Io Note 2, 3 | | Maximum Io |
|  |  | dBm/ SCSSSB | | dBm/BWChannel |
|  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |
| Conditions | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | -121 | -118 | -50 |
|  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | -50 |
|  | NR\_TDD\_FR1\_C | -120 | -117 | -50 |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -50 |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -50 |
|  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | -50 |
|  | NR\_FDD\_FR1\_G | -118 | -115 | -50 |
|  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The condition level is increased by ΔRIB,c as defined in clause 7.3B in TS 38.101-3 [20], depending on E-UTRA – NR band combination.  NOTE 3: The condition level is increased by MSD as defined in clause 7.3B in TS 38.101-3 [20], if applicable depending on E-UTRA – NR band combination.  NOTE 4: NR operating band groups are as defined in clause 3.5.  NOTE 5: Only NR bands within EN-DC band combinations as specified in clause 5.5B in TS 38.101-3 [20] are applicable. | | | | |

For FR2 PCell SFN and frame timing measurement:

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

- Io range deifined in Table 10.1.21.1-2.

Table 10.1.21.1-2: PCell Io range conditions in FR2

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Io Note 1 range | | |
|  | Minimum Io Note 2, 3 | | Maximum Io |
|  | dBm/ SCSSSB | | dBm/BWChannel |
|  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |
| Conditions | Same value as SSB\_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival | Same value as SSB\_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth and specified at the Reference point.  NOTE 2: 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 3: In the test cases, the SSB 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. | | | |

For E-UTRA PSCell SFN and frame timing measurement:

- Cell specific reference signals are transmitted either from one, two or four antenna ports.

- Conditions defined in TS 36.101 [25] Clause 7.3 for reference sensitivity are fulfilled.

- No changes to the uplink transmission timing are applied during the measurement period.

- RSRP|dBm according to Annex B.3.5 in TS 36.101 [25] for a corresponding Band.

- Io range deifined in Table 10.1.21.1-3.

Table 10.1.21.1-3: E-UTRA PSCell Io range conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Io Note 1 range | | |
|  | E-UTRA operating band groups Note 3 | Minimum Io | Maximum Io |
| Conditions |  | dBm/15kHz Note 2 | dBm/BWChannel |
|  | FDD\_A, TDD\_A | -121 | -50 |
|  | FDD\_C, TDD\_C | -120 | -50 |
|  | FDD\_D | -119.5 | -50 |
|  | FDD\_E, TDD\_E | -119 | -50 |
|  | FDD\_F | -118.5 | -50 |
|  | FDD\_G | -118 | -50 |
|  | FDD\_H | -117.5 | -50 |
|  | FDD\_N | -114.5 | -50 |
| NOTE 1: When in dBm/15kHz, the minimum Io condition is expressed as the average Io per RE over all REs in that symbol. Io may be different in different symbols within a subframe.  NOTE 2: The condition level is increased by ∆>0, when applicable, as described in clauses B.4.2 and B.4.3 in TS36.133 [15].  NOTE 3: E-UTRA operating band groups are as defined in clause 3.5 in TS 36.133 [15]. | | | |

Table 10.1.21.1-4: SFTD measurement accuracy

|  |  |  |
| --- | --- | --- |
| Accuracy | Conditions | |
|  | Ês/Iot Note 2 | Frequency range |
| Ts Note 1 | dB |  |
| 40\*64\*Tc | ≥-3 | FR1 |
| 40\*64\*Tc |  | FR2 |
| NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies. | | |

#### 10.1.21.2 SFTD acuracy requirements for NR-DC

The SFN and frame timing difference (SFTD) is measured between PCell in FR1 and PSCell in FR2 under NR dual connectivity.

The accuracy requirements in Table 10.1.21.2-3 are appilicable under the following conditions:

For FR1 PCell SFN and frame timing measurement:

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

- Io range deifined in Table 10.1.21.2-1.

Table 10.1.21.2-1: PCell Io range conditions in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Io Note 1 range | | | |
|  | NR operating band groups Note 2 | Minimum Io | | Maximum Io |
|  |  | dBm/ SCSSSB | | dBm/BWChannel |
|  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |
| Conditions | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | -121 | -118 | -50 |
|  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | -50 |
|  | NR\_TDD\_FR1\_C | -120 | -117 | -50 |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -50 |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -50 |
|  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | -50 |
|  | NR\_FDD\_FR1\_G | -118 | -115 | -50 |
|  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups are as defined in clause 3.5.2. | | | | |

For FR2 PSCell SFN and frame timing measurement:

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

- Io range deifined in Table 10.1.21.2-2.

- 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 10.1.21.2-2: PSCell Io range conditions in FR2

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Io Note 1 range | | |
|  | Minimum Io Note 2, 3 | | Maximum Io |
|  | dBm/ SCSSSB | | dBm/BWChannel |
|  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |
| Conditions | Same value as SSB\_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival | Same value as SSB\_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth and specified at the Reference point.  NOTE 2: 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 3: In the test cases, the SSB 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. | | | |

**Table 10.1.21.2-3: SFTD measurement accuracy**

|  |  |  |
| --- | --- | --- |
| Accuracy | Conditions | |
|  | Ês/Iot Note 2 | Frequency range |
| Ts Note 1 | dB |  |
| 40\*64\*Tc | ≥ -3 | Between FR1 and FR2 |
| NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies. | | |

#### 10.1.21.3 Inter frequency SFTD acuracy requirements

The SFN and frame timing difference (SFTD) is measured between PCell and inter-frequency neighbour cell.

The accuracy requirements in Table 10.1.21.3-3 are appilicable under the following conditions:

For FR1 PCell, inter frequency neighbour cell SFN and frame timing measurement:

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

- Io range deifined in Table 10.1.21.3-1.

Table 10.1.21.3-1: PCell, inter frequency neighbour cell Io range conditions in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Io Note 1 range | | | |
|  | NR operating band groups Note 2 | Minimum Io | | Maximum Io |
|  |  | dBm/ SCSSSB | | dBm/BWChannel |
|  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |
| Conditions | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | -121 | -118 | -50 |
|  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | -50 |
|  | NR\_TDD\_FR1\_C | -120 | -117 | -50 |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | -50 |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | -50 |
|  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | -50 |
|  | NR\_FDD\_FR1\_G | -118 | -115 | -50 |
|  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups are as defined in clause 3.5.2. | | | | |

For FR2 PCell, inter frequency neighbour cell SFN and frame timing measurement:

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

- Io range deifined in Table 10.1.21.3-2.

- 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 10.1.21.3-2: PCell, inter frequency neighbour cell Io range conditions in FR2

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Io Note 1 range | | |
|  | Minimum Io Note 2, 3 | | Maximum Io |
|  | dBm/ SCSSSB | | dBm/BWChannel |
|  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |
| Conditions | Same value as SSB\_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival | Same value as SSB\_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth and specified at the Reference point.  NOTE 2: 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 3: In the test cases, the SSB 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. | | | |

Table 10.1.21.3-3: Inter frequency SFTD measurement accuracy

|  |  |  |
| --- | --- | --- |
| Accuracy | Conditions | |
|  | Ês/Iot Note 2 | Frequency range |
| Ts Note 1 | dB |  |
| 40\*64\*Tc | ≥ -3 | FR1, FR2 |
| NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies. | | |

### 10.1.22 CLI measurement accuracy requirements

#### 10.1.22.1 SRS-RSRP

##### 10.1.22.1.1 SRS-RSRP Accuracy

The SRS-RSRP measurement reported by the UE shall fulfil the accuracy requirements defined in Table 10.1.22.1.1-1 for FR1 and Table 10.1.22.1.1-2 for FR2, provided that the following conditions are met. The accuracy requirements in this clause are derived based on AWGN radio propagation conditions.

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

- Conditions for SRS-RSRP measurements are fulfilled according to Annex B.2.z for a corresponding Band for each relevant SRS resource configured for measurement.

- The time difference between UE’s DL reference timing in the serving cell and SRS arrival time is no larger than Terror\_SRS\_RSRP, where

- Terror\_SRS\_RSRP = TC × NTA\_offset + 4.67us for FR1

- Terror\_SRS\_RSRP = TC × NTA\_offset + 3.67us for FR2

- NTA\_offset is defined in Table 7.1.2-2

- TC is 0.509ns

- The number of SRS ports in the SRS resource configured for measurement is 1,

- The number of symbols in the SRS resource configured for measurement is 1,

- The number of repetitions in the SRS resource configured for measurement is 1,

- Frequency hopping, sequence group hopping or sequence hopping is disabled in the SRS resource configured for measurement,

- The bandwidth of the SRS resource is 48 PRBs.

- One of the following conditions is met

- There is no other SRS resource with the same root sequence and on the same symbol and with same comb as the relevant SRS resource.

- If multiple SRS resources are on the same symbol and with same comb, the distance between cyclic shifts of any two resources is no less than 6 if transmissionComb = n4, and no less than 4 if transmissionComb = n2.

Table 10.1.22.1.1-1: SRS-RSRP absolute accuracy in FR1

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | | | | | Conditions | | | | | | |
| Normal condition | | | Extreme condition | | | SRS Ês/Iot | Io Note 1 range | | | | | |
|  | | |  | | |  | NR operating band groups Note 2 | Minimum Io | | | | Maximum Io |
| dB | | | | | | dB |  | dBm / SCSSRS | | | dBm/BW Channel | dBm/BW Channel |
| SCSSRS (kHz) | | | SCSSRS (kHz) | | |  |  |  | | |  |  |
| 15 | 30 | 60 | 15 | 30 | 60 |  |  | SCSSRS = 15 kHz | SCSSRS = 30 kHz | SCSSRS = 60 kHz |  |  |
| ±3 | ±3.5 | ±5 | ±7.5 | ±8 | ±9.5 | ≥1 | NR\_TDD\_FR1\_A, | -120 | -117 | -114 | N/A | -70 |
|  |  |  |  |  |  |  | NR\_TDD\_FR1\_C | -119 | -116 | -113 | N/A | -70 |
|  |  |  |  |  |  |  | NR\_TDD\_FR1\_D | -118.5 | -115.5 | -112.5 | N/A | -70 |
|  |  |  |  |  |  |  | NR\_TDD\_FR1\_E | -118 | -115 | -112 | N/A | -70 |
| ±6.5 | ±7 | ±8.5 | ±9.5 | ±10 | ±11.5 | ≥1 | NR\_TDD\_FR1\_A,  NR\_TDD\_FR1\_C, NR\_TDD\_FR1\_D, NR\_TDD\_FR1\_E | 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. | | | | | | | | | | | | |

Table 10.1.22.1.1-2: SRS-RSRP absolute accuracy in FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | | | Conditions | | | | |
| Normal condition | | Extreme condition | | SRS Ês/Iot | Io Note 1 range | | | |
|  | |  | |  | Minimum Io | | | Maximum Io |
| dB | | | | dB | dBm / SCSSRS Note 2 | | dBm/BWChannel | dBm/BWChannel |
| SCSSRS (kHz) | | SCSSRS (kHz) | |  | SCSSRS = | SCSSRS = |  |  |
| 60 | 120 | 60 | 120 |  | 60kHz | 120kHz |  |  |
| ±6 | ±8.5 | ±9 | ±11.5 | ≥1 | Same value as SRS\_RP in Table B.2.7-2, according to UE Power class, operating band and angle of arrival | | N/A | -70 |
| ±9 | ±11.5 | ±11 | ±13.5 | ≥1 | N/A | | -70 | -50 |
| NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  NOTE 2: 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 3: In the test cases, the SSB 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. | | | | | | | | |

##### 10.1.22.1.2 SRS-RSRP report mapping

The reporting range of SRS-RSRP is defined from -140 dBm to -44 dBm with 1 dB resolution. The mapping of measured quantity is defined in Table 10.1.22.1.2-1. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.22.1.2-1: SRS-RSRP measurement report mapping

|  |  |  |
| --- | --- | --- |
| Reported value | Measured quantity value | Unit |
| SRS-RSRP\_0 | SRS-RSRP<-140 | dBm |
| SRS-RSRP\_1 | -140≤ SRS-RSRP<-139 | dBm |
| SRS-RSRP\_2 | -139≤ SRS-RSRP<-138 | dBm |
| SRS-RSRP\_3 | -138≤ SRS-RSRP<-137 | dBm |
| SRS-RSRP\_4 | -137≤ SRS-RSRP<-136 | dBm |
| .. | .. | … |
| SRS-RSRP\_95 | -46≤ SRS-RSRP<-45 | dBm |
| SRS-RSRP\_96 | -45≤ SRS-RSRP<-44 | dBm |
| SRS-RSRP\_97 | -44≤ SRS-RSRP | dBm |
| SRS-RSRP\_98 | Infinity |  |
| Note: ‘Infinity’ means that UE cannot detect SRS due to too strong signal to measure. | | |

#### 10.1.22.2 CLI-RSSI

##### 10.1.22.2.1 CLI-RSSI Accuracy

The CLI-RSSI measurement reported by the UE shall fulfil the accuracy requirements defined in Table 10.1.22.2.1-1 for FR1 and Table 10.1.22.2.1-2 for FR2, provided that the following conditions are met.

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

Table 10.1.22.2.1-1: CLI-RSSI absolute accuracy in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | Io Note 1 range | | | | | |
|  |  | NR operating band groups Note 2 | Minimum Io | | | | Maximum Io |
| dB | dB |  | dBm / SCSSRS | | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSSRS = 15 kHz | SCSSRS = 30 kHz | SCSSRS = 60 kHz |  |  |
| ±3.5 | ±6.5 | NR\_TDD\_FR1\_A, | -120 | -117 | -114 | N/A | -70 |
|  |  | NR\_TDD\_FR1\_C | -119 | -116 | -113 | N/A | -70 |
|  |  | NR\_TDD\_FR1\_D | -118.5 | -115.5 | -112.5 | N/A | -70 |
|  |  | NR\_TDD\_FR1\_E | -118 | -115 | -112 | N/A | -70 |
| ±5.5 | ±8.5 | Note 3 | Note 3 | Note 3 | Note 3 | -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.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement. | | | | | | | |

Table 10.1.22.2.1-2: CLI-RSSI absolute accuracy in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | Io Note 1 range | | | |
|  |  | Minimum Io | | | Maximum Io |
| dB | dB | dBm / SCSSRS Note 2 | | dBm/BWChannel | dBm/BWChannel |
|  |  | SCSSRS = 60kHz | SCSSRS = 120kHz |  |  |
| ±5 | ±8 | Same value as SRS\_RP in Table B.2.7-2, according to UE Power class, operating band and angle of arrival | | N/A | -70 |
| ±7 | ±10 | Note 4 | | -70 | -50 |
| NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  NOTE 2: 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 3: In the test cases, the SSB 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 same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement. | | | | | |

##### 10.1.22.2.2 CLI-RSSI report mapping

The reporting range of CLI-RSSI is defined from -100 dBm to -25 dBm with 1 dB resolution. The mapping of measured quantity is defined in Table 10.1.22.2.2-1. The range in the signalling may be larger than the guaranteed accuracy range. UE shall scale the measured CLI-RSSI to report a nominal RSSI equivalent to 6RB measurement with 15kHz SCS.

Table 10.1.22.2.2-1: CLI-RSSI measurement report mapping

|  |  |  |
| --- | --- | --- |
| Reported value | Measured quantity value | Unit |
| CLI-RSSI\_00 | CLI-RSSI < ‑100 | dBm |
| CLI-RSSI\_01 | -100 ≤ CLI-RSSI < ‑99 | dBm |
| CLI-RSSI\_02 | -99 ≤ CLI-RSSI < ‑98 | dBm |
| … | … | … |
| CLI-RSSI\_74 | -27 ≤ CLI-RSSI < -26 | dBm |
| CLI-RSSI\_75 | -26 ≤ CLI-RSSI < -25 | dBm |
| CLI-RSSI\_76 | -25 ≤ CLI-RSSI | dBm |

### 10.1.23 RSTD Measurements

#### 10.1.23.1 Introduction

The requirements in Clause 10.1.23 shall apply, provided the UE has received *nr-DL-TDOA-RequestLocationInformation* message from LMF via LPP [34] requesting the UE to report one or more DL RSTD measurements defined in TS 38.215 [4]. The requirements in Clause 10.1.23 shall apply:

- when UE is in RRC\_CONNECTED state and the measurement is performed with MG or without MG,

- when UE is in RRC\_INACTIVE state.

#### 10.1.23.2 Measurement Accuracy Requirements

The accuracy requirements for RSTD measurement shall be within ±(X+Y+Z+Δ) Tc.

X is defined in Table 10.1.23.2-1 for AWGN channel and Table 10.1.23.2-3 for fading channel for FR1, provided that the following conditions are met.

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

- Conditions for RSTD measurements are fulfilled according to Annex B.2.14 for a corresponding Band for each relevant PRS resource configured for measurement.

- UE does not perform positioning measurement with reduced number of samples.

X is defined in Table 10.1.23.2-2 for AWGN channel and Table 10.1.23.2-4 for fading channel for FR2, provided that the following conditions are met.

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

- Conditions for RSTD measurements are fulfilled according to Annex B.2.14 for a corresponding Band for each relevant PRS resource configured for measurement.

- UE does not perform positioning measurement with reduced number of samples.

X is defined in Table 10.1.23.2-7 for AWGN channel in FR1 provided that the following conditions are met.

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

- Conditions for RSTD measurements are fulfilled according to Annex B.2.14 for a corresponding Band for each relevant PRS resource configured for measurement.

- UE supports positioning measurement with reduced number of sample and is indicated by LMF to perform positioning measurement with reduced number of samples.

X is defined in Table 10.1.23.2-8 for AWGN channel in FR2 provided that the following conditions are met.

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

- Conditions for RSTD measurements are fulfilled according to Annex B.2.14 for a corresponding Band for each relevant PRS resource configured for measurement.

- UE supports positioning measurement with reduced number of sample and is indicated by LMF to perform positioning measurement with reduced number of samples.

Note: The requriements for fading channel in this clause are derived based on TDL-A (30 ns delay spread, 5Hz) and TDL-C (60 ns delay spread, 300 Hz) channel models for FR1 and FR2 respectively.

When UE measures RSTD on PRS resources belonging to different PFLs, then the RSTD accuracy is defined as the accuracy corresponding to the largest accuracy value among different PFLs.

If the UE doesn’t support Rx TEG reporting for RSTD measurement or when the measurements of reference cell and neighbour cell belong to different Rx TEGs, Y, Z and Δ are defined as follows:

- When UE measures RSTD on PRS resources belonging to same PFL, Y=32 Tc, provided that the time offset between the two PRS resource instances from the reference cell and the neighbor cell, which are used for a single RSTD estimate, is no greater than 160 ms.

- When UE measures RSTD on PRS resources belonging different PFLs, Y=256 Tc, provided that the time offset between the two PRS resource instances from the reference cell and the neighbor cell, which are used for a single RSTD estimate, is no greater than 1280 ms.

- Z is defined in Table 10.1.23.2-5 for FR1 and Table 10.1.23.2-6 for FR2, respectively.

- Δ is zero for single PFL, and is defined in Table 10.1.23.2-5a for FR1 and Table 10.1.23.2-6a for FR2, respectively, for dual PFL.

If the measurements of reference cell and neighbour cell belong to the same Rx TEG, i.e. associated and reported with a common Rx TEG ID, then the sum of Y+Z+Δ is equal to the timing error margin of the Rx TEG reported in *nr-UE-RxTEG-TimingErrorMargin*. The timing error margin reported via *nr-UE-RxTEG-TimingErrorMargin* cannot be larger than the value of (Y+Z+Δ) defined when the UE does not associate the measurements with the same Rx TEG.

Table 10.1.23.2-1: RSTD absolute accuracy in FR1 for AWGN channel

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth  Note 1 | PRS resource repetition ()  Note 2 | Io Note 3 range | | |
| NR operating band groups Note 4 | Minimum Io | Maximum Io |
| Tc Note 5 | dB | kHz | RB |  |  | dBm/SCS | dBm/BWChannel |
| 132 | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)*i* ≥-13dB | 15 | ≥ 24 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -127 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -50 |
| 98 | ≥ 52 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 42 | ≥ 104 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 75 | 30 | ≥ 24 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -124 | -50 |
| NR\_FDD\_FR1\_B | -123.5 | -50 |
| NR\_TDD\_FR1\_C | -123 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 | -50 |
| NR\_FDD\_FR1\_F | -121.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -121 | -50 |
| NR\_FDD\_FR1\_H | -120.5 | -50 |
| 48 | ≥ 48 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 24 | ≥ 132 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 50 | 60 | ≥ 24 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
| NR\_FDD\_FR1\_B | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -50 |
| NR\_FDD\_FR1\_F | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -118 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -50 |
| 24 | ≥ 64 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 10 | ≥ 132 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: Void | | | | | | | |

Table 10.1.23.2-2: RSTD absolute accuracy in FR2 for AWGN channel

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth  Note 1 | PRS resource repetition  () Note 2 | Io Note 3 range | |
| Minimum Io | Maximum Io |
| Tc Note 4 | dB | kHz | RB |  | dBm/SCS | dBm/BWChannel |
| 35 | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)*i* ≥-13dB | 60 | ≥ 24 | ≥ 4 | Same value as PRS\_RP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| 24 | ≥ 64 | ≥ 1 | Note 5 | Note 5 |
| 11 | ≥ 132 | ≥ 1 | Note 5 | Note 5 |
| 24 | 120 | ≥ 32 | ≥ 4 | Same value as PRS\_RP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| 13 | ≥ 64 | ≥ 1 | Note 5 | Note 5 |
| 6 | ≥ 128 | ≥ 1 | Note 5 | Note 5 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 5: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 6: Void | | | | | | |

Table 10.1.23.2-3: RSTD absolute accuracy in FR1 for fading channel

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth  Note 1 | PRS resource repetition ()  Note 2 | Io Note 3 range | | |
| NR operating band groups Note 4 | Minimum Io | Maximum Io |
| Tc Note 5 | dB | kHz | RB |  |  | dBm/SCS | dBm/BWChannel |
| 247 | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)*i* ≥-13dB | 15 | ≥ 24 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -127 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -50 |
| 140 | ≥ 52 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 86 | ≥ 104 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 118 | 30 | ≥ 24 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -124 | -50 |
| NR\_FDD\_FR1\_B | -123.5 | -50 |
| NR\_TDD\_FR1\_C | -123 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 | -50 |
| NR\_FDD\_FR1\_F | -121.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -121 | -50 |
| NR\_FDD\_FR1\_H | -120.5 | -50 |
| 109 | ≥ 48 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 28 | ≥ 132 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 147 | 60 | ≥ 24 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
| NR\_FDD\_FR1\_B | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -50 |
| NR\_FDD\_FR1\_F | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -118 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -50 |
| 27 | ≥ 64 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 21 | ≥ 132 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: Void | | | | | | | |

Table 10.1.23.2-4: RSTD absolute accuracy in FR2 for fading channel

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth  Note 1 | PRS resource repetition  () Note 2 | Io Note 3 range | |
| Minimum Io | Maximum Io |
| Tc Note 4 | dB | kHz | RB |  | dBm/SCS | dBm/BWChannel |
| 83 | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)*i* ≥-13dB | 60 | ≥ 24 | ≥ 4 | Same value as PRS\_RP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| 64 | ≥ 64 | ≥ 1 | Note 5 | Note 5 |
| 46 | ≥ 132 | ≥ 1 | Note 5 | Note 5 |
| 48 | 120 | ≥ 32 | ≥ 4 | Same value as PRS\_RP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| 54 | ≥ 64 | ≥ 1 | Note 5 | Note 5 |
| 36 | ≥ 128 | ≥ 1 | Note 5 | Note 5 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 5: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 6: Void | | | | | | |

Table 10.1.23.2-5: Margin for RSTD measurement accuracy in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| PRS BW (RB number) | | | Margin (Tc) |
| SCS=15kHz | SCS=30kHz | SCS=60kHz |
| ≥ 24 | N/A | N/A | 120 |
| ≥ 52 | ≥ 24 | N/A | 72 |
| ≥ 104 | ≥ 48 | ≥ 24 | 36 |
| N/A | ≥ 132 | ≥ 64 | 16 |
| N/A | N/A | ≥ 132 | 12 |

Table 10.1.23.2-5a: Margin Δ for RSTD measurement accuracy in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| PRS BW (RB number) | | | Margin (Tc) |
| SCS=15kHz | SCS=30kHz | SCS=60kHz |
| ≥ 24 | N/A | N/A | 128 |
| ≥ 52 | ≥ 24 | N/A | 64 |
| ≥ 104 | ≥ 48 | ≥ 24 | 32 |
| N/A | ≥ 132 | ≥ 64 | 16 |
| N/A | N/A | ≥ 132 | 8 |

Table 10.1.23.2-6: Margin for RSTD measurement accuracy in FR2

|  |  |  |
| --- | --- | --- |
| PRS BW (RB number) | | Margin (Tc) |
| SCS=60kHz | SCS=120kHz |
| ≥ 24 | N/A | 72 |
| ≥ 64 | ≥ 32 | 32 |
| ≥ 132 | ≥ 64 | 16 |
| N/A | ≥ 128 | 12 |

Table 10.1.23.2-6a: Margin Δ for RSTD measurement accuracy in FR2

|  |  |  |
| --- | --- | --- |
| PRS BW (RB number) | | Margin (Tc) |
| SCS=60kHz | SCS=120kHz |
| ≥ 24 | N/A | 32 |
| ≥ 64 | ≥ 32 | 16 |
| ≥ 132 | ≥ 64 | 8 |
| N/A | ≥ 128 | 4 |

Table 10.1.23.2-7: RSTD absolute accuracy in FR1 for AWGN channel with reduced number of samples

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth  Note 1 | PRS resource repetition ()  Note 2 | Io Note 3 range | | |
| NR operating band groups Note 4 | Minimum Io | Maximum Io |
| Tc Note 5 | dB | kHz | RB |  |  | dBm/SCS | dBm/BWChannel |
| 98 | (PRS Ês/Iot)ref ≥-3dB  (PRS Ês/Iot)*i* ≥-6dB | 15 | ≥ 52 | ≥ 1 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -50 |
| 42 | ≥ 104 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 48 | 30 | ≥ 48 | ≥ 1 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -124 | -50 |
| NR\_FDD\_FR1\_B | -123.5 | -50 |
| NR\_TDD\_FR1\_C | -123 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 | -50 |
| NR\_FDD\_FR1\_F | -121.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -121 | -50 |
| NR\_FDD\_FR1\_H | -120.5 | -50 |
| 24 | ≥ 132 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 24 | 60 | ≥ 64 | ≥ 1 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -121 | -50 |
| NR\_FDD\_FR1\_B | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -50 |
| NR\_FDD\_FR1\_F | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -118 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -50 |
| 10 | ≥ 132 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: Void | | | | | | | |

Table 10.1.23.2-8: RSTD absolute accuracy in FR2 for AWGN channel with reduced number of samples

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth  Note 1 | PRS resource repetition  () Note 2 | Io Note 3 range | |
| Minimum Io | Maximum Io |
| Tc Note 4 | dB | kHz | RB |  | dBm/SCS | dBm/BWChannel |
| 24 | (PRS Ês/Iot)ref ≥-3dB  (PRS Ês/Iot)*i* ≥-6dB | 60 | ≥ 64 | ≥ 1 | Same value as PRS\_RP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | Note 5 |
| 11 | ≥ 132 | ≥ 1 | Note 5 | Note 5 |
| 13 | 120 | ≥ 64 | ≥ 1 | Same value as PRS\_RP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | Note 5 |
| 6 | ≥ 128 | ≥ 1 | Note 5 | Note 5 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 5: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 6: Void | | | | | | |

#### 10.1.23.3 Report mapping

##### 10.1.23.3.1 Absolute DL RSTD Measurement Reporting

The reporting range for the DL RSTD measurement is defined from -985024×Tc to 985024×Tc with the resolution step of 2*k*×Tc, where

Tc is defined in TS 38.211 [6],

*kmin*≤*k*≤*kmax*,

*kmin*=[2] and *kmax*=5, when configured PRS resource of at least one of the reference cell and neighbor cell measured for the RSTD measurement is in FR1,

*kmin*=0 and *kmax*=5, when configured PRS resource of both the reference cell and neighbor cell measured for the RSTD measurement are in FR2,

*k≥* *timingReportingGranularityFactor* [34] configured by LMF via LPP for the RSTD measurement.

The measurement report mapping for different *k* values are specified in Tables 10.1.23.3.1-1 − 10.1.23.3.1-6.

Table 10.1.23.3.1-1: Report mapping for *k*=0

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value, | Measured Quantity Value, | Unit |
| RSTD\_i | RSTD |  |
| RSTD\_0000000 | RSTD < -985024 | Tc |
| RSTD\_0000001 | -985024 ≤ RSTD < -985023 | Tc |
| RSTD\_0000002 | -985023 ≤ RSTD < -985022 | Tc |
| … | … | … |
| RSTD\_0985024 | -1 ≤ RSTD < 0 | Tc |
| RSTD\_0985025 | 0 ≤ RSTD < 1 | Tc |
| … | … | … |
| RSTD\_1970047 | 985022 ≤ RSTD < 985023 | Tc |
| RSTD\_1970048 | 985023 ≤ RSTD < 985024 | Tc |
| RSTD\_1970049 | 985024 ≤ RSTD | Tc |

Table 10.1.23.3.1-2: Report mapping for *k*=1

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value, | Measured Quantity Value, | Unit |
| RSTD\_i | RSTD |  |
| RSTD\_000000 | RSTD < -985024 | Tc |
| RSTD\_000001 | -985024 ≤ RSTD < -985022 | Tc |
| RSTD\_000002 | -985022 ≤ RSTD < -985020 | Tc |
| … | … | … |
| RSTD\_492512 | -2 ≤ RSTD < 0 | Tc |
| RSTD\_492513 | 0 ≤ RSTD < 2 | Tc |
| … | … | … |
| RSTD\_985023 | 985020 ≤ RSTD < 985022 | Tc |
| RSTD\_985024 | 985022 ≤ RSTD < 985024 | Tc |
| RSTD\_985025 | 985024 ≤ RSTD | Tc |

Table 10.1.23.3.1-3: Report mapping for *k*=2

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value, | Measured Quantity Value, | Unit |
| RSTD\_i | RSTD |  |
| RSTD\_000000 | RSTD < -985024 | Tc |
| RSTD\_000001 | -985024 ≤ RSTD < -985020 | Tc |
| RSTD\_000002 | -985020 ≤ RSTD < -985016 | Tc |
| … | … | … |
| RSTD\_246256 | -4 ≤ RSTD < 0 | Tc |
| RSTD\_246257 | 0 ≤ RSTD < 4 | Tc |
| … | … | … |
| RSTD\_492511 | 985016 ≤ RSTD < 985020 | Tc |
| RSTD\_492512 | 985020 ≤ RSTD < 985024 | Tc |
| RSTD\_492513 | 985024 ≤ RSTD | Tc |

Table 10.1.23.3.1-4: Report mapping for *k*=3

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value | Measured Quantity Value, | Unit |
| RSTD\_i | RSTD |  |
| RSTD\_000000 | RSTD < -985024 | Tc |
| RSTD\_000001 | -985024 ≤ RSTD < -985016 | Tc |
| RSTD\_000002 | -985016 ≤ RSTD < -985008 | Tc |
| … | … | … |
| RSTD\_123128 | -8 ≤ RSTD < 0 | Tc |
| RSTD\_123129 | 0 ≤ RSTD < 8 | Tc |
| … | … | … |
| RSTD\_246255 | 985008 ≤ RSTD < 985016 | Tc |
| RSTD\_246256 | 985016 ≤ RSTD < 985024 | Tc |
| RSTD\_246257 | 985024 ≤ RSTD | Tc |

Table 10.1.23.3.1-5: Report mapping for *k*=4

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value, | Measured Quantity Value, | Unit |
| RSTD\_i | RSTD |  |
| RSTD\_000000 | RSTD < -985024 | Tc |
| RSTD\_000001 | -985024 ≤ RSTD < -985008 | Tc |
| RSTD\_000002 | -985008 ≤ RSTD < -984992 | Tc |
| … | … | … |
| RSTD\_061564 | -16 ≤ RSTD < 0 | Tc |
| RSTD\_061565 | 0 ≤ RSTD < 16 | Tc |
| … | … | … |
| RSTD\_123127 | 984992 ≤ RSTD < 985008 | Tc |
| RSTD\_123128 | 985008 ≤ RSTD < 985024 | Tc |
| RSTD\_123129 | 985024 ≤ RSTD | Tc |

Table 10.1.23.3.1-6: Report mapping for *k*=5

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value, | Measured Quantity Value, | Unit |
| RSTD\_i | RSTD |  |
| RSTD\_00000 | RSTD < -985024 | Tc |
| RSTD\_00001 | -985024 ≤ RSTD < -984992 | Tc |
| RSTD\_00002 | -984992 ≤ RSTD < -984960 | Tc |
| … | … | … |
| RSTD\_30782 | -32 ≤ RSTD < 0 | Tc |
| RSTD\_30783 | 0 ≤ RSTD < 32 | Tc |
| … | … | … |
| RSTD\_61563 | 984960 ≤ RSTD < 984992 | Tc |
| RSTD\_61564 | 984992 ≤ RSTD < 985024 | Tc |
| RSTD\_61565 | 985024 ≤ RSTD | Tc |

##### 10.1.23.3.2 Differential Reporting for DL RSTD Measurement

A first DL RSTD measurement is reported by means of differential reporting, i.e. as ΔRSTD, relative to a second DL RSTD measurement (RSTD2), provided that:

- the absolute measured quantity value of the second DL RSTD measurement (RSTD2) is not larger than the absolute measured quantity value of the first DL RSTD measurement (RSTD1), i.e., ΔRSTD=RSTD1-RSTD2≥0, and

- the absolute value of the second DL RSTD measurement (RSTD2) is reported together with ΔRSTD for the first DL RSTD measurement.

The reporting range for differential reporting ΔRSTD of the first DL RSTD measurement is defined from 0 up to 8191×Tc with the resolution step of 2*k*×Tc, where

Tc is defined in TS 38.211 [6],

*kmin*≤*k*≤*kmax*,

*kmin*=[2] and *kmax*=5, when configured PRS resource of at least one of the reference cell and neighbor cell measured for the first RSTD measurement or second RSTD measurement is in FR1,

*kmin*=0 and *kmax*=5, when configured PRS resource of both the reference cell and neighbor cell measured for both of the first RSTD measurement and the second RSTD measurement are in FR2,

*k≥* *timingReportingGranularityFactor* [34] configured by LMF via LPP for the RSTD measurement.

The measurement report mapping for different *k* values are specified in Tables 10.1.23.3.2-1 − 10.1.23.3.2-6.

Table 10.1.23.3.2-1: Report mapping for *k*=0

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  DIFFRSTD\_i | ΔRSTD = RSTD1 − RSTD2 | Unit |
| DIFFRSTD\_0000 | 0 ≤ ΔRSTD < 1 | Tc |
| DIFFRSTD\_0001 | 1 ≤ ΔRSTD < 2 | Tc |
| DIFFRSTD\_0002 | 2 ≤ ΔRSTD < 3 | Tc |
| … | … | … |
| DIFFRSTD\_8189 | 8189 ≤ ΔRSTD < 8190 | Tc |
| DIFFRSTD\_8190 | 8190 ≤ ΔRSTD < 8191 | Tc |
| DIFFRSTD\_8191 | 8191 ≤ ΔRSTD | Tc |

Table 10.1.23.3.2-2: Report mapping for *k*=1

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  DIFFRSTD\_i | ΔRSTD = RSTD1 − RSTD2 | Unit |
| DIFFRSTD\_0000 | 0 ≤ ΔRSTD < 2 | Tc |
| DIFFRSTD\_0001 | 2 ≤ ΔRSTD < 4 | Tc |
| DIFFRSTD\_0002 | 4 ≤ ΔRSTD < 6 | Tc |
| … | … | … |
| DIFFRSTD\_4093 | 8186 ≤ ΔRSTD < 8188 | Tc |
| DIFFRSTD\_4094 | 8188 ≤ ΔRSTD < 8190 | Tc |
| DIFFRSTD\_4095 | 8190 ≤ ΔRSTD | Tc |

Table 10.1.23.3.2-3: Report mapping for *k*=2

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  DIFFRSTD\_i | ΔRSTD = RSTD1 − RSTD2 | Unit |
| DIFFRSTD\_0000 | 0 ≤ ΔRSTD < 4 | Tc |
| DIFFRSTD\_0001 | 4 ≤ ΔRSTD < 8 | Tc |
| DIFFRSTD\_0002 | 8 ≤ ΔRSTD < 12 | Tc |
| … | … | … |
| DIFFRSTD\_2045 | 8180 ≤ ΔRSTD < 8184 | Tc |
| DIFFRSTD\_2046 | 8184 ≤ ΔRSTD < 8188 | Tc |
| DIFFRSTD\_2047 | 8188 ≤ ΔRSTD | Tc |

Table 10.1.23.3.2-4: Report mapping for *k*=3

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  DIFFRSTD\_i | ΔRSTD = RSTD1 − RSTD2 | Unit |
| DIFFRSTD\_0000 | 0 ≤ ΔRSTD < 8 | Tc |
| DIFFRSTD\_0001 | 8 ≤ ΔRSTD < 16 | Tc |
| DIFFRSTD\_0002 | 16 ≤ ΔRSTD < 24 | Tc |
| … | … | … |
| DIFFRSTD\_1021 | 8168 ≤ ΔRSTD < 8176 | Tc |
| DIFFRSTD\_1022 | 8176 ≤ ΔRSTD < 8184 | Tc |
| DIFFRSTD\_1023 | 8184 ≤ ΔRSTD | Tc |

Table 10.1.23.3.2-5: Report mapping for *k*=4

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  DIFFRSTD\_i | ΔRSTD = RSTD1 − RSTD2 | Unit |
| DIFFRSTD\_000 | 0 ≤ ΔRSTD < 16 | Tc |
| DIFFRSTD\_001 | 16 ≤ ΔRSTD < 32 | Tc |
| DIFFRSTD\_002 | 32 ≤ ΔRSTD < 48 | Tc |
| … | … | … |
| DIFFRSTD\_509 | 8144 ≤ ΔRSTD < 8160 | Tc |
| DIFFRSTD\_510 | 8160 ≤ ΔRSTD < 8176 | Tc |
| DIFFRSTD\_511 | 8176 ≤ ΔRSTD | Tc |

Table 10.1.23.3.2-6: Report mapping for *k*=5

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  DIFFRSTD\_i | ΔRSTD = RSTD1 − RSTD2 | Unit |
| DIFFRSTD\_000 | 0 ≤ ΔRSTD < 32 | Tc |
| DIFFRSTD\_001 | 32 ≤ ΔRSTD < 64 | Tc |
| DIFFRSTD\_002 | 64 ≤ ΔRSTD < 96 | Tc |
| … | … | … |
| DIFFRSTD\_253 | 8096 ≤ ΔRSTD < 8128 | Tc |
| DIFFRSTD\_254 | 8128 ≤ ΔRSTD < 8160 | Tc |
| DIFFRSTD\_255 | 8160 ≤ ΔRSTD | Tc |

##### 10.1.23.3.3 Additional Path Report Mapping for DL RSTD

The reporting range for the additional path reporting for an RSTD measurement is defined up to the range from -8175×Tc to 8175×Tc with the resolution step of 2*k*×Tc, where

Tc is defined in TS 38.211 [6],

*kmin*≤*k*≤*kmax*,

*kmin*=[2] and *kmax*=5, when configured PRS resource of at least one of the reference cell and neighbor cell measured for the RSTD measurement is in FR1,

*kmin*=0 and *kmax*=5, when configured PRS resource of both the reference cell and neighbor cell measured for the RSTD measurement are in FR2,

*k≥* *timingReportingGranularityFactor* [34] configured by LMF via LPP for the RSTD measurement.

The UE can report the timing of up to two additional paths with respect to the path timing determining the RSTD measurement.

A UE capable of *additionalPathsExtSupport-r17* can report the timing for a number additional paths, up to its capability, with respect to the path timing determining the RSTD measurement.

The report mappings for different *k* values are specified in Tables 10.1.23.3.3-1 − 10.1.23.3.3-6.

Table 10.1.23.3.3-1: Report mapping for *k*=0

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  path\_i | Measured Quantity Value,  Δpath | Unit |
|
| path\_00000 | Δpath < -8175 | Tc |
| path\_00001 | -8175 ≤ Δpath < -8174 | Tc |
| path\_00002 | -8174 ≤ Δpath < -8173 | Tc |
| … | … | … |
| path\_08175 | -1 ≤ Δpath < 0 | Tc |
| path\_08176 | 0 ≤ Δpath < 1 | Tc |
| … | … | … |
| path\_ 16349 | 8173 ≤ Δpath < 8174 | Tc |
| path\_ 16350 | 8174 ≤ Δpath < 8175 | Tc |
| path\_ 16351 | 8175 ≤ Δpath | Tc |

Table 10.1.23.3.3-2: Report mapping for *k*=1

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  path\_i | Measured Quantity Value,  Δpath | Unit |
| path\_0000 | Δpath < -8175 | Tc |
| path\_0001 | -8175 ≤ Δpath < -8173 | Tc |
| path\_0002 | -8173 ≤ Δpath < -8171 | Tc |
| … | … | … |
| path\_4088 | -1 ≤ Δpath < 1 | Tc |
| … | … | … |
| path\_8174 | 8171 ≤ Δpath < 8173 | Tc |
| path\_8175 | 8173 ≤ Δpath < 8175 | Tc |
| path\_8176 | 8175 ≤ Δpath | Tc |

Table 10.1.23.3.3-3: Report mapping for *k*=2

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  path\_i | Measured Quantity Value,  Δpath | Unit |
| path\_0000 | Δpath < -8174 | Tc |
| path\_0001 | -8174 ≤ Δpath < -8170 | Tc |
| path\_0002 | -8170 ≤ Δpath < -8166 | Tc |
| … | … | … |
| path\_2044 | -2 ≤ Δpath < 2 | Tc |
| … | … | … |
| path\_4086 | 8166 ≤ Δpath < 8170 | Tc |
| path\_4087 | 8170 ≤ Δpath < 8174 | Tc |
| path\_4088 | 8174 ≤ Δpath | Tc |

Table 10.1.23.3.3-4: Report mapping for *k*=3

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  path\_i | Measured Quantity Value,  Δpath | Unit |
| path\_0000 | Δpath < -8172 | Tc |
| path\_0001 | -8172 ≤ Δpath < -8164 | Tc |
| path\_0002 | -8164 ≤ Δpath < -8156 | Tc |
| … | … | … |
| path\_1022 | -4 ≤ Δpath < 4 | Tc |
| … | … | … |
| path\_2042 | 8156 ≤ Δpath < 8164 | Tc |
| path\_2043 | 8164 ≤ Δpath < 8172 | Tc |
| path\_2044 | 8172 ≤ Δpath | Tc |

Table 10.1.23.3.3-5: Report mapping for *k*=4

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  path\_i | Measured Quantity Value,  Δpath | Unit |
| path\_0000 | Δpath < -8168 | Tc |
| path\_0001 | -8168 ≤ Δpath < -8152 | Tc |
| path\_0002 | -8152 ≤ Δpath < -8136 | Tc |
| … | … | … |
| path\_511 | -8 ≤ Δpath < 8 | Tc |
| … | … | … |
| path\_1020 | 8136 ≤ Δpath < 8152 | Tc |
| path\_1021 | 8152 ≤ Δpath < 8168 | Tc |
| path\_1022 | 8168 ≤ Δpath | Tc |

Table 10.1.23.3.3-6: Report mapping for *k*=5

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  path\_i | Measured Quantity Value,  Δpath | Unit |
| path\_000 | Δpath < -8160 | Tc |
| path\_001 | -8160 ≤ Δpath < -8128 | Tc |
| path\_002 | -8128 ≤ Δpath < -8096 | Tc |
| … | … | … |
| path\_256 | 0 ≤ Δpath < 32 | Tc |
| … | … | … |
| path\_509 | 8096 ≤ Δpath < 8128 | Tc |
| path\_510 | 8128 ≤ Δpath < 8160 | Tc |
| path\_511 | 8160 ≤ Δpath | Tc |

### 10.1.24 PRS-RSRP Measurements

#### 10.1.24.1 Introduction

The requirements in Clause 10.1.24 shall apply, provided the UE has received *nr-DL-TDOA-RequestLocationInformation* or *nr-Multi-RTT-RequestLocationInformation* or *nr-DL-AoD-RequestLocationInformation* message from LMF via LPP [34] requesting the UE to report one or more DL PRS-RSRP measurements defined in TS 38.215 [4].

The requirements in clause 10.1.24 apply for UE in RRC\_CONNECTED, including PRS-RSRP measurement with MG and outside MG, as well as for UE in RRC\_INACTIVE. For PRS-RSRP measurement in FR2, the requirements apply with and without reduced Rx beam sweeping factor.

#### 10.1.24.2 Measurement Accuracy Requirements

##### 10.1.24.2.1 Absolute PRS RSRP accuracy

The absolute accuracy requirements for PRS-RSRP measurement for FR1 defined in Table 10.1.24.2.1-1 are valid under the following conditions:

- Conditions defined in 38.101-1 Clause 7.3 for reference sensitivity are fulfilled.

- PRP 1,2|dBm according to Annex B.2.14 for a corresponding Band

- UE does not support positioning measurements with reduced number of samples, or LMF does not indicate UE to perform positioning measurements with reduced number of samples

The absolute accuracy requirements for PRS-RSRP measurement for FR2 defined in Table 10.1.24.2.1-2 are valid under the following conditions:

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

- PRP 1,2|dBm according to Annex B.2.14 for a corresponding Band

- UE does not support positioning measurements with reduced number of samples, or LMF does not indicate UE to perform positioning measurements with reduced number of samples

Table 10.1.24.2.1-1: PRS-RSRP absolute accuracy for FR1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | | |
| Normal condition | Extreme condition | PRS Ês/Iot | PRS BW | Repetition factor  ( | Io Note 7 range | | | | |
| NR operating band groups Note 8 | Minimum Io Note 1  dBm / SCSPRS | | | Maximum Io |
| dB | dB | dB | PRB | - |  | dBm / SCSPRS | | | dBm/BWChannel |
| dBm/15kHz Note 6 | dBm/30kHz Note 6 | dBm/60kHz Note 6 |
| ±3.5 | ±8 | ≥-3dB | ≥24 | All | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -124 | -121 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -123.5 | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -123 | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -122.5 | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -122 | -119 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -121.5 | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -121 | -118 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -120.5 | -117.5 | -50 |
| Note 4 | | | | |
| Note 4 | | | | |
| ±8.5 | ±13 | ≥-13dB | 24 ≤ BW ≤ 52 | All | Note 4 | | | | |
| ±6 | ±10.5 | 52< BW≤ 104 | All | Note 4 | | | | |
| ±4.5 | ±9 | BW >104 | All | Note 4 | | | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: Void.  NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA or DL-AoD assistance data defined in [34].  NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 24 RB.  NOTE 5: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.  NOTE 6: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 7: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 8: NR operating band groups are as defined in Section 3.5.2. | | | | | | | | | |

Table 10.1.24.2.1-2: PRS-RSRP absolute accuracy for FR2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | PRS Ês/Iot | PRS BW | Repetition factor  ( | Io Note 7 range | | |
| Minimum Io Note 1  dBm / SCSPRS | | Maximum Io |
| dB | dB | dB | PRB | - | dBm / SCSPRS | | dBm/BWChannel |
| dBm/120kHz Note 6 | dBm/60kHz Note 6 |
| ±5 | ±8 | ≥-3dB | ≥24 | All | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | | -50 |
| Note 4 | | |
| Note 4 | | |
| ±8.5 | ±11.5 | ≥-13dB | 24 ≤ BW ≤ 64 | All | Note 4 | | |
| ±6 | ±9 | BW >64 | All | Note 4 | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: Void.  NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA or DL-AoD assistance data defined in [34].  NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 24 RB.  NOTE 5: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.  NOTE 6: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 7: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 8: NR operating band groups are as defined in Section 3.5.2. | | | | | | | |

The absolute accuracy requirements for PRS-RSRP measurement for FR1 defined in Table 10.1.24.2.1-3 are valid under the following conditions:

- Conditions defined in 38.101-1 Clause 7.3 for reference sensitivity are fulfilled.

- PRP 1,2|dBm according to Annex B.2.14 for a corresponding Band

- UE supports positioning measurements with reduced number of samples, and LMF indicates UE to perform positioning measurements with reduced number of samples

- AWGN channel

The absolute accuracy requirements for PRS-RSRP measurement for FR2 defined in Table 10.1.24.2.1-4 are valid under the following conditions:

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

- PRP 1,2|dBm according to Annex B.2.14 for a corresponding Band

- UE supports positioning measurements with reduced number of samples, and LMF indicates UE to perform positioning measurements with reduced number of samples

- AWGN channel

Table 10.1.24.2.1-3: PRS-RSRP absolute accuracy for FR1 with reduced sample number

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | | **Conditions** | | | | | | | | |
| **Normal condition** | **Extreme condition** | **PRS Ês/Iot** | **PRS BW** | **Repetition factor**  **(** | **Io Note 6 range** | | | | | |
| **NR operating band groups Note 7** | **Minimum Io Note 1**  **dBm / SCSPRS** | | | | **Maximum Io** |
| **dB** | **dB** | **dB** | **PRB** | **-** |  | **dBm / SCSPRS** | | | | **dBm/BWChannel** |
| **dBm/15kHz Note 5** | | **dBm/30kHz Note 5** | **dBm/60kHz Note 5** |
| ±3.5 | ±8 | ≥0 | ≥48 | All | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -124 | | -121 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -123.5 | | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -123 | | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -122.5 | | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -122 | | -119 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -121.5 | | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -121 | | -118 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -120.5 | | -117.5 | -50 |
| ±8.5 | ±13 | ≥-6 | 48 ≤ BW ≤ 52 | All | Note 3 | | | | | |
| ±6 | ±10.5 | 52< BW≤ 104 | All | Note 3 | | | | | |
| ±4.5 | ±9 | BW >104 | All | Note 3 | | | | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA or DL-AoD assistance data defined in [34].  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 48 RB.  NOTE 4: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.  NOTE 5: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 6: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 7: NR operating band groups are as defined in Section 3.5.2. | | | | | | | | | | |

Table 10.1.24.2.1-4: PRS-RSRP absolute accuracy for FR2 with reduced sample number

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | | **Conditions** | | | | | |
| **Normal condition** | **Extreme condition** | **PRS Ês/Iot** | **PRS BW** | **Repetition factor**  **(** | **Io Note 6 range** | | |
| **Minimum Io Note 1**  **dBm / SCSPRS** | | **Maximum Io** |
| **dB** | **dB** | **dB** | **PRB** | **-** | **dBm / SCSPRS** | | **dBm/BWChannel** |
| **dBm/120kHz Note 5** | **dBm/60kHz Note 5** |
| ±5 | ±8 | ≥0 | ≥48 | All | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | | -50 |
| ±8.5 | ±11.5 | ≥-6 | 48 ≤ BW ≤ 64 | All | Note 3 | | |
| ±6 | ±9 | BW >64 | All | Note 3 | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA or DL-AoD assistance data defined in [34].  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 48 RB.  NOTE 4: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.  NOTE 5: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 6: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 7: NR operating band groups are as defined in Section 3.5.2. | | | | | | | |

##### 10.1.24.2.2 Relative PRS RSRP accuracy

The relative accuracy of PRS-RSRP is defined as accuracy of the difference between two PRS-RSRP measurements.

The relative PRS-RSRP accuracy requirements apply for the cases when PRS-RSRP is measured from PRS resources in the same PRS resource set in FR1 or FR2, and measured with same Rx beam in case of FR2.

The accuracy requirements for PRS-RSRP measurement for FR1 defined in Table 10.1.24.2.2-1 are valid under the following conditions:

- Conditions defined in 38.101-1 Clause 7.3 for reference sensitivity are fulfilled.

- PRP 1,2|dBm according to Annex B.2.14 for a corresponding Band

- UE does not support positioning measurements with reduced number of samples, or LMF does not indicate UE to perform positioning measurements with reduced number of samples

The accuracy requirements for PRS-RSRP measurement for FR2 defined in Table 10.1.24.2.2-2 are valid under the following conditions:

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

- PRP 1,2|dBm according to Annex B.2.14 for a corresponding Band

- UE does not support positioning measurements with reduced number of samples, or LMF does not indicate UE to perform positioning measurements with reduced number of samples

Table 10.1.24.2.2-1: PRS-RSRP relative accuracy for FR1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | | |
| Normal condition | Extreme condition | PRS Ês/Iot | PRS BW | Repetition factor  ( | Io Note 7 range | | | | |
| NR operating band groups Note 8 | Minimum Io Note 1  dBm / SCSPRS | | | Maximum Io |
| dB | dB | dB | PRB | - |  | dBm / SCSPRS | | | dBm/BWChannel |
| dBm/15kHz Note 6 | dBm/30kHz Note 6 | dBm/60kHz Note 6 |
| [±3.5] | ±5.0 | ≥-3dB | ≥24 | All | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -124 | -121 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -123.5 | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -123 | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -122.5 | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -122 | -119 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -121.5 | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -121 | -118 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -120.5 | -117.5 | -50 |
| Note 4 | | | | |
| Note 4 | | | | |
| ±9.5 | ±11.0 | ≥-13dB | 24 ≤ BW ≤ 52 | All | Note 4 | | | | |
| ±6.5 | ±8.0 | 52< BW≤ 104 | All | Note 4 | | | | |
| ±5.0 | ±6.5 | BW >104 | All | Note 4 | | | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: Void.  NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA or DL-AoD assistance data defined in [34].  NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 24 RB.  NOTE 5: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.  NOTE 6: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 7: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 8: NR operating band groups are as defined in Section 3.5.2. | | | | | | | | | |

Table 10.1.24.2.2-2: PRS-RSRP relative accuracy for FR2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | PRS Ês/Iot | PRS BW | Repetition factor  ( | Io Note 7 range | | |
| Minimum Io Note 1  dBm / SCSPRS | | Maximum Io |
| dB | dB | dB | PRB | - | dBm / SCSPRS | | dBm/BWChannel |
| dBm/120kHz Note 6 | dBm/60kHz Note 6 |
| ±5.0 | ±8.0 | ≥-3dB | ≥24 | All | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | | -50 |
| Note 4 | | |
| Note 4 | | |
| ±10 | ±13 | ≥-13dB | 24 ≤ BW ≤ 64 | All | Note 4 | | |
| ±7.5 | ±10.5 | BW >64 | All | Note 4 | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: Void.  NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA or DL-AoD assistance data defined in [34].  NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 24 RB.  NOTE 5: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.  NOTE 6: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 7: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 8: NR operating band groups are as defined in Section 3.5.2. | | | | | | | |

The absolute accuracy requirements for PRS-RSRP measurement for FR1 defined in Table 10.1.24.2.2-3 are valid under the following conditions:

- Conditions defined in 38.101-1 Clause 7.3 for reference sensitivity are fulfilled.

- PRP 1,2|dBm according to Annex B.2.14 for a corresponding Band

- UE supports positioning measurements with reduced number of samples, and LMF indicates UE to perform positioning measurements with reduced number of samples

- AWGN channel

The absolute accuracy requirements for PRS-RSRP measurement for FR2 defined in Table 10.1.24.2.2-4 are valid under the following conditions:

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

- PRP 1,2|dBm according to Annex B.2.14 for a corresponding Band

- UE supports positioning measurements with reduced number of samples, and LMF indicates UE to perform positioning measurements with reduced number of samples

- AWGN channel

Table 10.1.24.2.2-3: PRS-RSRP relative accuracy for FR1 with reduced sample number

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | | **Conditions** | | | | | | | |
| **Normal condition** | **Extreme condition** | **PRS Ês/Iot** | **PRS BW** | **Repetition factor**  **(** | **Io Note 6 range** | | | | |
| **NR operating band groups Note 7** | **Minimum Io Note 1**  **dBm / SCSPRS** | | | **Maximum Io** |
| **dB** | **dB** | **dB** | **PRB** | **-** |  | **dBm / SCSPRS** | | | **dBm/BWChannel** |
| **dBm/15kHz Note 5** | **dBm/30kHz Note 5** | **dBm/60kHz Note 5** |
| [±3.5] | ±5.0 | ≥0 | ≥48 | All | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -124 | -121 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -123.5 | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -123 | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -122.5 | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -122 | -119 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -121.5 | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -121 | -118 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -120.5 | -117.5 | -50 |
| ±9.5 | ±11.0 | ≥-6 | 48 ≤ BW ≤ 52 | All | Note 3 | | | | |
| ±6.5 | ±8.0 | 52< BW≤ 104 | All | Note 3 | | | | |
| ±5.0 | ±6.5 | BW >104 | All | Note 3 | | | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA or DL-AoD assistance data defined in [34].  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 48 RB.  NOTE 4: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.  NOTE 5: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 6: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 7: NR operating band groups are as defined in Section 3.5.2. | | | | | | | | | |

Table 10.1.24.2.2-4: PRS-RSRP relative accuracy for FR2 with reduced sample number

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | | **Conditions** | | | | | |
| **Normal condition** | **Extreme condition** | **PRS Ês/Iot** | **PRS BW** | **Repetition factor**  **(** | **Io Note 6 range** | | |
| **Minimum Io Note 1**  **dBm / SCSPRS** | | **Maximum Io** |
| **dB** | **dB** | **dB** | **PRB** | **-** | **dBm / SCSPRS** | | **dBm/BWChannel** |
| **dBm/120kHz Note 5** | **dBm/60kHz Note 5** |
| ±5.0 | ±8.0 | ≥0 | ≥48 | All | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | | -50 |
| ±10 | ±13 | ≥-6 | 48 ≤ BW ≤ 64 | All | Note 3 | | |
| ±7.5 | ±10.5 | BW >64 | All | Note 3 | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA or DL-AoD assistance data defined in [34].  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 24 RB.  NOTE 4: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.  NOTE 5: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 6: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 8: NR operating band groups are as defined in Section 3.5.2. | | | | | | | |

#### 10.1.24.3 Report mapping

##### 10.1.24.3.1 Absolute PRS-RSRP Measurement Report Mapping

The reporting range of absolute PRS-RSRP measurement is defined from -156 dBm to -31 dBm with 1 dB resolution.

The mapping of measured quantity is defined in Table 10.1.24.3.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.24.3.1-1: Measurement report mapping for PRS-RSRP

|  |  |  |
| --- | --- | --- |
| **Reported value** | **Measured quantity value** | **Unit** |
| PRS\_RSRP\_0 | PRS-RSRP<-156 | dBm |
| PRS\_RSRP\_1 | -156≤PRS-RSRP<-155 | dBm |
| PRS\_RSRP\_2 | -155≤PRS-RSRP<-154 | dBm |
| PRS\_RSRP\_3 | -154≤PRS-RSRP<-153 | dBm |
| PRS\_RSRP\_4 | -153≤PRS-RSRP<-152 | dBm |
| PRS\_RSRP\_5 | -152≤PRS-RSRP<-151 | dBm |
| PRS\_RSRP\_6 | -151≤PRS-RSRP<-150 | dBm |
| PRS\_RSRP\_7 | -150≤PRS-RSRP<-149 | dBm |
| PRS\_RSRP\_8 | -149≤PRS-RSRP<-148 | dBm |
| PRS\_RSRP\_9 | -148≤PRS-RSRP<-147 | dBm |
| PRS\_RSRP\_10 | -147≤PRS-RSRP<-146 | dBm |
| PRS\_RSRP\_11 | -146≤PRS-RSRP<-145 | dBm |
| PRS\_RSRP\_12 | -145≤PRS-RSRP<-144 | dBm |
| PRS\_RSRP\_13 | -144≤PRS-RSRP<-143 | dBm |
| PRS\_RSRP\_14 | -143≤PRS-RSRP<-142 | dBm |
| PRS\_RSRP\_15 | -142≤PRS-RSRP<-141 | dBm |
| PRS\_RSRP\_16 | -141≤PRS-RSRP<-140 | dBm |
| PRS\_RSRP\_17 | -140≤PRS-RSRP<-139 | dBm |
| PRS\_RSRP\_18 | -139≤PRS-RSRP<-138 | dBm |
| … | … | … |
| PRS\_RSRP\_111 | -46≤PRS-RSRP<-45 | dBm |
| PRS\_RSRP\_112 | -45≤PRS-RSRP<-44 | dBm |
| PRS\_RSRP\_113 | -44≤PRS-RSRP<-43 | dBm |
| PRS\_RSRP\_114 | -43≤PRS-RSRP<-42 | dBm |
| PRS\_RSRP\_115 | -42≤PRS-RSRP<-41 | dBm |
| PRS\_RSRP\_116 | -41≤PRS-RSRP<-40 | dBm |
| PRS\_RSRP\_117 | -40≤PRS-RSRP<-39 | dBm |
| PRS\_RSRP\_118 | -39≤PRS-RSRP<-38 | dBm |
| PRS\_RSRP\_119 | -38≤PRS-RSRP<-37 | dBm |
| PRS\_RSRP\_120 | -37≤PRS-RSRP<-36 | dBm |
| PRS\_RSRP\_121 | -36≤PRS-RSRP<-35 | dBm |
| PRS\_RSRP\_122 | -35≤PRS-RSRP<-34 | dBm |
| PRS\_RSRP\_123 | -34≤PRS-RSRP<-33 | dBm |
| PRS\_RSRP\_124 | -33≤PRS-RSRP<-32 | dBm |
| PRS\_RSRP\_125 | -32≤PRS-RSRP<-31 | dBm |
| PRS\_RSRP\_126 | -31≤PRS-RSRP | dBm |

##### 10.1.24.3.2 Differential Report Mapping for PRS-RSRP Measurement

The reporting range of differential PRS-RSRP is defined from -30 dB to 0 dB with 1 dB resolution when *nr-DL-AoD-RequestLocationInformation* message is received.

The mapping of measured quantity is defined in Table 10.1.24.3.2-1. The range in the signalling may be larger than the guaranteed accuracy range.

The reporting range of differential PRS-RSRP is defined from -30 dB to 30 dB with 1 dB resolution when *nr-DL-TDOA-RequestLocationInformation* or *nr-Multi-RTT-RequestLocationInformation* is received.

The mapping of measured quantity is defined in Table 10.1.24.3.2-2. The range in the signalling may be larger than the guaranteed accuracy range or the range supported by the UE receiver for differentail RSRP measured on different PRS resources in frequency domain at the same time.

Table 10.1.24.3.2-1: Measurement report mapping for differential PRS-RSRP

|  |  |  |
| --- | --- | --- |
| Reported value | Measured quantity value | Unit |
| DIFFRSRP\_0 | -30≥ΔRSRP | dB |
| DIFFRSRP\_1 | -29≥ΔRSRP>-30 | dB |
| DIFFRSRP\_2 | -28≥ΔRSRP>-29 | dB |
| DIFFRSRP\_3 | -27≥ΔRSRP>-28 | dB |
| DIFFRSRP\_4 | -26≥ΔRSRP>-27 | dB |
| DIFFRSRP\_5 | -25≥ΔRSRP>-26 | dB |
| DIFFRSRP\_6 | -24≥ΔRSRP>-25 | dB |
| DIFFRSRP\_7 | -23≥ΔRSRP>-24 | dB |
| DIFFRSRP\_8 | -22≥ΔRSRP>-23 | dB |
| DIFFRSRP\_9 | -21≥ΔRSRP>-22 | dB |
| DIFFRSRP\_10 | -20≥ΔRSRP>-21 | dB |
| DIFFRSRP\_11 | -19≥ΔRSRP>-20 | dB |
| DIFFRSRP\_12 | -18≥ΔRSRP>-19 | dB |
| DIFFRSRP\_13 | -17≥ΔRSRP>-18 | dB |
| DIFFRSRP\_14 | -16≥ΔRSRP>-17 | dB |
| DIFFRSRP\_15 | -15≥ΔRSRP>-16 | dB |
| DIFFRSRP\_16 | -14≥ΔRSRP>-15 | dB |
| DIFFRSRP\_17 | -13≥ΔRSRP>-14 | dB |
| DIFFRSRP\_18 | -12≥ΔRSRP>-13 | dB |
| DIFFRSRP\_19 | -11≥ΔRSRP>-12 | dB |
| DIFFRSRP\_20 | -10≥ΔRSRP>-11 | dB |
| DIFFRSRP\_21 | -9≥ΔRSRP>-10 | dB |
| DIFFRSRP\_22 | -8≥ΔRSRP>-9 | dB |
| DIFFRSRP\_23 | -7≥ΔRSRP>-8 | dB |
| DIFFRSRP\_24 | -6≥ΔRSRP>-7 | dB |
| DIFFRSRP\_25 | -5≥ΔRSRP>-6 | dB |
| DIFFRSRP\_26 | -4≥ΔRSRP>-5 | dB |
| DIFFRSRP\_27 | -3≥ΔRSRP>-4 | dB |
| DIFFRSRP\_28 | -2≥ΔRSRP>-3 | dB |
| DIFFRSRP\_29 | -1≥ΔRSRP>-2 | dB |
| DIFFRSRP\_30 | 0≥ΔRSRP>-1 | dB |

Table 10.1.24.3.2-2: Measurement report mapping for differential PRS-RSRP

|  |  |  |
| --- | --- | --- |
| Reported value | Measured quantity value | Unit |
| DIFFRSRP\_0 | -30≥ΔRSRP | dB |
| DIFFRSRP\_1 | -29≥ΔRSRP>-30 | dB |
| DIFFRSRP\_2 | -28≥ΔRSRP>-29 | dB |
| DIFFRSRP\_3 | -27≥ΔRSRP>-28 | dB |
| DIFFRSRP\_4 | -26≥ΔRSRP>-27 | dB |
| DIFFRSRP\_5 | -25≥ΔRSRP>-26 | dB |
| DIFFRSRP\_6 | -24≥ΔRSRP>-25 | dB |
| DIFFRSRP\_7 | -23≥ΔRSRP>-24 | dB |
| DIFFRSRP\_8 | -22≥ΔRSRP>-23 | dB |
| DIFFRSRP\_9 | -21≥ΔRSRP>-22 | dB |
| DIFFRSRP\_10 | -20≥ΔRSRP>-21 | dB |
| DIFFRSRP\_11 | -19≥ΔRSRP>-20 | dB |
| DIFFRSRP\_12 | -18≥ΔRSRP>-19 | dB |
| DIFFRSRP\_13 | -17≥ΔRSRP>-18 | dB |
| DIFFRSRP\_14 | -16≥ΔRSRP>-17 | dB |
| … | … | … |
| DIFFRSRP\_25 | -5≥ΔRSRP>-6 | dB |
| DIFFRSRP\_26 | -4≥ΔRSRP>-5 | dB |
| DIFFRSRP\_27 | -3≥ΔRSRP>-4 | dB |
| DIFFRSRP\_28 | -2≥ΔRSRP>-3 | dB |
| DIFFRSRP\_29 | -1≥ΔRSRP>-2 | dB |
| DIFFRSRP\_30 | 0≥ΔRSRP>-1 | dB |
| DIFFRSRP\_31 | 1≥ΔRSRP>0 | dB |
| DIFFRSRP\_32 | 2≥ΔRSRP>1 | dB |
| DIFFRSRP\_33 | 3≥ΔRSRP>2 | dB |
| DIFFRSRP\_34 | 4≥ΔRSRP>3 | dB |
| DIFFRSRP\_35 | 5≥ΔRSRP>4 | dB |
| DIFFRSRP\_36 | 6≥ΔRSRP>5 | dB |
| … | … | … |
| DIFFRSRP\_47 | 17≥ΔRSRP>16 | dB |
| DIFFRSRP\_48 | 18≥ΔRSRP>17 | dB |
| DIFFRSRP\_49 | 19≥ΔRSRP>18 | dB |
| DIFFRSRP\_50 | 20≥ΔRSRP>19 | dB |
| DIFFRSRP\_51 | 21≥ΔRSRP>20 | dB |
| DIFFRSRP\_52 | 22≥ΔRSRP>21 | dB |
| DIFFRSRP\_53 | 23≥ΔRSRP>-22 | dB |
| DIFFRSRP\_54 | 24≥ΔRSRP>23 | dB |
| DIFFRSRP\_55 | 25≥ΔRSRP>24 | dB |
| DIFFRSRP\_56 | 26≥ΔRSRP>25 | dB |
| DIFFRSRP\_57 | 27≥ΔRSRP>26 | dB |
| DIFFRSRP\_58 | 28≥ΔRSRP>27 | dB |
| DIFFRSRP\_59 | 29≥ΔRSRP>28 | dB |
| DIFFRSRP\_60 | 30≥ΔRSRP>29 | dB |
| DIFFRSRP\_61 | ΔRSRP>30 | dB |

### 10.1.25 UE Rx-Tx Time Difference Measurements

#### 10.1.25.1 Introduction

The requirements in Clause 10.1.25 shall apply, provided the UE has received *nr-Multi-RTT-RequestLocationInformation* message from LMF via LPP [31] requesting the UE to report one or more UE Rx-Tx time difference measurements defined in TS 38.215 [4]. The requirements in Clause 10.1.25 shall apply:

- when UE is in RRC\_CONNECTED state and the measurement is performed with MG or without MG,

- when UE is in RRC\_INACTIVE state.

#### 10.1.25.2 Measurement Accuracy Requirements

The UE Rx-Tx time difference measurement accuracy requirements in this clause shall not apply, if:

NTA\_offset defined in Table 7.1.2-2 changes during the UE Rx-Tx measurement period or

if the uplink transmission timing changes during the UE Rx-Tx measurement period due to the network-configured Timing Advance.

The UE Rx-Tx time difference measurement accuracy requirements in this clause shall apply provided that:

- The UE transmits SRS within [-160, 160] msec of at least one DL PRS resource of each of the TRPs in the assistance data.

If the uplink transmission timing changes during the UE Rx-Tx measurement period due to the autonomous timing adjustment defined in clause 7.1.2 then:

- UE Rx-Tx measurement accuracy requirements shall apply for a cell, which is also the downlink reference cell (defined in section 7.1.1) for SRS transmission even if the uplink transmission timing changes during the UE Rx-Tx measurement period due to autonomous adjustment.

- UE Rx-Tx measurement accuracy requirements shall not apply for a cell, which is not the downlink reference cell (defined in section 7.1.1) for SRS transmission, if the uplink transmission timing changes during the UE Rx-Tx measurement period due to autonomous adjustment.

When a serving cell change occurs during the UE Rx-Tx measurement period, the UE Rx-Tx time difference measurement accuracy requirements in this clause shall apply provided that the serving cell change does not impact SRS configuration for the UE Rx-Tx measurement.

The relative accuracy of UE Rx-Tx measurement in this clause is defined as accuracy of the difference between two UE Rx-Tx measurements.

The accuracy requirements in Table 10.1.25.2-1 for FR1 are valid under the following conditions:

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

PRP|dBm according to Annex B.2.14 for a corresponding Band.

AWGN propagation condition.

Table 10.1.25.2-1: UE Rx-Tx time difference measurement accuracy in FR1 in AWGN

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| PRS Ês/Iot | Minimum PRS bandwidth | PRS SCS | PRS resource repetition Note 3 | NR operating band groupsNote 2 | IoNote 4 range | |
| Minimum IoNote 1 | Maximum Io |
| TcNote 5 | dB | RB | kHz |  |  | dBm / SCSPRS | dBm/BW |
| ± 78+δ | -3 | ≥24 | 15 | ≥4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -127 | -50 |
| NR\_FDD\_FR1\_B | -126.5 |
| NR\_TDD\_FR1\_C | -126 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 |
| NR\_FDD\_FR1\_F | -124.5 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 |
| NR\_FDD\_FR1\_H | -123.5 |
| ± 59+δ | ≥52 | ≥1 | Note 6 | Note 6 | Note 6 |
| ± 30+δ | >104 | ≥1 | Note 6 | Note 6 | Note 6 |
| ± 57+δ |  | ≥24 | 30 | ≥4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -124 | -50 |
| NR\_FDD\_FR1\_B | -123.5 |
| NR\_TDD\_FR1\_C | -123 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 |
| NR\_FDD\_FR1\_F | -121.5 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -121 |
|  | NR\_FDD\_FR1\_H | -120.5 |
| ± 30+δ |  | ≥48 | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 15+δ |  | ≥132 | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 29+δ | ≥24 | 60 | ≥4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
| NR\_FDD\_FR1\_B | -120.5 |
| NR\_TDD\_FR1\_C | -120 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 |
| NR\_FDD\_FR1\_F | -118.5 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -118 |
| NR\_FDD\_FR1\_H | -117.5 |
| ± 15+δ |  | ≥ 64 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 7+δ |  | ≥ 132 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 101+δ | -13 | ≥24 | 15 | ≥4 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 75+δ | ≥52 | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 37+δ | >104 | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 58+δ |  | ≥24 | 30 | ≥4 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 39+δ |  | ≥48 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 16+δ |  | ≥132 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 36+δ | ≥24 | 60 | ≥4 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 16+δ |  | ≥ 64 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 8+δ |  | ≥ 132 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34].  NOTE 4: The Io is defined in PRS slots. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same slot.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: δ is the margin determined from Table 10.1.25.2-5. | | | | | | | |

The accuracy requirements in Table 10.1.25.2-1a for FR1 are valid under the following conditions:

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

PRP|dBm according to Annex B.2.14 for a corresponding Band.

Number of measurement samples is less than 4

AWGN propagation condition.

Table 10.1.25.2-1a: UE Rx-Tx time difference measurement accuracy in FR1 in AWGN with reduced measurement samples

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| PRS Ês/Iot | Minimum PRS bandwidth | PRS SCS | PRS resource repetition Note 3 | NR operating band groupsNote 2 | IoNote 4 range | |
| Minimum IoNote 1 | Maximum Io |
| TcNote 5 | dB | RB | kHz |  |  | dBm / SCSPRS | dBm/BW |
| ± 59+δ | 0 | ≥52 | 15 | ≥1 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -50 |
| ± 30+δ6 |  | >104 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 30+δ |  | ≥48 | 30 | ≥1 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -124 | -50 |
| NR\_FDD\_FR1\_B | -123.5 | -50 |
| NR\_TDD\_FR1\_C | -123 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 | -50 |
| NR\_FDD\_FR1\_F | -121.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -121 | -50 |
| NR\_FDD\_FR1\_H | -120.5 | -50 |
| ± 15+δ |  | ≥132 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 15+δ |  | ≥64 | 60 | ≥1 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -121 | -50 |
| NR\_FDD\_FR1\_B | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -50 |
| NR\_FDD\_FR1\_F | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -118 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -50 |
| ± 7+δ |  | ≥132 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 75+δ | -6 | ≥52 | 15 | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 37+δ |  | >104 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 39+δ |  | ≥48 | 30 | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 16+δ |  | ≥132 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 16+δ |  | ≥64 | 60 | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 8+δ |  | ≥132 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34].  NOTE 4: The Io is defined in PRS slots. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same slot.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: δ is the margin determined from Table 10.1.25.2-5. | | | | | | | |

The relative accuracy requirements in Table 10.1.25.2-1b for FR1 are valid under the following conditions:

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

PRP|dBm according to Annex B.2.14 for a corresponding Band.

AWGN propagation condition.

the two UE Rx-Tx time difference measurements are associated with the same RxTx TEG

Table 10.1.25.2-1b: UE Rx-Tx time difference relative measurement accuracy in FR1 in AWGN with TEG reporting

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth  Note 1 | PRS resource repetition ()  Note 2 | Io Note 3 range | | |
| NR operating band groups Note 4 | Minimum Io | Maximum Io |
| Tc Note 5 | dB | kHz | RB |  |  | dBm/SCS | dBm/BWChannel |
| 132 +ΔNote 7 | (PRS Ês/Iot)*j*≥-6dB  (PRS Ês/Iot)*i* ≥-13dB | 15 | ≥ [24 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -127 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -50 |
| 98 +Δ | ≥ 52 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 42 +Δ | ≥ 104 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 75 +Δ | 30 | ≥ 24 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -124 | -50 |
| NR\_FDD\_FR1\_B | -123.5 | -50 |
| NR\_TDD\_FR1\_C | -123 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 | -50 |
| NR\_FDD\_FR1\_F | -121.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -121 | -50 |
| NR\_FDD\_FR1\_H | -120.5 | -50 |
| 48 +Δ | ≥ 48 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 24 +Δ | ≥ 132 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 50 +Δ | 60 | ≥24 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
| NR\_FDD\_FR1\_B | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -50 |
| NR\_FDD\_FR1\_F | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -118 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -50 |
| 24 +Δ | ≥ 64 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| 10 +Δ | ≥ 132 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of resource j and resource i.  NOTE 2: Minimum number of PRS resource repetitions among resource j and resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: Δis the value of the timing error margin for the RxTx TEG, reported via *nr-UE-RxTxTEG-TimingErrorMargin*. Δ cannot be larger than the sum of the margins in table 10.1.25.2-5 (dependent on PRS/SRS BW) for any pair of individual UE Rx-Tx time difference measurements associated with the RxTx TEG. . | | | | | | | |

The accuracy requirements in Table 10.1.25.2-2 for FR1 are valid under the following conditions:

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

PRP|dBm according to Annex B.2.14 for a corresponding Band.

Fading propagation condition.

Table 10.1.25.2-2: UE Rx-Tx time difference measurement accuracy in FR1 in fading

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| PRS Ês/Iot | Minimum PRS bandwidth | PRS SCS | PRS resource repetition Note 3 | NR operating band groupsNote 2 | IoNote 4 range | |
| Minimum IoNote 1 | Maximum Io |
| TcNote 5 | dB | RB | kHz |  |  | dBm / SCSPRS | dBm/BW |
| ± 137+δ | -3 | ≥24 | 15 | ≥4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -127 | -50 |
| NR\_FDD\_FR1\_B | -126.5 |
| NR\_TDD\_FR1\_C | -126 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 |
| NR\_FDD\_FR1\_F | -124.5 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 |
| NR\_FDD\_FR1\_H | -123.5 |
| ± 96+δ | ≥52 | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 62+δ | >104 | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 87+δ |  | ≥24 | 30 | ≥4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -124 | -50 |
| NR\_FDD\_FR1\_B | -123.5 |
| NR\_TDD\_FR1\_C | -123 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 |
| NR\_FDD\_FR1\_F | -121.5 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -121 |
|  | NR\_FDD\_FR1\_H | -120.5 |
| ± 68+δ |  | ≥48 | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 44+δ |  | ≥132 | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 59+δ | ≥24 | 60 | ≥4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
| NR\_FDD\_FR1\_B | -120.5 |
| NR\_TDD\_FR1\_C | -120 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 |
| NR\_FDD\_FR1\_F | -118.5 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -118 |
| NR\_FDD\_FR1\_H | -117.5 |
| ± 42+δ |  | ≥ 64 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 36+δ |  | ≥ 132 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 180+δ | -13 | ≥24 | 15 | ≥4 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 98+δ | ≥52 | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 68+δ | >104 | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 87+δ |  | ≥24 | 30 | ≥4 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 85+δ |  | ≥48 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 44+δ |  | ≥132 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 139+δ | ≥24 | 60 | ≥4 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 46+δ |  | ≥ 64 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| ± 30+δ |  | ≥ 132 |  | ≥1 | NOTE 6 | NOTE 6 | NOTE 6 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34].  NOTE 4: The Io is defined in PRS slots. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same slot.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: δ is the margin determined from Table 10.1.25.2-5. | | | | | | | |

The accuracy requirements in Table 10.1.25.2-3 for FR2 are valid under the following conditions:

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

PRP|dBm according to Annex B.2.14 for a corresponding Band.

AWGN propagation condition.

Table 10.1.25.2-3: UE Rx-Tx time difference measurement accuracy in FR2 in AWGN

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | |
| PRS Ês/Iot | Minimum PRS bandwidth | PRS SCS | PRS resource repetitionNote 3 | IoNote 4 range | |
| Minimum IoNote 1 | Maximum Io |
| **TcNote 5** | **dB** | **RB** | **kHz** |  | **dBm / SCSPRS** | **dBm/BWChannel** |
| ± 22+δ | -3 | ≥24 | 60 | ≥1 | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| ± 15+δ |  | ≥64 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 7+δ |  | ≥132 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 12+δ | ≥32 | 120 | ≥1 | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| ± 7+δ |  | ≥64 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 4+δ |  | ≥128 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 35+δ | -13 | ≥24 | 60 | ≥1 | NOTE 6 | NOTE 6 |
| ± 15+δ |  | ≥64 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 7+δ |  | ≥132 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 14+δ | ≥32 | 120 | ≥1 | NOTE 6 | NOTE 6 |
| ± 9+δ |  | ≥64 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 4+δ |  | ≥128 |  | ≥1 | NOTE 6 | NOTE 6 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34].  NOTE 4: The Io is defined in PRS slots. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same slot.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: δ is the margin determined from Table 10.1.25.2-6. | | | | | | |

The accuracy requirements in Table 10.1.25.2-3a for FR2 are valid under the following conditions:

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

PRP|dBm according to Annex B.2.14 for a corresponding Band

Number of measurement samples is less than 4

AWGN propagation condition.

Table 10.1.25.2-3a: UE Rx-Tx time difference measurement accuracy in FR2 in AWGN with reduced measurement samples

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | |
| PRS Ês/Iot | Minimum PRS bandwidth | PRS SCS | PRS resource repetitionNote 3 | IoNote 4 range | |
| Minimum IoNote 1 | Maximum Io |
| TcNote 5 | dB | RB | kHz |  | dBm / SCSPRS | dBm/BWChannel |
| ± 15+δ | 0 | ≥64 | 60 | ≥1 | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | NOTE 6 |
| ± 7+δ |  | ≥132 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 7+δ |  | ≥64 | 120 | ≥1 | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | NOTE 6 |
| ± 4+δ |  | ≥128 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 15+δ | -6 | ≥64 | 60 | ≥1 | NOTE 6 | NOTE 6 |
| ± 7+δ |  | ≥132 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 9+δ |  | ≥64 | 120 | ≥1 | NOTE 6 | NOTE 6 |
| ± 4+δ |  | ≥128 |  | ≥1 | NOTE 6 | NOTE 6 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: are configured by higher layer parameter dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeNdefined in TS 37.355 [34].  NOTE 4: The Io is defined in PRS slots. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same slot.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: δ is the margin determined from Table 10.1.25.2-6. | | | | | | |

The relative accuracy requirements in Table 10.1.25.2-3b for FR2 are valid under the following conditions:

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

PRP|dBm according to Annex B.2.14 for a corresponding Band

AWGN propagation condition.

the two UE Rx-Tx time difference measurements are associated with the same RxTx TEG

Table 10.1.25.2-3b: UE Rx-Tx time difference relative measurement accuracy in FR2 in AWGN with TEG reporting

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth  Note 1 | PRS resource repetition  () Note 2 | Io Note 3 range | |
| Minimum Io | Maximum Io |
| Tc Note 4 | dB | kHz | RB |  | dBm/SCS | dBm/BWChannel |
| 35 +ΔNote 6 | (PRS Ês/Iot)*j*≥-6dB  (PRS Ês/Iot)*i* ≥-13dB | 60 | ≥ 24 | ≥ 4 | Same value as PRS\_RP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| 24 +Δ | ≥ 64 | ≥ 1 | Note 5 | Note 5 |
| 11 +Δ | ≥ 132 | ≥ 1 | Note 5 | Note 5 |
| 24+Δ | 120 | ≥ 32 | ≥ 4 | Same value as PRS\_RP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| 13 +Δ | ≥ 64 | ≥ 1 | Note 5 | Note 5 |
| 6 +Δ | ≥ 128 | ≥ 1 | Note 5 | Note 5 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of resource j and resource i.  NOTE 2: Minimum number of PRS resource repetitions among resource j and resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 5: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 6: Δis the value of the timing error margin for the RxTx TEG, reported via *nr-UE-RxTxTEG-TimingErrorMargin*. Δ cannot be larger than the sum of the margins in table 10.1.25.2-6 (dependent on PRS/SRS BW) for any pair of individual UE Rx-Tx time difference measurements associated with the RxTx TEG. | | | | | | |

The accuracy requirements in Table 10.1.25.2-4 for FR2 are valid under the following conditions:

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

PRP|dBm according to Annex B.2.14 for a corresponding Band.

Fading propagation condition.

Table 10.1.25.2-4: UE Rx-Tx time difference measurement accuracy in FR2 in fading

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | |
| PRS Ês/Iot | Minimum PRS bandwidth | PRS SCS | PRS resource repetitionNote 3 | IoNote 4 range | |
| Minimum IoNote 1 | Maximum Io |
| TcNote 5 | dB | RB | kHz |  | dBm / SCSPRS | dBm/BWChannel |
| ± 75+δ | -3 | ≥24 | 60 | ≥4 | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| ± 72+δ |  | ≥64 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 57+δ |  | ≥132 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 61+δ | ≥32 | 120 | ≥1 | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| ± 64+δ |  | ≥64 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 55+δ |  | ≥128 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 92+δ | -13 | ≥24 | 60 | ≥4 | NOTE 6 | NOTE 6 |
| ± 70+δ |  | ≥64 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 57+δ |  | ≥132 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 60+δ | ≥32 | 120 | ≥1 | NOTE 6 | NOTE 6 |
| ± 66+δ |  | ≥64 |  | ≥1 | NOTE 6 | NOTE 6 |
| ± 62+δ |  | ≥128 |  | ≥1 | NOTE 6 | NOTE 6 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34].  NOTE 4: The Io is defined in PRS slots. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same slot.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: δ is the margin determined from Table 10.1.25.2-6. | | | | | | |

Table 10.1.25.2-5: Margin for UE Rx-Tx time difference measurement accuracy in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Min(PRS BW, SRS BW) (RB) | | | Margin (Tc Note 1) |
| SCS = 15 kHz | SCS = 30 kHz | SCS = 60 kHz |
| ≥ 24 | N/A | N/A | 160 |
| ≥ 52 | ≥ 24 | N/A | 80 |
| ≥ 104 | ≥ 48 | ≥ 24 | 56 |
| N/A | ≥ 132 | ≥ 64 | 24 |
| N/A | N/A | ≥ 132 | 24 |
| NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 2: If SRS and PRS have different SCS, the margin corresponding to the smallest RS BW in MHz applies. | | | |

Table 10.1.25.2-6: Margin for UE Rx-Tx time difference measurement accuracy in FR2

|  |  |  |
| --- | --- | --- |
| Min(PRS BW, SRS BW) (MHz) | | Margin (Tc Note 1) |
| SCS = 60 kHz | SCS = 120 kHz |
| ≥ 24 | N/A | 76 |
| ≥ 64 | ≥ 32 | 32 |
| ≥ 132 | ≥ 64 | 24 |
| N/A | ≥ 128 | 20 |
| NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 2: If SRS and PRS have different SCS, the margin corresponding to the smallest RS BW in MHz applies. | | |

#### 10.1.25.3 Report mapping

Absolute UE Rx-Tx measurement reporting in clause 10.1.25.3.1, differential reporting for UE Rx-Tx measurement in clause 10.1.25.3.2, and additional path report mapping for UE Rx-Tx measurement in clause 10.1.25.3.3 applies, regardless of number of samples used to measure PRS, to report:

- TEG based measurement corresponding to UE reported Rx TEG in *nr-UE-Rx-TEG-ID-r17* [34],

- gap-based UE Rx-Tx measurement,

- gapless UE Rx-Tx measurement,

- UE Rx-Tx in RRC\_INACTIVE state.

##### 10.1.25.3.1 Absolute UE Rx-Tx Measurement Report Mapping

The reporting range for the absolute UE Rx-Tx time difference measurement (TUE Rx-Tx) is defined from -985024Tc to 985024Tc with the resolution step of 2*k*Tc, where:

Tc is defined in TS 38.211 [6],

*kmin*≤*k*≤*kmax*,

*kmin*=[2] and *kmax*=5, when at least one of the PRS and the SRS resources configured for TUE Rx-Tx is in FR1,

*kmin*=0 and *kmax*=5, when both PRS and SRS resources configured for TUE Rx-Tx are in FR2,

*k≥* *timingReportingGranularityFactor* [34] configured by LMF via LPP for the UE Rx-Tx time difference measurement.

The TUE Rx-Tx report mapping for *k* = 0, 1, 2, 3, 4, and 5 are specified in Tables 10.1.25.3.1-1, 10.1.25.3.1-2, 10.1.25.3.1-3, 10.1.25.3.1-4, 10.1.25.3.1-5, and 10.1.25.3.1-6, respectively.

Table 10.1.25.3.1-1: Absolute UE Rx-Tx time difference measurement report mapping for *k*=0

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value | Measured Quantity Value | Unit |
| RX-TX\_TIME\_DIFFERENCE\_0000 | TUE Rx-Tx < -985024 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_0001 | -985024  TUE Rx-Tx < -985023 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_0002 | -985023  TUE Rx-Tx < -985022 | Tc |
|  |  | … |
| RX-TX\_TIME\_DIFFERENCE\_985024 | -1  TUE Rx-Tx < 0 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_985025 | 0  TUE Rx-Tx < 1 | Tc |
| … | … | … |
| RX-TX\_TIME\_DIFFERENCE\_1970047 | 985022  TUE Rx-Tx < 985023 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_1970048 | 985023  TUE Rx-Tx < 985024 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_1970049 | 985024  TUE Rx-Tx | Tc |

Table 10.1.25.3.1-2: Absolute UE Rx-Tx time difference measurement report mapping for *k*=1

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value | Measured Quantity Value | Unit |
| RX-TX\_TIME\_DIFFERENCE\_0000 | TUE Rx-Tx < -985024 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_0001 | -985024  TUE Rx-Tx < -985022 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_0002 | -985022  TUE Rx-Tx < -985020 | Tc |
|  |  | … |
| RX-TX\_TIME\_DIFFERENCE\_492512 | -2  TUE Rx-Tx < 0 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_492513 | 0  TUE Rx-Tx < 2 | Tc |
| … | … | … |
| RX-TX\_TIME\_DIFFERENCE\_985023 | 985020  TUE Rx-Tx < 985022 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_985024 | 985022  TUE Rx-Tx < 985024 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_985025 | 985024  TUE Rx-Tx | Tc |

Table 10.1.25.3.1-3: Absolute UE Rx-Tx time difference measurement report mapping for *k*=2

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value | Measured Quantity Value | Unit |
| RX-TX\_TIME\_DIFFERENCE\_0000 | TUE Rx-Tx < -985024 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_0001 | -985024  TUE Rx-Tx < -985020 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_0002 | -985020  TUE Rx-Tx < -985016 | Tc |
|  |  | … |
| RX-TX\_TIME\_DIFFERENCE\_246256 | -4  TUE Rx-Tx < 0 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_246257 | 0  TUE Rx-Tx < 4 | Tc |
| … | … | … |
| RX-TX\_TIME\_DIFFERENCE\_492511 | 985016  TUE Rx-Tx < 985020 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_492512 | 985020  TUE Rx-Tx < 985024 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_492513 | 985024  TUE Rx-Tx | Tc |

Table 10.1.25.3.1-4: Absolute UE Rx-Tx time difference measurement report mapping for *k*=3

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value | Measured Quantity Value | Unit |
| RX-TX\_TIME\_DIFFERENCE\_0000 | TUE Rx-Tx < -985024 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_0001 | -985024  TUE Rx-Tx < -985016 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_0002 | -985016  TUE Rx-Tx < -985008 | Tc |
|  |  | … |
| RX-TX\_TIME\_DIFFERENCE\_123128 | -8  TUE Rx-Tx < 0 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_123129 | 0  TUE Rx-Tx < 8 | Tc |
| … | … | … |
| RX-TX\_TIME\_DIFFERENCE\_246255 | 985008  TUE Rx-Tx < 985016 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_246256 | 985016  TUE Rx-Tx < 985024 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_246257 | 985024  TUE Rx-Tx | Tc |

Table 10.1.25.3.1-5: Absolute UE Rx-Tx time difference measurement report mapping for *k*=4

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value | Measured Quantity Value | Unit |
| RX-TX\_TIME\_DIFFERENCE\_0000 | TUE Rx-Tx < -985024 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_0001 | -985024  TUE Rx-Tx < -985008 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_0002 | -985008  TUE Rx-Tx < -984992 | Tc |
|  |  | … |
| RX-TX\_TIME\_DIFFERENCE\_61564 | -16  TUE Rx-Tx < 0 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_61565 | 0  TUE Rx-Tx < 16 | Tc |
| … | … | … |
| RX-TX\_TIME\_DIFFERENCE\_123127 | 984992  TUE Rx-Tx < 985008 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_123128 | 985008  TUE Rx-Tx < 985024 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_123129 | 985024  TUE Rx-Tx | Tc |

**Table 10.1.25.3.1-6: Absolute UE Rx-Tx time difference measurement report mapping for *k*=5**

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value | Measured Quantity Value | Unit |
| RX-TX\_TIME\_DIFFERENCE\_0000 | TUE Rx-Tx < -985024 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_0001 | -985024  TUE Rx-Tx < -984992 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_0002 | -984992  TUE Rx-Tx < -984960 | Tc |
|  |  | … |
| RX-TX\_TIME\_DIFFERENCE\_30782 | -32  TUE Rx-Tx < 0 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_30783 | 0  TUE Rx-Tx < 32 | Tc |
| … | … | … |
| RX-TX\_TIME\_DIFFERENCE\_61563 | 984960  TUE Rx-Tx < 984992 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_61564 | 984992  TUE Rx-Tx < 985024 | Tc |
| RX-TX\_TIME\_DIFFERENCE\_61565 | 985024  TUE Rx-Tx | Tc |

##### 10.1.25.3.2 Differential UE Rx-Tx Measurement Report Mapping

The reporting range for differential UE Rx-Tx time difference measurement (TUE Rx-Tx) is defined from 0 up to 8191Tc where:

TUE Rx-Tx = TUE Rx-Tx1 - TUE Rx-Tx2; where:

TUE Rx-Tx1 > TUE Rx-Tx2,

TUE Rx-Tx1 is the first absolute UE Rx-Tx time difference measurement,

TUE Rx-Tx1 is the second absolute UE Rx-Tx time difference measurement,

Tc is defined in TS 38.211 [6],

*kmin*≤*k*≤*kmax*,

*kmin*=[2] and *kmax*=5, when at least one of the PRS and the SRS resources configured for TUE Rx-Tx is in FR1,

*kmin*=0 and *kmax*=5, when all the PRS and SRS resources configured for TUE Rx-Tx are in FR2,

*k≥* *timingReportingGranularityFactor* [34] configured by LMF via LPP for the UE Rx-Tx time difference measurement.

The TUE Rx-Tx report mapping for *k* = 0, 1, 2, 3, 4, and 5 are specified in Tables 10.1.25.3.2-1, 10.1.25.3.2-2, 10.1.25.3.2-3, 10.1.25.3.2-4, 10.1.25.3.2-5, and 10.1.25.3.2-6, respectively.

Table 10.1.25.3.2-1: Differential UE Rx-Tx time difference measurement report mapping for *k*=0

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value | Measured Quantity Value | Unit |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0000 | 0  TUE Rx-Tx < 1 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0001 | 1  TUE Rx-Tx < 2 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0002 | 2  TUE Rx-Tx < 3 | Tc |
|  |  | … |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_8189 | 8189  TUE Rx-Tx < 8190 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_8190 | 8190  TUE Rx-Tx < 8191 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_8191 | 8191  TUE Rx-Tx | Tc |

Table 10.1.25.3.2-2: Differential UE Rx-Tx time difference measurement report mapping for *k*=1

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value | Measured Quantity Value | Unit |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0000 | 0  TUE Rx-Tx < 2 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0001 | 2  TUE Rx-Tx < 4 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0002 | 4  TUE Rx-Tx < 6 | Tc |
|  |  | … |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_4093 | 8186  TUE Rx-Tx < 8188 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_4094 | 8188  TUE Rx-Tx < 8190 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_4095 | 8190  TUE Rx-Tx | Tc |

Table 10.1.25.3.2-3: Differential UE Rx-Tx time difference measurement report mapping for *k*=2

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value | Measured Quantity Value | Unit |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0000 | 0  TUE Rx-Tx < 4 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0001 | 4  TUE Rx-Tx < 8 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0002 | 8  TUE Rx-Tx < 12 | Tc |
|  |  | … |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_2045 | 8180  TUE Rx-Tx < 8184 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_2046 | 8184  TUE Rx-Tx < 8188 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_2047 | 8188  TUE Rx-Tx | Tc |

Table 10.1.25.3.2-4: Differential UE Rx-Tx time difference measurement report mapping for *k*=3

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value | Measured Quantity Value | Unit |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0000 | 0  TUE Rx-Tx < 8 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0001 | 8  TUE Rx-Tx < 16 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0002 | 16  TUE Rx-Tx < 24 | Tc |
|  |  | … |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_1021 | 8168  TUE Rx-Tx < 8176 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_1022 | 8176  TUE Rx-Tx < 8184 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_1023 | 8184  TUE Rx-Tx | Tc |

Table 10.1.25.3.2-5: Differential UE Rx-Tx time difference measurement report mapping for *k*=4

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value | Measured Quantity Value | Unit |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0000 | 0  TUE Rx-Tx < 16 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0001 | 16  TUE Rx-Tx < 32 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0002 | 32  TUE Rx-Tx < 48 | Tc |
|  |  | … |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_509 | 8144  TUE Rx-Tx < 8160 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_510 | 8160  TUE Rx-Tx < 8176 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_511 | 8176  TUE Rx-Tx | Tc |

Table 10.1.25.3.2-6: Differential UE Rx-Tx time difference measurement report mapping for *k*=5

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value | Measured Quantity Value | Unit |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0000 | 0  TUE Rx-Tx < 32 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0001 | 32  TUE Rx-Tx < 64 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_0002 | 64  TUE Rx-Tx < 96 | Tc |
|  |  | … |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_253 | 8096  TUE Rx-Tx < 8128 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_254 | 8128  TUE Rx-Tx < 8160 | Tc |
| DIFF\_RX-TX\_TIME\_DIFFERENCE\_255 | 8160  TUE Rx-Tx | Tc |

##### 10.1.25.3.3 Additional Path Report Mapping for UE Rx-Tx Time Difference

The reporting range for the additional path reporting for an UE Rx-Tx time difference measurement is defined up to the range from -8175×Tc to 8175×Tc with the resolution step of 2*k*×Tc, where

Tc is defined in TS 38.211 [6],

*kmin*≤*k*≤*kmax*,

*kmin*=[2] and *kmax*=5, when at least one of the PRS resource and SRS resource configured for the UE Rx-Tx time difference measurement is in FR1,

*kmin*=0 and *kmax*=5, when both of the PRS resource and SRS resource configured for the UE Rx-Tx time difference measurement is in FR2,

*k≥* *timingReportingGranularityFactor* [34] configured by LMF via LPP for the UE Rx-Tx time difference measurement.

The UE can report the timing of up to two additional paths with respect to the path timing determining the UE Rx-Tx time difference measurement.

The UE capable of  *additionalPathsExtSupport-r17* can report the timing of up to its supported number of additional paths with respect to the path timing determining the UE Rx-Tx measurement.

The report mappings for different *k* values are specified in Tables 10.1.25.3.3-1 − 10.1.25.3.3-6.

Table 10.1.25.3.3-1: Report mapping for *k*=0

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  path\_i | Measured Quantity Value,  Δpath | Unit |
|
| path\_00000 | Δpath < -8175 | Tc |
| path\_00001 | -8175 ≤ Δpath < -8174 | Tc |
| path\_00002 | -8174 ≤ Δpath < -8173 | Tc |
| … | … | … |
| path\_08175 | -1 ≤ Δpath < 0 | Tc |
| path\_08176 | 0 ≤ Δpath < 1 | Tc |
| … | … | … |
| path\_ 16349 | 8173 ≤ Δpath < 8174 | Tc |
| path\_ 16350 | 8174 ≤ Δpath < 8175 | Tc |
| path\_ 16351 | 8175 ≤ Δpath | Tc |

Table 10.1.25.3.3-2: Report mapping for *k*=1

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  path\_i | Measured Quantity Value,  Δpath | Unit |
| path\_0000 | Δpath < -8175 | Tc |
| path\_0001 | -8175 ≤ Δpath < -8173 | Tc |
| path\_0002 | -8173 ≤ Δpath < -8171 | Tc |
| … | … | … |
| path\_4088 | -1 ≤ Δpath < 1 | Tc |
| … | … | … |
| path\_8174 | 8171 ≤ Δpath < 8173 | Tc |
| path\_8175 | 8173 ≤ Δpath < 8175 | Tc |
| path\_8176 | 8175 ≤ Δpath | Tc |

Table 10.1.25.3.3-3: Report mapping for *k*=2

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  path\_i | Measured Quantity Value,  Δpath | Unit |
| path\_0000 | Δpath < -8174 | Tc |
| path\_0001 | -8174 ≤ Δpath < -8170 | Tc |
| path\_0002 | -8170 ≤ Δpath < -8166 | Tc |
| … | … | … |
| path\_2044 | -2 ≤ Δpath < 2 | Tc |
| … | … | … |
| path\_4086 | 8166 ≤ Δpath < 8170 | Tc |
| path\_4087 | 8170 ≤ Δpath < 8174 | Tc |
| path\_4088 | 8174 ≤ Δpath | Tc |

Table 10.1.25.3.3-4: Report mapping for *k*=3

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  path\_i | Measured Quantity Value,  Δpath | Unit |
| path\_0000 | Δpath < -8172 | Tc |
| path\_0001 | -8172 ≤ Δpath < -8164 | Tc |
| path\_0002 | -8164 ≤ Δpath < -8156 | Tc |
| … | … | … |
| path\_1022 | -4 ≤ Δpath < 4 | Tc |
| … | … | … |
| path\_2042 | 8156 ≤ Δpath < 8164 | Tc |
| path\_2043 | 8164 ≤ Δpath < 8172 | Tc |
| path\_2044 | 8172 ≤ Δpath | Tc |

Table 10.1.25.3.3-5: Report mapping for *k*=4

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  path\_i | Measured Quantity Value,  Δpath | Unit |
| path\_0000 | Δpath < -8168 | Tc |
| path\_0001 | -8168 ≤ Δpath < -8152 | Tc |
| path\_0002 | -8152 ≤ Δpath < -8136 | Tc |
| … | … | … |
| path\_511 | -8 ≤ Δpath < 8 | Tc |
| … | … | … |
| path\_1020 | 8136 ≤ Δpath < 8152 | Tc |
| path\_1021 | 8152 ≤ Δpath < 8168 | Tc |
| path\_1022 | 8168 ≤ Δpath | Tc |

Table 10.1.25.3.3-6: Report mapping for *k*=5

|  |  |  |
| --- | --- | --- |
| Reported Quantity Value,  path\_i | Measured Quantity Value,  Δpath | Unit |
| path\_000 | Δpath < -8160 | Tc |
| path\_001 | -8160 ≤ Δpath < -8128 | Tc |
| path\_002 | -8128 ≤ Δpath < -8096 | Tc |
| … | … | … |
| path\_256 | 0 ≤ Δpath < 32 | Tc |
| … | … | … |
| path\_509 | 8096 ≤ Δpath < 8128 | Tc |
| path\_510 | 8128 ≤ Δpath < 8160 | Tc |
| path\_511 | 8160 ≤ Δpath | Tc |

### 10.1.26 FR2 P-MPR report

The FR2 P-MPR report mapping is defined by this clause.

#### 10.1.26.1 Report mapping

Table 10.1.26.1-1 defines the FR2 P-MPR report mapping.

Table 10.1.26.1-1 Mapping of FR2 P-MPR

|  |  |  |
| --- | --- | --- |
| Reported value | Measured quantity value | Unit |
| P-MPR\_00 | 3  PMP-R < 6 | dB |
| P-MPR\_01 | 6  PMP-R < 9 | dB |
| P-MPR\_02 | 9  PMP-R < 12 | dB |
| P-MPR\_03 | PMP-R ≥ 12 | dB |

### 10.1.27 L1-SINR accuracy requirements for FR1

#### 10.1.27.1 L1-SINR accuracy requirements with CSI-RS based CMR and no dedicated IMR configured

##### 10.1.27.1.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RS based L1-SINR in this clause apply to all CSI-RS resources configured as CMR and no dedicated resource configured as IMR of the serving cell configured for L1-SINR measurement.

The accuracy requirements in Table 10.1.27.1.1-1 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 L1-SINR measurements are fulfilled according to Annex B.2.8.1 for a corresponding Band for each relevant CSI-RS based CMR.

- The bandwidth of CSI-RS as CMR is 48 PRBs and the density is 3.

- AWGN radio propagation conditions.

The performance with larger bandwidth of CSI-RS as CMR is equal to or better than the accuracy requirements in Table 10.1.27.1.1-1.

Table 10.1.27.1.1-1: L1-SINR absolute accuracy for CSI-RS based CMR only in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | CSI-RS  CMR  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 | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | -114 | N/A | -50 |
| ±5.5 | ±6.5 | ≥-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 |
| 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.  NOTE 3: The requirements apply for CSI-RS CMR Ês/Iot ≤ [6] dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | | |

##### 10.1.27.1.2 Relative Accuracy

The relative accuracy of CSI-RS based L1-SINR is defined as the L1-SINR measured from one CSI-RS compared to the largest measured value of L1-SINR among all CSI-RS resources of the serving cell.

The accuracy requirements in Table 10.1.27.1.2-1 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 L1-SINR measurements are fulfilled according to Annex B.2.8.1 for a corresponding Band for each relevant CSI-RS based CMR.

- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

- AWGN radio propagation conditions.

The performance with larger bandwidth of CSI-RS as CMR is equal to or better than the accuracy requirements in Table 10.1.27.1.2-1.

Table 10.1.27.1.2-1: L1-SINR relative accuracy for CSI-RS based CMR only in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | CSI-RS  CMR  Ês/Iot Note 2 | 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 |
| ±[4.5] | ±[5.5] | ≥-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 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter CSI-RS CMR Ês/Iot is the minimum CMR CMR Ês/Iot of the pair of CSI-RS resources to which the requirement applies.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 4: The requirements apply for CSI-RS CMR Ês/Iot ≤ [6] dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | | |

#### 10.1.27.2 L1-SINR accuracy requirements with SSB based CMR and dedicated IMR configured

##### 10.1.27.2.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SSB based L1-SINR in this clause apply to all SSBs configured as CMR and dedicated resources configured as IMR of the serving cell configured for L1-SINR measurement.

The accuracy requirements are defined in Table 10.1.27.2.1-1 for SSB based CMR and NZP-IMR and in Table 10.1.27.2.1-2 for SSB based CMR and ZP-IMR.

The accuracy requirements in Tables 10.1.27.2.1-1 and 10.1.27.2.1-2 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 L1-SINR measurements are fulfilled according to Annex B.2.8.2 for a corresponding Band for each relevant SSB based CMR and IMR.

- The bandwidth of NZP-IMR and ZP-IMR is 48 PRBs and the density is 3.

- AWGN radio propagation conditions.

The performance with larger bandwidth of NZP-IMR and ZP-IMR is equal to or better than the accuracy requirements in Tables 10.1.27.2.1-1 and 10.1.27.2.1-2.

Table 10.1.27.2.1-1: L1-SINR absolute accuracy for SSB based CMR and NZP-IMR in FR1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | | |
| Normal condition | Extreme condition | SSB-  CMR  Ês/Iot | NZP-IMR  Ês/Iot | | Io Note 1 range | | | | |
|  |  |  | |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB | | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±4.0 | ±5.0 | ≥0 | | ≥0 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -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.  NOTE 3: The requirements apply for SSB-CMR Ês/Iot ≤ [6] dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | | | |

Table 10.1.27.2.1-2: L1-SINR absolute accuracy for SSB based CMR and ZP-IMR in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB-  CMR  Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±4.5 | ±5.5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -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.  NOTE 3: The requirements apply for SSB Ês/Iot ≤ [6] dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | |

##### 10.1.27.2.2 Relative Accuracy

The relative accuracy of SSB based L1-SINR is defined as the L1-SINR measured from one SSB configured as CMR and one IMR configured as IMR compared to the largest measured value of L1-SINR among all SSBs and IMRs of the serving cell.

The accuracy requirements are defined in Table 10.1.27.2.2-1 for SSB based CMR and NZP-IMR and in Table 10.1.27.2.2-2 for SSB based CMR and ZP-IMR.

The accuracy requirements in Tables 10.1.27.2.2-1 and 10.1.27.2.2-2 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 L1-SINR measurements are fulfilled according to Annex B.2.8.2 for a corresponding Band for each relevant SSB based CMR and IMR.

- The bandwidth of NZP-IMR and ZP-IMR is 48 PRBs and the density is 3.

- AWGN radio propagation conditions.

The performance with larger bandwidth of NZP-IMR and ZP-IMR is equal to or better than the accuracy requirements in Tables 10.1.27.2.2-1 and 10.1.27.2.2-2.

Table 10.1.27.2.2-1: L1-SINR relative accuracy for SSB based CMR and NZP-IMR in FR1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | | |
| Normal condition | Extreme condition | SSB-  CMR  Ês/Iot Note 2 | NZP-IMR  Ês/Iot | | Io Note 1 range | | | | |
|  |  |  | |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB | | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±[3.0] | ±[4.0] | ≥0 | | ≥0 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB CMR Ês/Iot is the minimum SSB CMR Ês/Iot of the pair of SSBs to which the requirement applies.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 4: The requirements apply for SSB-CMR Ês/Iot ≤ [6] dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | | | |

Table 10.1.27.2.2-2: L1-SINR relative accuracy for SSB based CMR and ZP-IMR in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB-  CMR  Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±[3.5] | ±[4.5] | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB CMR Ês/Iot is the minimum SSB CMR Ês/Iot of the pair of SSBs to which the requirement applies.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 4: The requirements apply for SSB Ês/Iot ≤ [6] dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | |

#### 10.1.27.3 L1-SINR accuracy requirements with CSI-RS based CMR and dedicated IMR configured

##### 10.1.27.3.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RS based L1-SINR in this clause apply to all CSI-RS resources configured as CMR and dedicated resources configured as IMR of the serving cell configured for L1-SINR measurement.

The accuracy requirements are defined in Table 10.1.27.3.1-1 for CSI-RS based CMR and NZP-IMR and in Table 10.1.27.3.1-2 for CSI-RS based CMR and ZP-IMR.

The accuracy requirements in Tables 10.1.27.3.1-1 and 10.1.27.3.1-2 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 L1-SINR measurements are fulfilled according to Annex B.2.8.3 for a corresponding Band for each relevant CSI-RS based CMR and IMR.

- The bandwidth of CSI-RS as CMR, NZP-IMR and ZP-IMR is 48 PRBs and the density is 3.

- AWGN radio propagation conditions.

The performance with larger bandwidth of CSI-RS as CMR, NZP-IMR and ZP-IMR is equal to or better than the accuracy requirements in Tables 10.1.27.3.1-1 and 10.1.27.3.1-2.

Table 10.1.27.3.1-1: L1-SINR absolute accuracy for CSI-RS based CMR and NZP-IMR in FR1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | | |
| Normal condition | Extreme condition | CSI-RS  CMR Ês/Iot | NZP-IMR  Ês/Iot | Io Note 1 range | | | | | |
|  |  |  |  | NR operating band groups Note 2 | Minimum Io | | | | Maximum Io |
| dB | 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 |
| ±4.0 | ±5.0 | ≥0 | ≥0 | 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: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 3: The requirements apply for CSI-RS CMR Ês/Iot ≤ [6] dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | | | |

Table 10.1.27.3.1-2: L1-SINR absolute accuracy for CSI-RS based CMR and ZP-IMR in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | CSI-RS  CMR 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 | -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 | ±5.5 | ≥-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 |
| 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.  NOTE 3: The requirements apply for CSI-RS CMR Ês/Iot ≤ [6] dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | | |

##### 10.1.27.3.2 Relative Accuracy

The relative accuracy of CSI-RS based L1-SINR is defined as the L1-SINR measured from one CSI-RS configured as CMR and one IMR configured as IMR compared to the largest measured value of L1-SINR among all CSI-RS and IMR resources of the serving cell.

The accuracy requirements are defined in Table 10.1.27.3.2-1 for CSI-RS based CMR and NZP-IMR and in Table 10.1.27.3.2-2 for CSI-RS based CMR and ZP-IMR.

The accuracy requirements in Tables 10.1.27.3.2-1 and 10.1.27.3.2-2 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 L1-SINR measurements are fulfilled according to Annex B.2.8.3 for a corresponding Band for each relevant CSI-RS based CMR and IMR.

- The bandwidth of CSI-RS as CMR, NZP-IMR and ZP-IMR is 48 PRBs and the density is 3.

- AWGN radio propagation conditions.

The performance with larger bandwidth of CSI-RS as CMR, NZP-IMR and ZP-IMR is equal to or better than the accuracy requirements in Tables 10.1.27.3.2-1 and 10.1.27.3.2-2.

Table 10.1.27.3.2-1: L1-SINR relative accuracy for CSI-RS based CMR and NZP-IMR in FR1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | | |
| Normal condition | Extreme condition | CSI-RS  CMR Ês/Iot Note 2 | NZP-IMR  Ês/Iot | Io Note 1 range | | | | | |
|  |  |  |  | NR operating band groups Note 3 | Minimum Io | | | | Maximum Io |
| dB | 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 |
| ±[3.0] | ±[4.0] | ≥0 | ≥0 | 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 CMR Ês/Iot is the minimum CMR CMR Ês/Iot of the pair of CSI-RS resources to which the requirement applies.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 4: The requirements apply for CSI-RS CMR Ês/Iot ≤ [6] dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | | | |

Table 10.1.27.3.2-2: L1-SINR relative accuracy for CSI-RS based CMR and ZP-IMR in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | CSI-RS  CMR Ês/Iot Note 2 | 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 |
| ±[3.5] | ±[4.5] | ≥-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 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter CSI-RS CMR Ês/Iot is the minimum CMR CMR Ês/Iot of the pair of CSI-RS resources to which the requirement applies.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 4: The requirements apply for CSI-RS CMR Ês/Iot ≤ [6] dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | | |

### 10.1.28 L1-SINR accuracy requirements for FR2

10.1.28.1 L1-SINR accuracy requirements with CSI-RS based CMR and no dedicated IMR configured

10.1.28.1.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RS based L1-SINR in this clause apply to all CSI-RS resources configured as CMR and no dedicated resource configured as IMR of the serving cell configured for L1-SINR measurement.

The accuracy requirements in Table 10.1.28.1.1-1 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 L1-SINR measurements are fulfilled according to Annex B.2.8.1 for a corresponding Band for each relevant CSI-RS based CMR.

- The bandwidth of CSI-RS as CMR is 48 PRBs and the density is 3.

- 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].

- AWGN radio propagation conditions.

The performance with larger bandwidth of CSI-RS as CMR is equal to or better than the accuracy requirements in Table 10.1.28.1.1-1.

Table 10.1.28.1.1-1: L1-SINR absolute accuracy for CSI-RS based CMR only in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | CSI-RS  CMR  Ês/Iot Note 3 | Io Note 1 range | | | |
|  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 2 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |  |
| ±5.5 | ±6.5 | ≥-3 | Same value as CSI-RS\_RP in Table in B.2.8.1, according to UE Power class, operating band and angle of arrival | | N/A | -50 |
| NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  NOTE 2: 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 3: In the test cases, the CSI-RS CMR 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. | | | | | | |

10.1.28.1.2 Relative Accuracy

The relative accuracy of CSI-RS based L1-SINR is defined as the L1-SINR measured from one CSI-RS compared to the largest measured value of L1-SINR among all CSI-RS resources of the serving cell.

The accuracy requirements in Table 10.1.28.1.2-1 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 L1-SINR measurements are fulfilled according to Annex B.2.8.1 for a corresponding Band for each relevant CSI-RS based CMR.

- The bandwidth of CSI-RS as CMR is 48 PRBs and the density is 3.

- 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].

- AWGN radio propagation conditions.

The performance with larger bandwidth of CSI-RS as CMR is equal to or better than the accuracy requirements in Table 10.1.28.1.2-1.

Table 10.1.28.1.2-1: L1-SINR relative accuracy for CSI-RS based CMR only in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | CSI-RS  CMR  Ês/Iot Note 2, Note 4 | Io Note 1 range | | | |
|  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 3 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |  |
| ±4.5 | ±5.5 | ≥-3 | Same value as CSI-RS\_RP in Table in B.2.8.1, according to UE Power class, operating band and angle of arrival | | N/A | -50 |
| NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter CSI-RS CMR Ês/Iot is the minimum CSI-RS CMR Ês/Iot of the pair of CSI-RS resources to which the requirement applies.  NOTE 3: 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 4: In the test cases, the CSI-RS CMR 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. | | | | | | |

10.1.28.2 L1-SINR accuracy requirements with SSB based CMR and dedicated IMR configured

10.1.28.2.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SSB based L1-SINR in this clause apply to all SSBs configured as CMR and dedicated resources configured as IMR of the serving cell configured for L1-SINR measurement.

The accuracy requirements are defined in Table 10.1.28.2.1-1 for SSB based CMR and NZP-IMR and in Table 10.1.28.2.1-2 for SSB based CMR and ZP-IMR.

The accuracy requirements in Tables 10.1.28.2.1-1 and 10.1.28.2.1-2 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 L1-SINR measurements are fulfilled according to Annex B.2.8.2 for a corresponding Band for each relevant SSB based CMR and IMR.

- The bandwidth of NZP-IMR and ZP-IMR is 48 PRBs and the density is 3.

- 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].

- AWGN radio propagation conditions.

- SSB based CMR and IMR in the test come from the same direction.

The performance with larger bandwidth of NZP-IMR and ZP-IMR is equal to or better than the accuracy requirements in Tables 10.1.28.2.1-1 and 10.1.28.2.1-2.

Table 10.1.28.2.1-1: L1-SINR absolute accuracy for SSB based CMR and NZP-IMR in FR2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB  CMR  Ês/Iot Note 3 | NZP-IMR  Ês/Iot Note 3 | Io Note 1 range | | | |
|  |  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dB | dBm / SCSSSB Note 2 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |  |
| ±4.0 | ±5.0 | ≥0 | ≥0 | Same value as SSB\_RP in Table in B.2.8.2, according to UE Power class, operating band and angle of arrival | | N/A | -50 |
| NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  NOTE 2: 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 3: In the test cases, the SSB Ês/Iot, NZP-IMR 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. | | | | | | | |

Table 10.1.28.2.1-2: L1-SINR absolute accuracy for SSB based CMR and ZP-IMR in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | SSB  CMR  Ês/Iot Note 3 | Io Note 1 range | | | |
|  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 2 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |  |
| ±4.5 | ±5.5 | ≥-3 | Same value as SSB\_RP in Table in B.2.8.2, according to UE Power class, operating band and angle of arrival | | N/A | -50 |
| NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  NOTE 2: 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 3: In the test cases, the SSB CMR 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. | | | | | | |

10.1.28.2.2 Relative Accuracy

The relative accuracy of SSB based L1-SINR is defined as the L1-SINR measured from one SSB configured as CMR and one IMR configured as IMR compared to the largest measured value of L1-SINR among all SSB based CMRs and IMRs of the serving cell.

The accuracy requirements are defined in Table 10.1.28.2.2-1 for SSB based CMR and NZP-IMR and in Table 10.1.28.2.2-2 for SSB based CMR and ZP-IMR.

The accuracy requirements in Tables 10.1.28.2.2-1 and 10.1.28.2.2-2 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 L1-SINR measurements are fulfilled according to Annex B.2.8.2 for a corresponding Band for each relevant SSB based CMR and IMR.

- The bandwidth of NZP-IMR and ZP-IMR is 48 PRBs and the density is 3.

- 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].

- AWGN radio propagation conditions.

- SSB based CMR and IMR in the test come from the same direction.

The performance with larger bandwidth of NZP-IMR and ZP-IMR is equal to or better than the accuracy requirements in Tables 10.1.28.2.2-1 and 10.1.28.2.2-2.

Table 10.1.28.2.2-1: L1-SINR relative accuracy for SSB based CMR and NZP-IMR in FR2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB  CMR  Ês/Iot Note 2, Note 4 | NZP-IMR  Ês/Iot Note 4 | Io Note 1 range | | | |
|  |  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dB | dBm / SCSSSB Note 3 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |  |
| ±3.0 | ±4.0 | ≥0 | ≥0 | Same value as SSB\_RP in Table in B.2.8.2, according to UE Power class, operating band and angle of arrival | | N/A | -50 |
| NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB CMR Ês/Iot is the minimum SSB CMR Ês/Iot of the pair of SSBs to which the requirement applies.  NOTE 3: 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 4: In the test cases, the SSB CMR Ês/Iot, NZP-IMR 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. | | | | | | | |

Table 10.1.28.2.2-2: L1-SINR relative accuracy for SSB based CMR and ZP-IMR in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | SSB  CMR  Ês/Iot Note 2, Note 4 | Io Note 1 range | | | |
|  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dBm / SCSSSB Note 3 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSSSB = 120kHz | SCSSSB = 240kHz |  |  |
| ±3.5 | ±4.5 | ≥-3 | Same value as SSB\_RP in Table in B.2.8.2, according to UE Power class, operating band and angle of arrival | | N/A | -50 |
| NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB CMR Ês/Iot is the minimum SSB CMR Ês/Iot of the pair of SSBs to which the requirement applies.  NOTE 3: 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 4: In the test cases, the SSB CMR 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. | | | | | | |

10.1.28.3 L1-SINR accuracy requirements with CSI-RS based CMR and dedicated IMR configured

10.1.28.3.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RS based L1-SINR in this clause apply to all CSI-RS resources as CMR and dedicated resources configured as IMR of the serving cell configured for L1-SINR measurement.

The accuracy requirements are defined in Table 10.1.28.3.1-1 for CSI-RS based CMR and NZP-IMR and in Table 10.1.28.3.1-2 for CSI-RS based CMR and ZP-IMR.

The accuracy requirements in Tables 10.1.28.3.1-1 and 10.1.28.3.1-2 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 L1-SINR measurements are fulfilled according to Annex B.2.8.3 for a corresponding Band for each relevant CSI-RS based CMR and IMR.

- The bandwidth of CSI-RS as CMR, NZP-IMR and ZP-IMR is 48 PRBs and the density is 3.

- 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].

- AWGN radio propagation conditions.

- CSI-RS based CMR and IMR in the test come from the same direction.

The performance with larger bandwidth of CSI-RS as CMR, NZP-IMR and ZP-IMR is equal to or better than the accuracy requirements in Tables 10.1.28.3.1-1 and 10.1.28.3.1-2.

Table 10.1.28.3.1-1: L1-SINR absolute accuracy for CSI-RS based CMR and NZP-IMR in FR2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | CSI-RS CMR Ês/Iot Note 3 | NZP-IMR  Ês/Iot Note 3 | Io Note 1 range | | | |
|  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dB | dBm / SCSCSI-RS Note 2 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |  |
| ±4.0 | ±5.0 | ≥0 | ≥0 | Same value as CSI-RS\_RP in Table in B.2.8.3, according to UE Power class, operating band and angle of arrival | | N/A | -50 |
| NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  NOTE 2: 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 3: In the test cases, the CSI-RS Ês/Iot, NZP-IMR 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. | | | | | | | |

Table 10.1.28.3.1-2: L1-SINR absolute accuracy for CSI-RS based CMR and ZP-IMR in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | CSI-RS CMR Ês/Iot Note 3 | Io Note 1 range | | | |
|  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 2 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |  |
| ±4.5 | ±5.5 | ≥-3 | Same value as CSI-RS\_RP in Table in B.2.8.3, according to UE Power class, operating band and angle of arrival | | N/A | -50 |
| NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  NOTE 2: 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 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. | | | | | | |

10.1.28.3.2 Relative Accuracy

The relative accuracy of CSI-RS based L1-SINR is defined as the L1-SINR measured from one CSI-RS configured as CMR and one IMR configured as IMR compared to the largest measured value of L1-SINR among all CSI-RS based CMRs and IMRs of the serving cell.

The accuracy requirements are defined in Table 10.1.28.3.2-1 for CSI-RS based CMR and NZP-IMR and in Table 10.1.28.3.2-2 for CSI-RS based CMR and ZP-IMR.

The accuracy requirements in Tables 10.1.28.3.2-1 and 10.1.28.3.2-2 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 L1-SINR measurements are fulfilled according to Annex B.2.8.3 for a corresponding Band for each relevant CSI-RS based CMR and IMR.

- The bandwidth of CSI-RS as CMR, NZP-IMR and ZP-IMR is 48 PRBs and the density is 3.

- 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].

- AWGN radio propagation conditions.

- CSI-RS based CMR and IMR in the test come from the same direction.

The performance with larger bandwidth of CSI-RS as CMR, NZP-IMR and ZP-IMR is equal to or better than the accuracy requirements in Tables 10.1.28.3.2-1 and 10.1.28.3.2-2.

Table 10.1.28.3.2-1: L1-SINR relative accuracy for CSI-RS based CMR and NZP-IMR in FR2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | CSI-RS CMR Ês/Iot Note 2, Note 4 | NZP-IMR  Ês/Iot Note 4 | Io Note 1 range | | | |
|  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dB | dBm / SCSCSI-RS Note 3 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |  |
| ±3.0 | ±4.0 | ≥0 | ≥0 | Same value as CSI-RS\_RP in Table in B.2.8.3, according to UE Power class, operating band and angle of arrival | | N/A | -50 |
| NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter CSI-RS CMR Ês/Iot is the minimum CSI-RS CMR Ês/Iot of the pair of CSI-RS resources to which the requirement applies.  NOTE 3: 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 4: In the test cases, the CSI-RS CMR Ês/Iot, NZP-IMR 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. | | | | | | | |

Table 10.1.28.3.2-2: L1-SINR relative accuracy for CSI-RS based CMR and ZP-IMR in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | CSI-RS CMR Ês/Iot Note 2, Note 4 | Io Note 1 range | | | |
|  |  | Minimum Io | | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 3 | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |  |
| ±3.5 | ±4.5 | ≥-3 | Same value as CSI-RS\_RP in Table in B.2.8.3, according to UE Power class, operating band and angle of arrival | | N/A | -50 |
| NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter CSI-RS CMR Ês/Iot is the minimum CSI-RS CMR Ês/Iot of the pair of CSI-RS resources to which the requirement applies.  NOTE 3: 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 4: In the test cases, the CSI-RS CMR 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. | | | | | | |

### 10.1.29 Intra-frequency RSRQ accuracy requirements under CCA

#### 10.1.29.1 Intra-frequency SS-RSRQ accuracy requirements in FR1

##### 10.1.29.1.1 Absolute SS-RSRQ Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on the same frequency as that of the serving cell under CCA.

The accuracy requirements in Table 10.1.29.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F 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 for each relevant SSB.

Table 10.1.29.1.1-1: SS-RSRQ intra-frequency absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±2.5 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±3.5 | ±4 | ≥-6 | 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 are as defined in clause 3.5.2. | | | | | | | |

### 10.1.30 Inter-frequency RSRQ accuracy requirements under CCA

#### 10.1.30.1 Inter-frequency SS-RSRQ accuracy requirements in FR1

##### 10.1.30.1.1 Aboslute Accuracy of SS-RSRQ

The requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on a frequency under CCA that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.30.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F 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 for each relevant SSB.

Table 10.1.30.1.1-1: SS-RSRQ inter-frequency absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±2.5 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±3.5 | ±4 | ≥-6 | 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 are as defined in clause 3.5.2. | | | | | | | |

##### 10.1.30.1.2 Relative Accuracy of SS-RSRQ

The relative accuracy of SS-RSRQ in inter-frequency case is defined as the RSRQ measured from one cell on a frequency compared to the RSRP measured from another cell on a different frequency, with at least one of the two frequencies being under CCA.

The accuracy requirements in Table 10.1.30.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3F 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 for each relevant SSB.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

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

Table 10.1.30.1.2-1: SS-RSRQ inter-frequency relative accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 2 | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| **dB** | **dB** | **dB** |  | **dBm / SCSSSB** | | **dBm/BWChannel** | **dBm/BWChannel** |
|  |  |  |  | **SCSSSB = 15 kHz** | **SCSSSB = 30 kHz** |  |  |
| ±3 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±4 | ±4 | ≥-6 | 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 SSB Ês/Iot is the minimum SSB 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 are as defined in clause 3.5.2. | | | | | | | |

### 10.1.31 Intra-frequency SINR accuracy requirements under CCA

#### 10.1.31.1 Intra-frequency SS-SINR accuracy requirements in FR1

##### 10.1.31.1.1 Absolute SS-SINR Accuracy

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

The accuracy requirements in Table 10.1.31.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F 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.

Table 10.1.31.1.1-1: SS-SINR intra-frequency absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 3 | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±3.0 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±3.5 | ±4 | ≥-6 | 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: The requirements apply for SSB Ês/Iot ≤ 25 dB.  NOTE 4: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

### 10.1.32 Inter-frequency SINR accuracy requirements under CCA

#### 10.1.32.1 Inter-frequency SS-SINR accuracy requirements in FR1

##### 10.1.32.1.1 Aboslute Accuracy of SS-SINR

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

The accuracy requirements in Table 10.1.32.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F 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.

Table 10.1.32.1.1-1: SS-SINR inter-frequency absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 3 | Io Note 1 range | | | | |
|  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±3.0 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | 116.5 | -113.5 |
| ±3.5 | ±4 | ≥-6 | 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: The requirements apply for SSB Ês/Iot ≤ 25 dB.  NOTE 4: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

##### 10.1.32.1.2 Relative Accuracy of SS-SINR

The relative accuracy of SS-SINR in inter frequency case is defined as the SS-SINR measured from one cell on a frequency compared to the SS-SINR measured from another cell on a different frequency, with at least one of the two frequencies being under CCA.

The accuracy requirements in Table 10.1.32.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3F 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.

- SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

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

Table 10.1.32.1.2-1: SS-SINR inter-frequency relative accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 2,4 | NR operating band groups Note 5 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 120 kHz | SCSSSB = 240 kHz |  |  |
| ±3.5 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±4 | ±4 | ≥-6 | 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 SSB Ês/Iot is the minimum SSB 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: The requirements apply for SSB Ês/Iot ≤ 25 dB.  NOTE 5: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

### 10.1.33 L1-RSRP accuracy requirements under CCA

#### 10.1.33.1 SSB based L1-RSRP accuracy requirements in FR1

##### 10.1.33.1.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SSB based L1-RSRP in this clause apply to all SSBs of the serving cell configured for L1-RSRP measurement under CCA.

The accuracy requirements in Table 10.1.33.1.1-1 are valid under the following conditions:

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

- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.10.1 for a corresponding Band for each relevant SSB.

Table 10.1.33.1.1-1: SSB based L1-RSRP absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±5.0 | ±9.5 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -70 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±8.5 | ±11.5 | ≥-3 | NR\_CCA\_FR1\_I | N/A | N/A | -70 | -50 |
| NR\_CCA\_FR1\_J |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

##### 10.1.33.1.2 Relative Accuracy

The relative accuracy of SSB based L1-RSRP is defined as the L1-RSRP measured from one SSB compared to the largest measured value of L1-RSRP among all SSBs of the serving cell under CCA.

The accuracy requirements in Table 10.1.33.1.2-1 are valid under the following conditions:

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

- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.10.1 for a corresponding Band for each relevant SSB.

Table 10.1.33.1.2-1: SSB based L1-RSRP relative accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±3 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of SSBs to which the requirement applies.  NOTE 3: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

### 10.1.34 RSSI measurements under CCA

#### 10.1.34.1 Intra-frequency absolute RSSI measurement accuracy requirements in FR1

The accuracy requirements for intra-frequency RSSI measurements on a carrier frequency under CCA are specified in Table 10.1.34.1-1. The requirements apply for any configured RSSI *measDuration* [2], provided that:

- All symbols duing each RSSI measurement duration are available for RSSI sampling within the same reporting interval.

The intra-frequency RSSI measurement bandwidth is the channel bandwidth defined in Clause 4 of TS 37.213 [33], where the channel has the center frequency configured by *ARFCN-valueNR*.

Table 10.1.34.1-1: Intra-frequency RSSI accuracy under CCA

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | Io Note 1 range | | | | |
|  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| [±3.5] | [±6.5] | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -70 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| [±5.5] | [±8.5] | NR\_CCA\_FR1\_I | N/A | N/A | -70 | -50 |
| NR\_CCA\_FR1\_J |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups are as defined in clause 3.5.2. | | | | | | |

#### 10.1.34.2 Inter-frequency absolute RSSI measurement accuracy requirements in FR1

The accuracy requirements for inter-frequency RSSI measurements on a carrier frequency under CCA are the same as specified in clause 10.1.34.1.

The inter-frequency RSSI measurement bandwidth is the channel bandwidth defined in Clause 4 of TS 37.213 [33], where the channel has the center frequency configured by *ARFCN-valueNR*.

#### 10.1.34.3 RSSI measurement report mapping

The reporting range of RSSI measurement is defined from -100 dBm to -25 dBm with 1 dBm resolution.

The mapping of the measured quantity is defined in Table 10.1.34.3-1. The range in the signalling may be larger than the guaranteed accuracy range, provided that the following condition is met:

the RSSI measurement bandwidth is the channel bandwidth defined in Clause 4 of TS 37.213 [33], where the channel has the center frequency configured by *ARFCN-valueNR*.

Table 10.1.34.3-1: RSSI measurement report mapping

|  |  |  |
| --- | --- | --- |
| Reported value | Measured quantity value | Unit |
| RSSI\_00 | RSSI < ‑100 | dBm |
| RSSI\_01 | -100 ≤ RSSI < ‑99 | dBm |
| RSSI\_02 | -99 ≤ RSSI < ‑98 | dBm |
| … | … | … |
| RSSI\_74 | -27 ≤ RSSI < -26 | dBm |
| RSSI\_75 | -26 ≤ RSSI < -25 | dBm |
| RSSI\_76 | -25 ≤ RSSI | dBm |

### 10.1.35 Channel occupancy measurements under CCA

#### 10.1.35.1 Intra-frequency channel occupancy measurement accuracy requirements in FR1

The UE shall be able to correctly evaluate the intra-frequency channel occupancy configured according to TS 38.331 [2], provided that the following conditions are met:

- All symbols during each RSSI measurement duration are available for RSSI sampling within the same reporting interval,

- RSSI at the UE receiver meets the following condition with respect to the configured *channelOccupancyThreshold* [2]:

- RSSI at the UE receiver is below *channelOccupancyThreshold*-, or

- RSSI at the UE receiver is above *channelOccupancyThreshold*+,

- where  is the applicable RSSI measurement accuracy value from the RSSI measurement accuracy requirements specified in clause 10.1.34.1.

The channel occupancy measurement bandwidth is the same as the RSSI measurement bandwidth in Clause 10.1.34.1.

#### 10.1.35.2 Inter-frequency channel occupancy measurement accuracy requirements in FR1

The UE shall be able to correctly evaluate the inter-frequency channel occupancy configured according to TS 38.331 [2], provided that the following conditions are met:

- All symbols during each RSSI measurement duration are available for RSSI sampling within the same reporting interval,

- RSSI at the UE receiver meets the following condition with respect to the configured *channelOccupancyThreshold* [2]:

- RSSI at the UE receiver is below *channelOccupancyThreshold*-, or

- RSSI at the UE receiver is above *channelOccupancyThreshold*+,

- where  is the applicable RSSI measurement accuracy value from the RSSI measurement accuracy requirements specified in clause 10.1.34.2.

The channel occupancy measurement bandwidth is the same as the RSSI measurement bandwidth in Clause 10.1.34.2.

### 10.1.36 Intra-frequency RSRP accuracy requirements under CCA

#### 10.1.36.1 Intra-frequency SS-RSRP accuracy requirements in FR1

##### 10.1.36.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on the same frequency as that of the serving cell under CCA.

The accuracy requirements in Table 10.1.36.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F 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 for each relevant SSB.

Table 10.1.36.1.1-1: SS-RSRP intra-frequency absolute accuracy

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±4.5 | ±9 | ≥-6 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -70 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±8 | ±11 | ≥-6 | NR\_CCA\_FR1\_I | N/A | N/A | -70 | -50 |
| NR\_CCA\_FR1\_J |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

##### 10.1.36.1.2 Relative SS-RSRP Accuracy

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell compared to the SS-RSRP measured from another cell on the same frequency, or between any two SS-RSRP levels measured on the same cell under CCA.

The accuracy requirements in Table 10.1.36.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3F 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 for each relevant SSB.

Table 10.1.36.1.2-1: SS-RSRP intra-frequency relative accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±2 | ±3 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±3 | ±3 | ≥-6 | 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 SSB Ês/Iot is the minimum SSB 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 are as defined in clause 3.5.2. | | | | | | | |

### 10.1.37 Inter-frequency RSRP accuracy requirements under CCA

#### 10.1.37.1 Inter-frequency SS-RSRP accuracy requirements in FR1

##### 10.1.37.1.1 Absolute Accuracy of SS-RSRP

The requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on a frequency under CCA that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.37.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F 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 for each relevant SSB.

Table 10.1.37.1.1-1: SS-RSRP inter-frequency absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±4.5 | ±9 | ≥-6 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -70 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±8 | ±11 | ≥-6 | NR\_CCA\_FR1\_I | N/A | N/A | -70 | -50 |
| NR\_CCA\_FR1\_J |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

##### 10.1.37.1.2 Relative Accuracy of SS-RSRP

The relative accuracy of SS-RSRP in inter frequency case is defined as the RSRP measured from one cell on a frequency compared to the RSRP measured from another cell on a different frequency, with at least one of the two frequencies being under CCA.

The accuracy requirements in Table 10.1.37.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3F 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 for each relevant SSB.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

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

Table 10.1.37.1.2-1: SS-RSRP inter-frequency relative accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±4.5 | ±6 | ≥-6 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

### 10.1.38 PRS-RSRPP Measurements

#### 10.1.38.1 Introduction

The requirements in Clause 10.1.38.2 shall apply, provided the UE has received *nr-DL-AoD-RequestLocationInformation* message from LMF via LPP [34] requesting the UE to report one or more DL PRS-RSRPP measurements defined in TS 38.215 [4]. The requirements in Clause 10.1.38 shall apply:

- when UE is in RRC\_CONNECTED state,

- when UE is in RRC\_INACTIVE state.

The requirements in Clause 10.1.38.2 apply for the first path PRS-RSRP measurement.

#### 10.1.38.2 Measurement Accuracy Requirements

##### 10.1.38.2.1 Absolute PRS RSRPP accuracy

The absolute accuracy requirements for PRS-RSRPP measurement for FR1 defined in Table 10.1.38.2.1-1 and Table 10.1.38.2.1-3 are valid under the following conditions:

- Conditions defined in 38.101-1 Clause 7.3 for reference sensitivity are fulfilled.

- PRP 1,2|dBm according to Annex B.2.14 for a corresponding Band

The absolute accuracy requirements for PRS-RSRPP measurement for FR2 defined in Table 10.1.38.2.1-2 and Table 10.1.38.2.1-4 are valid under the following conditions:

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

- PRP 1,2|dBm according to Annex B.2.14 for a corresponding Band

The absolute accuracy requirements for PRS-RSRPP measurement defined in Table 10.1.38.2.1-1 and Table 10.1.38.2.1-2 apply for the UE not supporting *supportedDL-PRS-ProcessingSamples* [34] or LMF does not indicate UE to perform positioning measurements with reduced number of samples.

The absolute accuracy requirements for PRS-RSRPP measurement defined in Table 10.1.38.2.1-3 and Table 10.1.38.2.1-4 apply for the UE supporting *supportedDL-PRS-ProcessingSamples* [34].

Note: The requriements in this clause are derived based on two-tap channel defined in 38.101-4 Annex B.2.4 (a = 1, τd=0.45 µs and fD=5 Hz).

Note: The requirements in this clause are derived based on the difference between the estimated PRS-RSRPP compared to the ideal PRS-RSRPP defined as

Where:

is the effective channel frequency response (over REs occupied by PRS) measured without receiver noise.

is the exact delay of the p-th path in the channel model.

Table 10.1.38.2.1-1: PRS-RSRPP absolute accuracy for FR1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | | |
| **Normal condition** | Extreme condition | PRS Ês/Iot | PRS BW | Repetition factor  ( | **Io Note 7 range** | | | | |
| NR operating band groups Note 8 | Minimum Io Note 1  dBm / SCSPRS | | | Maximum Io |
| **dB** | **dB** | **dB** | **PRB** | **-** |  | dBm / SCSPRS | | | dBm/BWChannel |
| dBm/15kHz Note 6 | dBm/30kHz Note 6 | dBm/60kHz Note 6 |
| ±TBD | ±TBD | ≥-3 | ≥24 | All | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -124 | -121 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -123.5 | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -123 | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -122.5 | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -122 | -119 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -121.5 | -118.5 | -50 |
| NR\_FDD\_FR1\_G | -124 | -121 | -118 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -120.5 | -117.5 | -50 |
| Note 4 | | | | |
| Note 4 | | | | |
| ±TBD | ±TBD | ≥-13 | 24 ≤ BW ≤ 52 | All | Note 4 | | | | |
| ±TBD | ±TBD | 52< BW≤ 104 | All | Note 4 | | | | |
| ±TBD | ±TBD | BW >104 | All | Note 4 | | | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: Void.  NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA or DL-AoD assistance data defined in [34].  NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 24 RB.  NOTE 5: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.  NOTE 6: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 7: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 8: NR operating band groups are as defined in Section 3.5.2. | | | | | | | | | |

Table 10.1.38.2.1-2: PRS-RSRPP absolute accuracy for FR2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | PRS Ês/Iot | PRS BW | Repetition factor  ( | Io Note 7 range | | |
| Minimum Io Note 1  dBm / SCSPRS | | Maximum Io |
| dB | dB | dB | PRB | - | dBm / SCSPRS | | dBm/BWChannel |
| dBm/120kHz Note 6 | dBm/60kHz Note 6 |
| ±TBD | ±TBD | ≥-3 | ≥24 | All | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | | -50 |
| Note 4 | | |
| Note 4 | | |
| ±TBD | ±TBD | ≥-13 | 24 ≤ BW ≤ 64 | All | Note 4 | | |
| ±TBD | ±TBD | BW >64 | All | Note 4 | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: Void.  NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA or DL-AoD assistance data defined in [34].  NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 24 RB.  NOTE 5: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.  NOTE 6: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 7: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 8: NR operating band groups are as defined in Section 3.5.2. | | | | | | | |

Table 10.1.38.2.1-3: PRS-RSRPP absolute accuracy for FR1 for reduced number of samples

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | | |
| Normal condition | Extreme condition | PRS Ês/Iot | PRS BW | Repetition factor  ( | Io Note 7 range | | | | |
| NR operating band groups Note 8 | Minimum Io Note 1  dBm / SCSPRS | | | Maximum Io |
| dB | dB | dB | PRB | - |  | dBm / SCSPRS | | | dBm/BWChannel |
| dBm/15kHz Note 6 | dBm/30kHz Note 6 | dBm/60kHz Note 6 |
| TBD | TBD | ≥0 | ≥48 | All | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -124 | -121 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -123.5 | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -123 | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -122.5 | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -122 | -119 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -121.5 | -118.5 | -50 |
| NR\_FDD\_FR1\_G | -124 | -121 | -118 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -120.5 | -117.5 | -50 |
| Note 4 | | | | |
| Note 4 | | | | |
| ±TBD | ±TBD | ≥-6 | 48 ≤ BW ≤ 52 | All | Note 4 | | | | |
| ±TBD | ±TBD | 52< BW≤ 104 | All | Note 4 | | | | |
| ±TBD | ±TBD | BW >104 | All | Note 4 | | | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: Void.  NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA or DL-AoD assistance data defined in [34].  NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 48 RB.  NOTE 5: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.  NOTE 6: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 7: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 8: NR operating band groups are as defined in Section 3.5.2. | | | | | | | | | |

Table 10.1.38.2.1-4: PRS-RSRPP absolute accuracy for FR2 for reduced number of samples

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | | **Conditions** | | | | | |
| Normal condition | Extreme condition | PRS Ês/Iot | PRS BW | Repetition factor  ( | Io Note 7 range | | |
| Minimum Io Note 1  dBm / SCSPRS | | Maximum Io |
| dB | dB | dB | PRB | - | dBm / SCSPRS | | dBm/BWChannel |
| dBm/120kHz Note 6 | dBm/60kHz Note 6 |
| TBD | TBD | ≥0 | ≥48 | All | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | | -50 |
| Note 4 | | |
| Note 4 | | |
| ±TBD | ±TBD | ≥-6 | 48 ≤ BW ≤ 64 | All | Note 4 | | |
| ±TBD | ±TBD | BW >64 | All | Note 4 | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: Void.  NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA or DL-AoD assistance data defined in [34].  NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 48 RB.  NOTE 5: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.  NOTE 6: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 7: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 8: NR operating band groups are as defined in Section 3.5.2. | | | | | | | |

#### 10.1.38.3 Report mapping

##### 10.1.38.3.1 Absolute PRS-RSRPP Measurement Report Mapping

The reporting range of absolute PRS-RSRPP measurement is defined from -156 dBm to -31 dBm with 1 dB resolution.

The mapping of measured quantity is defined in Table 10.1.38.3.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

The UE capable of *additionalPathsExtSupport-r17* can report the PRS-RSRPP measurement of up to its supported number of additional paths.

Table 10.1.38.3.1-1: Measurement report mapping for PRS-RSRPP

|  |  |  |
| --- | --- | --- |
| **Reported value** | **Measured quantity value** | **Unit** |
| PRS\_RSRPP\_0 | PRS-RSRPP<-156 | dBm |
| PRS\_RSRPP\_1 | -156≤PRS-RSRPP<-155 | dBm |
| PRS\_RSRPP\_2 | -155≤PRS-RSRPP<-154 | dBm |
| PRS\_RSRPP\_3 | -154≤PRS-RSRPP<-153 | dBm |
| PRS\_RSRPP\_4 | -153≤PRS-RSRPP<-152 | dBm |
| PRS\_RSRPP\_5 | -152≤PRS-RSRPP<-151 | dBm |
| PRS\_RSRPP\_6 | -151≤PRS-RSRPP<-150 | dBm |
| PRS\_RSRPP\_7 | -150≤PRS-RSRPP<-149 | dBm |
| PRS\_RSRPP\_8 | -149≤PRS-RSRPP<-148 | dBm |
| PRS\_RSRPP\_9 | -148≤PRS-RSRPP<-147 | dBm |
| PRS\_RSRPP\_10 | -147≤PRS-RSRPP<-146 | dBm |
| PRS\_RSRPP\_11 | -146≤PRS-RSRPP<-145 | dBm |
| PRS\_RSRPP\_12 | -145≤PRS-RSRPP<-144 | dBm |
| PRS\_RSRPP\_13 | -144≤PRS-RSRPP<-143 | dBm |
| PRS\_RSRPP\_14 | -143≤PRS-RSRPP<-142 | dBm |
| PRS\_RSRPP\_15 | -142≤PRS-RSRPP<-141 | dBm |
| PRS\_RSRPP\_16 | -141≤PRS-RSRPP<-140 | dBm |
| PRS\_RSRPP\_17 | -140≤PRS-RSRPP<-139 | dBm |
| PRS\_RSRPP\_18 | -139≤PRS-RSRPP<-138 | dBm |
| … | … | … |
| PRS\_RSRPP\_111 | -46≤PRS-RSRPP<-45 | dBm |
| PRS\_RSRPP\_112 | -45≤PRS-RSRPP<-44 | dBm |
| PRS\_RSRPP\_113 | -44≤PRS-RSRPP<-43 | dBm |
| PRS\_RSRPP\_114 | -43≤PRS-RSRPP<-42 | dBm |
| PRS\_RSRPP\_115 | -42≤PRS-RSRPP<-41 | dBm |
| PRS\_RSRPP\_116 | -41≤PRS-RSRPP<-40 | dBm |
| PRS\_RSRPP\_117 | -40≤PRS-RSRPP<-39 | dBm |
| PRS\_RSRPP\_118 | -39≤PRS-RSRPP<-38 | dBm |
| PRS\_RSRPP\_119 | -38≤PRS-RSRPP<-37 | dBm |
| PRS\_RSRPP\_120 | -37≤PRS-RSRPP<-36 | dBm |
| PRS\_RSRPP\_121 | -36≤PRS-RSRPP<-35 | dBm |
| PRS\_RSRPP\_122 | -35≤PRS-RSRPP<-34 | dBm |
| PRS\_RSRPP\_123 | -34≤PRS-RSRPP<-33 | dBm |
| PRS\_RSRPP\_124 | -33≤PRS-RSRPP<-32 | dBm |
| PRS\_RSRPP\_125 | -32≤PRS-RSRPP<-31 | dBm |
| PRS\_RSRPP\_126 | -31≤PRS-RSRPP | dBm |

##### 10.1.38.3.2 Differential Report Mapping for PRS-RSRPP Measurement

The reporting range of differential PRS-RSRPP is defined from -30 dB to 0 dB with 1 dB resolution when *nr-DL-AoD-RequestLocationInformation* message is received.

The mapping of measured quantity is defined in Table 10.1.38.3.2-1. The range in the signalling may be larger than the guaranteed accuracy range.

For differential reporting, PRS-RSRPP is reported as the difference in dB with respect to the first reported PRS-RSRPP.

Table 10.1.38.3.2-1: Measurement report mapping for differential PRS-RSRPP

|  |  |  |
| --- | --- | --- |
| Reported value | Measured quantity value | Unit |
| DIFFRSRPP\_0 | -30≥ΔRSRPP | dB |
| DIFFRSRPP\_1 | -29≥ΔRSRPP>-30 | dB |
| DIFFRSRPP\_2 | -28≥ΔRSRPP>-29 | dB |
| DIFFRSRPP\_3 | -27≥ΔRSRPP>-28 | dB |
| DIFFRSRPP\_4 | -26≥ΔRSRPP>-27 | dB |
| DIFFRSRPP\_5 | -25≥ΔRSRPP>-26 | dB |
| DIFFRSRPP\_6 | -24≥ΔRSRPP>-25 | dB |
| DIFFRSRPP\_7 | -23≥ΔRSRPP>-24 | dB |
| DIFFRSRPP\_8 | -22≥ΔRSRPP>-23 | dB |
| DIFFRSRPP\_9 | -21≥ΔRSRPP>-22 | dB |
| DIFFRSRPP\_10 | -20≥ΔRSRPP>-21 | dB |
| DIFFRSRPP\_11 | -19≥ΔRSRPP>-20 | dB |
| DIFFRSRPP\_12 | -18≥ΔRSRPP>-19 | dB |
| DIFFRSRPP\_13 | -17≥ΔRSRPP>-18 | dB |
| DIFFRSRPP\_14 | -16≥ΔRSRPP>-17 | dB |
| DIFFRSRPP\_15 | -15≥ΔRSRPP>-16 | dB |
| DIFFRSRPP\_16 | -14≥ΔRSRPP>-15 | dB |
| DIFFRSRPP\_17 | -13≥ΔRSRPP>-14 | dB |
| DIFFRSRPP\_18 | -12≥ΔRSRPP>-13 | dB |
| DIFFRSRPP\_19 | -11≥ΔRSRPP>-12 | dB |
| DIFFRSRPP\_20 | -10≥ΔRSRPP>-11 | dB |
| DIFFRSRPP\_21 | -9≥ΔRSRPP>-10 | dB |
| DIFFRSRPP\_22 | -8≥ΔRSRPP>-9 | dB |
| DIFFRSRPP\_23 | -7≥ΔRSRPP>-8 | dB |
| DIFFRSRPP\_24 | -6≥ΔRSRPP>-7 | dB |
| DIFFRSRPP\_25 | -5≥ΔRSRPP>-6 | dB |
| DIFFRSRPP\_26 | -4≥ΔRSRPP>-5 | dB |
| DIFFRSRPP\_27 | -3≥ΔRSRPP>-4 | dB |
| DIFFRSRPP\_28 | -2≥ΔRSRPP>-3 | dB |
| DIFFRSRPP\_29 | -1≥ΔRSRPP>-2 | dB |
| DIFFRSRPP\_30 | 0≥ΔRSRPP>-1 | dB |

### 10.1.39 UE Rx-Tx time difference measurements for RTT-based PDC

#### 10.1.39.1 Introduction

Editors note: This is to capture the applicability of the requirements in this section

#### 10.1.39.2 Measurement Accuracy Requirements for PRS

The error in the reported value of UE Rx-Tx time difference measurement, including both the measurement error and the reporting quantization error, should be within the accuracy requirements specified in this clause.

The UE Rx-Tx time difference measurement accuracy requirements in this clause shall not apply, if:

- NTA\_offset defined in Table 7.1.2-2 changes during the UE Rx-Tx measurement period or

- if the uplink transmission timing changes during the UE Rx-Tx measurement period due to the network-configured Timing Advance.

The UE Rx-Tx time difference measurement accuracy requirements in this clause shall apply provided that:

- The UE transmits SRS within [-160, 160] msec of at least one PDC DL PRS resource from the serving cell (PCell).

When a serving cell change occurs during the UE Rx-Tx measurement period, the UE Rx-Tx time difference measurement accuracy requirements in this clause shall apply provided that the serving cell change does not impact SRS configuration for the UE Rx-Tx measurement.

The accuracy requirements in Table 10.1.39.2-1 for FR1 are valid under the following conditions:

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

PRP|dBm according to Annex [TBD] for a corresponding Band.

AWGN propagation condition.

Table 10.1.39.2-1: UE Rx-Tx time difference measurement accuracy in FR1 in AWGN

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| PRS Ês/Iot | Minimum PRS bandwidth | PRS SCS | PRS resource repetition Note 3 | NR operating band groupsNote 2 | IoNote 4 range | |
| Minimum IoNote 1 | Maximum Io |
| TcNote 5 | dB | RB | kHz |  |  | dBm / SCSPRS | dBm/BW |
| ± [78+δ+ℇ] | -3 | ≥[24] | 15 | ≥[4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
|  |  |  |  |  | NR\_FDD\_FR1\_B | -120.5 |  |
|  |  |  |  |  | NR\_TDD\_FR1\_C | -120 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_F | -118.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_G | -118 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_H | -117.5 |  |
| ± [59+δ+ℇ] |  | ≥[52] |  | ≥[1] | Note 6 | NOTE 6 | NOTE 6 |
| ± [30+δ+ℇ] |  | >[104] |  | ≥[1] | Note 6 | NOTE 6 | NOTE 6 |
| ± [57+δ+ℇ] |  | ≥[24] | 30 | ≥[4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -118 | -50 |
|  |  |  |  |  | NR\_FDD\_FR1\_B | -117.5 |  |
|  |  |  |  |  | NR\_TDD\_FR1\_C | -117 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -116.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -116 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_F | -115.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_G | -115 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_H | -114.5 |  |
| ± [30+δ+ℇ] |  | ≥[48] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [15+δ+ℇ] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [29+δ+ℇ] |  | ≥[24] | 60 | ≥[4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -115 | -50 |
|  |  |  |  |  | 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 | -113.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_G | -113 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_H | -111.5 |  |
| ± [15+δ+ℇ] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [7+δ+ℇ] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34].  NOTE 4: The Io is defined in PRS slots. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same slot.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: δ is the margin determined from Table 10.1.39.2-3.  NOTE 8: ℇ is the margin for reporting quantitization error and ℇ=16 Tc. | | | | | | | |

The accuracy requirements in Table 10.1.39.2-2 for FR2 are valid under the following conditions:

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

PRP|dBm according to Annex [TBD] for a corresponding Band.

AWGN propagation condition.

Table 10.1.39.2-2: UE Rx-Tx time difference measurement accuracy in FR2 in AWGN

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | |
| PRS Ês/Iot | Minimum PRS bandwidth | PRS SCS | PRS resource repetitionNote 3 | IoNote 4 range | |
| Minimum IoNote 1 | Maximum Io |
| TcNote 5 | dB | RB | kHz |  | dBm / SCSPRS | dBm/BWChannel |
| ± [22+δ+ℇ] | -3 | ≥[24] | 60 | ≥[1] | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| ± [15+δ+ℇ] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [7+δ+ℇ] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [12+δ+ℇ] |  | ≥[32] | 120 | ≥[1] | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| ± [7+δ+ℇ] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [4+δ+ℇ] |  | ≥[128] |  | ≥[1] | NOTE 6 | NOTE 6 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: are configured by higher layer parameter dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeNdefined in TS 37.355 [34].  NOTE 4: The Io is defined in PRS slots. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same slot.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: δ is the margin determined from Table 10.1.39.2-4.  NOTE 8: ℇ is the margin for reporting quantitization error and ℇ=16 Tc. | | | | | | |

Table 10.1.39.2-3: Margin for UE Rx-Tx time difference measurement accuracy in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Min(PRS BW, SRS BW) (RB) | | | Margin (Tc Note 1) |
| SCS = 15 kHz | SCS = 30 kHz | SCS = 60 kHz |
| ≥ 24 | N/A | N/A | [160] |
| ≥ 52 | ≥ 24 | N/A | [80] |
| ≥ 104 | ≥ 48 | ≥ 24 | [56] |
| N/A | ≥ 132 | ≥ 64 | [24] |
| N/A | N/A | ≥ 132 | [24] |
| NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 2: If SRS and PRS have different SCS, the margin corresponding to the smallest RS BW in MHz applies. | | | |

Table 10.1.39.2-4: Margin for UE Rx-Tx time difference measurement accuracy in FR2

|  |  |  |
| --- | --- | --- |
| Min(PRS BW, SRS BW) (MHz) | | Margin (Tc Note 1) |
| SCS = 60 kHz | SCS = 120 kHz |
| ≥ 24 | N/A | [76] |
| ≥ 64 | ≥ 32 | [32] |
| ≥ 132 | ≥ 64 | [24] |
| N/A | ≥ 128 | [20] |
| NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 2: If SRS and PRS have different SCS, the margin corresponding to the smallest RS BW in MHz applies. | | |

#### 10.1.39.3 Measurement Accuracy Requirements for TRS

The error in the reported value of UE Rx-Tx time difference measurement, including both the measurement error and the reporting quantization error, should be within the accuracy requirements specified in this clause.

The UE Rx-Tx time difference measurement accuracy requirements in this clause shall not apply, if:

- NTA\_offset defined in Table 7.1.2-2 changes during the UE Rx-Tx measurement period or

- if the uplink transmission timing changes during the UE Rx-Tx measurement period due to the network-configured Timing Advance.

The UE Rx-Tx time difference measurement accuracy requirements in this clause shall apply provided that:

- The UE transmits SRS within [-160, 160] msec of at least one PDC TRS resource from the serving cell (PCell).

When a serving cell change occurs during the UE Rx-Tx measurement period, the UE Rx-Tx time difference measurement accuracy requirements in this clause shall apply provided that the serving cell change does not impact SRS configuration for the UE Rx-Tx measurement.

The accuracy requirements in Table 10.1.39.3-1 for FR1 are valid under the following conditions:

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

PRP|dBm according to Annex [TBD] for a corresponding Band.

AWGN propagation condition.

Table 10.1.39.3-1: UE Rx-Tx time difference measurement accuracy in FR1 in AWGN

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | |
| TRS Ês/Iot | Minimum TRS bandwidth | TRS SCS | NR operating band groupsNote 2 | IoNote 3 range | |
| Minimum IoNote 1 | Maximum Io |
| TcNote 4 | dB | RB | kHz |  | dBm / SCSTRS | dBm/BW |
| [116+δ+ℇ] | -3 | ≥[24] | 15 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
|  |  |  |  | NR\_FDD\_FR1\_B | -120.5 |  |
|  |  |  |  | NR\_TDD\_FR1\_C | -120 |  |
|  |  |  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 |  |
|  |  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 |  |
|  |  |  |  | NR\_FDD\_FR1\_F | -118.5 |  |
|  |  |  |  | NR\_FDD\_FR1\_G | -118 |  |
|  |  |  |  | NR\_FDD\_FR1\_H | -117.5 |  |
| [60+δ+ℇ] |  | ≥[52] |  | Note 5 | NOTE 5 | NOTE 5 |
| [29+δ+ℇ] |  | >[104] |  | Note 5 | NOTE 5 | NOTE 5 |
| [56+δ+ℇ] |  | ≥[24] | 30 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -118 | -50 |
|  |  |  |  | NR\_FDD\_FR1\_B | -117.5 |  |
|  |  |  |  | NR\_TDD\_FR1\_C | -117 |  |
|  |  |  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -116.5 |  |
|  |  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -116 |  |
|  |  |  |  | NR\_FDD\_FR1\_F | -115.5 |  |
|  |  |  |  | NR\_FDD\_FR1\_G | -115 |  |
|  |  |  |  | NR\_FDD\_FR1\_H | -114.5 |  |
| [29+δ+ℇ] |  | ≥[48] |  | NOTE 5 | NOTE 5 | NOTE 5 |
| [15+δ+ℇ] |  | ≥[132] |  | NOTE 5 | NOTE 5 | NOTE 5 |
| [29+δ+ℇ] |  | ≥[24] | 60 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -115 | -50 |
|  |  |  |  | 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 | -113.5 |  |
|  |  |  |  | NR\_FDD\_FR1\_G | -113 |  |
|  |  |  |  | NR\_FDD\_FR1\_H | -111.5 |  |
| [14+δ+ℇ] |  | ≥[64] |  | NOTE 5 | NOTE 5 | NOTE 5 |
| [7+δ+ℇ] |  | ≥[132] |  | NOTE 5 | NOTE 5 | NOTE 5 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: The Io is defined in TRS slots. The same Io range applies to TRS and non-TRS symbols. Io levels are different in TRS and non-TRS symbols within the same slot.  NOTE 4: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 5: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the TRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 6: δ is the margin determined from Table 10.1.39.3-3.  NOTE 7: ℇ is the margin for reporting quantitization error and ℇ=16 Tc. | | | | | | |

The accuracy requirements in Table 10.1.39.3-2 for FR2 are valid under the following conditions:

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

PRP|dBm according to Annex [TBD] for a corresponding Band.

AWGN propagation condition.

Table 10.1.39.3-2: UE Rx-Tx time difference measurement accuracy in FR2 in AWGN

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | |
| TRS Ês/Iot | Minimum TRS bandwidth | TRS SCS | IoNote 3 range | |
| Minimum IoNote 1 | Maximum Io |
| TcNote 4 | dB | RB | kHz | dBm / SCSTRS | dBm/BWChannel |
| [29+δ+ℇ] | -3 | ≥[24] | 60 | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| [14+δ+ℇ] |  | ≥[64] |  | NOTE 5 | NOTE 5 |
| [7+δ+ℇ] |  | ≥[132] |  | NOTE 5 | NOTE 5 |
| [15+δ+ℇ] |  | ≥[32] | 120 | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| [7+δ+ℇ] |  | ≥[64] |  | NOTE 5 | NOTE 5 |
| [4+δ+ℇ] |  | ≥[128] |  | NOTE 5 | NOTE 5 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: The Io is defined in TRS slots. The same Io range applies to TRS and non-TRS symbols. Io levels are different in TRS and non-TRS symbols within the same slot.  NOTE 4: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 5: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the TRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 6: δ is the margin determined from Table 10.1.39.3-4.  NOTE 7: ℇ is the margin for reporting quantitization error and ℇ=16 Tc. | | | | | |

Table 10.1.39.3-3: Margin for UE Rx-Tx time difference measurement accuracy in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Min(TRS BW, SRS BW) (RB) | | | Margin (Tc Note 1) |
| SCS = 15 kHz | SCS = 30 kHz | SCS = 60 kHz |
| ≥ 24 | N/A | N/A | [160] |
| ≥ 52 | ≥ 24 | N/A | [80] |
| ≥ 104 | ≥ 48 | ≥ 24 | [56] |
| N/A | ≥ 132 | ≥ 64 | [24] |
| N/A | N/A | ≥ 132 | [24] |
| NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 2: If SRS and TRS have different SCS, the margin corresponding to the smallest RS BW in MHz applies. | | | |

Table 10.1.39.3-4: Margin for UE Rx-Tx time difference measurement accuracy in FR2

|  |  |  |
| --- | --- | --- |
| Min(TRS BW, SRS BW) (MHz) | | Margin (Tc Note 1) |
| SCS = 60 kHz | SCS = 120 kHz |
| ≥ 24 | N/A | [76] |
| ≥ 64 | ≥ 32 | [32] |
| ≥ 132 | ≥ 64 | [24] |
| N/A | ≥ 128 | [20] |
| NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 2: If SRS and TRS have different SCS, the margin corresponding to the smallest RS BW in MHz applies. | | |

### 10.1.40 Measurement Accuracy Requirements for Propagation Delay Compensation

#### *10.1.40.1* Measurement Accuracy Requirements for PRS

The error in the reported value of UE Rx-Tx time difference measurement, including both the measurement error and the reporting quantization error, should be within the accuracy requirements specified in this clause.

The accuracy requirements in Table 10.1.40.1-1 for FR1 are valid under the following conditions:

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

PRP|dBm according to Annex [TBD] for a corresponding Band.

AWGN propagation condition.

Table 10.1.40.1-1: UE Rx-Tx time difference measurement accuracy in FR1 in AWGN

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| PRS Ês/Iot | Minimum PRS bandwidth | PRS SCS | PRS resource repetition Note 3 | NR operating band groupsNote 2 | IoNote 4 range | |
| Minimum IoNote 1 | Maximum Io |
| TcNote 5 | dB | RB | kHz |  |  | dBm / SCSPRS | dBm/BW |
| ± [78+δ+ℇ] | -3 | ≥[24] | 15 | ≥[4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
|  |  |  |  |  | NR\_FDD\_FR1\_B | -120.5 |  |
|  |  |  |  |  | NR\_TDD\_FR1\_C | -120 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_F | -118.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_G | -118 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_H | -117.5 |  |
| ± [59+δ+ℇ] |  | ≥[52] |  | ≥[1] | Note 6 | NOTE 6 | NOTE 6 |
| ± [30+δ+ℇ] |  | >[104] |  | ≥[1] | Note 6 | NOTE 6 | NOTE 6 |
| ± [57+δ+ℇ] |  | ≥[24] | 30 | ≥[4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -118 | -50 |
|  |  |  |  |  | NR\_FDD\_FR1\_B | -117.5 |  |
|  |  |  |  |  | NR\_TDD\_FR1\_C | -117 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -116.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -116 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_F | -115.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_G | -115 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_H | -114.5 |  |
| ± [30+δ+ℇ] |  | ≥[48] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [15+δ+ℇ] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [29+δ+ℇ] |  | ≥[24] | 60 | ≥[4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -115 | -50 |
|  |  |  |  |  | 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 | -113.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_G | -113 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_H | -111.5 |  |
| ± [15+δ+ℇ] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [7+δ+ℇ] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34].  NOTE 4: The Io is defined in PRS slots. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same slot.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: δ is the margin determined from Table 10.1.40.1-3.  NOTE 8: ℇ is the margin for reporting quantitization error and ℇ=16 Tc. | | | | | | | |

The accuracy requirements in Table 10.1.40.1-2 for FR2 are valid under the following conditions:

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

PRP|dBm according to Annex [TBD] for a corresponding Band.

AWGN propagation condition.

Table 10.1.40.1-2: UE Rx-Tx time difference measurement accuracy in FR2 in AWGN

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | |
| PRS Ês/Iot | Minimum PRS bandwidth | PRS SCS | PRS resource repetitionNote 3 | IoNote 4 range | |
| Minimum IoNote 1 | Maximum Io |
| TcNote 5 | dB | RB | kHz |  | dBm / SCSPRS | dBm/BWChannel |
| ± [22+δ+ℇ] | -3 | ≥[24] | 60 | ≥[1] | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| ± [15+δ+ℇ] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [7+δ+ℇ] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [12+δ+ℇ] |  | ≥[32] | 120 | ≥[1] | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| ± [7+δ+ℇ] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [4+δ+ℇ] |  | ≥[128] |  | ≥[1] | NOTE 6 | NOTE 6 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: are configured by higher layer parameter dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeNdefined in TS 37.355 [34].  NOTE 4: The Io is defined in PRS slots. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same slot.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: δ is the margin determined from Table 10.1.40.1-4.  NOTE 8: ℇ is the margin for reporting quantitization error and ℇ=16 Tc. | | | | | | |

Table 10.1.40.1-3: Margin for UE Rx-Tx time difference measurement accuracy in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Min(PRS BW, SRS BW) (RB) | | | Margin (Tc Note 1) |
| SCS = 15 kHz | SCS = 30 kHz | SCS = 60 kHz |
| ≥ 24 | N/A | N/A | [160] |
| ≥ 52 | ≥ 24 | N/A | [80] |
| ≥ 104 | ≥ 48 | ≥ 24 | [56] |
| N/A | ≥ 132 | ≥ 64 | [24] |
| N/A | N/A | ≥ 132 | [24] |
| NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 2: If SRS and PRS have different SCS, the margin corresponding to the smallest RS BW in MHz applies. | | | |

Table 10.1.40.1-4: Margin for UE Rx-Tx time difference measurement accuracy in FR2

|  |  |  |
| --- | --- | --- |
| Min(PRS BW, SRS BW) (MHz) | | Margin (Tc Note 1) |
| SCS = 60 kHz | SCS = 120 kHz |
| ≥ 24 | N/A | [76] |
| ≥ 64 | ≥ 32 | [32] |
| ≥ 132 | ≥ 64 | [24] |
| N/A | ≥ 128 | [20] |
| NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 2: If SRS and PRS have different SCS, the margin corresponding to the smallest RS BW in MHz applies. | | |

Editor’s Note: FFS whether and which applicability conditions from clause 10.1.25.2 should be ad*ded.*

#### 10.1.40.2 Measurement Accuracy Requirements for TRS

The error in the reported value of UE Rx-Tx time difference measurement, including both the measurement error and the reporting quantization error, should be within the accuracy requirements specified in this clause.

The accuracy requirements in Table 10.1.40.2-1 for FR1 are valid under the following conditions:

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

PRP|dBm according to Annex [TBD] for a corresponding Band.

AWGN propagation condition.

Table 10.1.40.2-1: UE Rx-Tx time difference measurement accuracy in FR1 in AWGN

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | |
| TRS Ês/Iot | Minimum TRS bandwidth | TRS SCS | NR operating band groupsNote 2 | IoNote 3 range | |
| Minimum IoNote 1 | Maximum Io |
| TcNote 4 | dB | RB | kHz |  | dBm / SCSTRS | dBm/BW |
| [TBD+δ+ℇ] | -3 | ≥[24] | 15 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
|  |  |  |  | NR\_FDD\_FR1\_B | -120.5 |  |
|  |  |  |  | NR\_TDD\_FR1\_C | -120 |  |
|  |  |  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 |  |
|  |  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 |  |
|  |  |  |  | NR\_FDD\_FR1\_F | -118.5 |  |
|  |  |  |  | NR\_FDD\_FR1\_G | -118 |  |
|  |  |  |  | NR\_FDD\_FR1\_H | -117.5 |  |
| [TBD+δ+ℇ] |  | ≥[52] |  | Note 5 | NOTE 5 | NOTE 5 |
| [TBD+δ+ℇ] |  | >[104] |  | Note 5 | NOTE 5 | NOTE 5 |
| [TBD+δ+ℇ] |  | ≥[24] | 30 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -118 | -50 |
|  |  |  |  | NR\_FDD\_FR1\_B | -117.5 |  |
|  |  |  |  | NR\_TDD\_FR1\_C | -117 |  |
|  |  |  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -116.5 |  |
|  |  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -116 |  |
|  |  |  |  | NR\_FDD\_FR1\_F | -115.5 |  |
|  |  |  |  | NR\_FDD\_FR1\_G | -115 |  |
|  |  |  |  | NR\_FDD\_FR1\_H | -114.5 |  |
| [TBD+δ+ℇ] |  | ≥[48] |  | NOTE 5 | NOTE 5 | NOTE 5 |
| [TBD+δ+ℇ] |  | ≥[132] |  | NOTE 5 | NOTE 5 | NOTE 5 |
| [TBD+δ+ℇ] |  | ≥[24] | 60 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -115 | -50 |
|  |  |  |  | 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 | -113.5 |  |
|  |  |  |  | NR\_FDD\_FR1\_G | -113 |  |
|  |  |  |  | NR\_FDD\_FR1\_H | -111.5 |  |
| [TBD+δ+ℇ] |  | ≥[64] |  | NOTE 5 | NOTE 5 | NOTE 5 |
| [TBD+δ+ℇ] |  | ≥[132] |  | NOTE 5 | NOTE 5 | NOTE 5 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: The Io is defined in TRS slots. The same Io range applies to TRS and non-TRS symbols. Io levels are different in TRS and non-TRS symbols within the same slot.  NOTE 4: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 5: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the TRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 6: δ is the margin determined from Table 10.1.40.2-3.  NOTE 7: ℇ is the margin for reporting quantitization error and ℇ=16 Tc. | | | | | | |

The accuracy requirements in Table 10.1.40.2-2 for FR2 are valid under the following conditions:

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

PRP|dBm according to Annex [TBD] for a corresponding Band.

AWGN propagation condition.

Table 10.1.40.2-2: UE Rx-Tx time difference measurement accuracy in FR2 in AWGN

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | |
| TRS Ês/Iot | Minimum TRS bandwidth | TRS SCS | IoNote 3 range | |
| Minimum IoNote 1 | Maximum Io |
| TcNote 4 | dB | RB | kHz | dBm / SCSTRS | dBm/BWChannel |
| [TBD+δ+ℇ] | -3 | ≥[24] | 60 | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| [TBD+δ+ℇ] |  | ≥[64] |  | NOTE 5 | NOTE 5 |
| [TBD+δ+ℇ] |  | ≥[132] |  | NOTE 5 | NOTE 5 |
| [TBD+δ+ℇ] |  | ≥[32] | 120 | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| [TBD+δ+ℇ] |  | ≥[64] |  | NOTE 5 | NOTE 5 |
| [TBD+δ+ℇ] |  | ≥[128] |  | NOTE 5 | NOTE 5 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: The Io is defined in TRS slots. The same Io range applies to TRS and non-TRS symbols. Io levels are different in TRS and non-TRS symbols within the same slot.  NOTE 4: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 5: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the TRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 6: δ is the margin determined from Table 10.1.40.2-4.  NOTE 7: ℇ is the margin for reporting quantitization error and ℇ=16 Tc. | | | | | |

**Table 10.1.40.2-3: Margin for UE Rx-Tx time difference measurement accuracy in FR1**

|  |  |  |  |
| --- | --- | --- | --- |
| Min(PRS BW, SRS BW) (RB) | | | Margin (Tc Note 1) |
| SCS = 15 kHz | SCS = 30 kHz | SCS = 60 kHz |
| ≥ 24 | N/A | N/A | [160] |
| ≥ 52 | ≥ 24 | N/A | [80] |
| ≥ 104 | ≥ 48 | ≥ 24 | [56] |
| N/A | ≥ 132 | ≥ 64 | [24] |
| N/A | N/A | ≥ 132 | [24] |
| NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 2: If SRS and PRS have different SCS, the margin corresponding to the smallest RS BW in MHz applies. | | | |

Table 10.1.40.2-4: Margin for UE Rx-Tx time difference measurement accuracy in FR2

|  |  |  |
| --- | --- | --- |
| Min(PRS BW, SRS BW) (MHz) | | Margin (Tc Note 1) |
| SCS = 60 kHz | SCS = 120 kHz |
| ≥ 24 | N/A | [76] |
| ≥ 64 | ≥ 32 | [32] |
| ≥ 132 | ≥ 64 | [24] |
| N/A | ≥ 128 | [20] |
| NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 2: If SRS and PRS have different SCS, the margin corresponding to the smallest RS BW in MHz applies. | | |

Editor’s Note: FFS whether and which applicability conditions from clause 10.1.25.2 should be added

## 10.1A NR measurements for RedCap

### 10.1A.1 Introduction

The requirements in this section are applicable for RedCap UE as follows:

- intra-frequency requirements apply for PCell measurements in SA,

- inter-frequency requirements apply for non-serving cell measurements on NR carrier frequencies.

- inter-frequency requirements apply for measurements from one cell on a frequency compared to the measurement from another cell on a different frequency.

The accuracy requirements in this clause are applicable for AWGN radio propagation conditions. The accuracy requirements of RSRP, RSRQ amd SINR are applicable provided that reference SSB is not changed during measurement period.

### 10.1A.2 Intra-frequency RSRP accuracy requirements for FR1

#### 10.1A.2.1 Intra-frequency SS-RSRP accuracy requirements

##### 10.1A.2.1.1 Absolute SS-RSRP Accuracy

The accuracy requirements in clause 10.1.2.1.1 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.2.1.1-1 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 relevant SSB.

Table 10.1A.2.1.1-1: SS-RSRP Intra frequency absolute accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -70 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -70 |
| ±5.5 | ±10 | ≥-6 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -70 |
| ±9 | ±12 | ≥-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 | -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. | | | | | | | |

##### 10.1A.2.1.2 Relative SS-RSRP Accuracy

The accuracy requirements in clause 10.1.2.1.2 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.2.1.2-1 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 relevant SSB.

Table 10.1A.2.1.2-1: SS-RSRP Intra frequency relative accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±3 | ±4 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±4 | ±4 | ≥-6 | 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 SSB Ês/Iot is the minimum SSB 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. | | | | | | | |

### 10.1A.3 Intra-frequency RSRP accuracy requirements for FR2

#### 10.1A.3.1 Intra-frequency SS-RSRP accuracy requirements

##### 10.1A.3.1.1 Absolute SS-RSRP Accuracy

The accuracy requirements in clause 10.1.3.1.1 shall apply.

##### 10.1A.3.1.2 Relative SS-RSRP Accuracy

The accuracy requirements in clause 10.1.3.1.2 shall apply.

### 10.1A.4 Inter-frequency RSRP accuracy requirements for FR1

#### 10.1A.4.1 Inter-frequency SS-RSRP accuracy requirements

##### 10.1A.4.1.1 Absolute Accuracy of SS-RSRP in FR1

The accuracy requirements in clause 10.1.4.1.1 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.4.1.1-1 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.

Table 10.1A.4.1.1-1: SS-RSRP Inter frequency Absolute accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -70 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -70 |
| ±5.5 | ±10 | ≥-6 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -70 |
| ±9 | ±12 | ≥-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 | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: Void  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

##### 10.1A.4.1.2 Relative Accuracy of SS-RSRP in FR1

The accuracy requirements in clause 10.1.4.1.2 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.4.1.2-1 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.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

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

Table 10.1A.4.1.2-1: SS-RSRP Inter frequency relative accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±5.5 | ±7 | ≥-6 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

### 10.1A.5 Inter-frequency RSRP accuracy requirements for FR2

#### 10.1A.5.1 Inter-frequency SS-RSRP accuracy requirements

##### 10.1A.5.1.1 Absolute SS-RSRP Accuracy

The accuracy requirements in clause 10.1.5.1.1 shall apply.

##### 10.1A.5.1.2 Relative SS-RSRP Accuracy

The accuracy requirements in clause 10.1.5.1.2 shall apply.

### 10.1A.6 Intra-frequency RSRQ accuracy requirements for FR1

#### 10.1A.6.1 Intra-frequency SS-RSRQ accuracy requirements in FR1

##### 10.1A.6.1.1 Absolute SS-RSRQ Accuracy in FR1

The accuracy requirements in clause 10.1.7.1.1 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.6.1.1-1 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 relevant SSB.

Table 10.1A.6.1.1-1: SS-RSRQ Intra frequency absolute accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±3.5 | ±5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±4.5 | ±5 | ≥-6 | 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. | | | | | | | |

### 10.1A.7 Intra-frequency RSRQ accuracy requirements for FR2

#### 10.1A.7.1 Intra-frequency SS-RSRQ accuracy requirements in FR2

##### 10.1A.7.1.1 Absolute SS-RSRQ Accuracy in FR2

The accuracy requirements in clause 10.1.8.1.1 shall apply.

### 10.1A.8 Inter-frequency RSRQ accuracy requirements for FR1

#### 10.1A.8.1 Inter-frequency SS-RSRQ accuracy requirements in FR1

##### 10.1A.8.1.1 Absolute Accuracy of SS-RSRQ in FR1

The accuracy requirements in clause 10.1.9.1.1 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.8.1.1-1 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.

Table 10.1A.8.1.1-1: SS-RSRQ Inter frequency absolute accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±3.5 | ±5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±4.5 | ±5 | ≥-6 | 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. | | | | | | | |

##### 10.1A.8.1.2 Relative Accuracy of SS-RSRQ in FR1

The accuracy requirements in clause 10.1.9.1.2 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.8.1.2-1 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 each relevant SSB.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

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

Table 10.1A.8.1.2-1: SS-RSRQ Inter frequency relative accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 2 | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±4 | ±5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±5 | ±5 | ≥-6 | 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 SSB Ês/Iot is the minimum SSB 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. | | | | | | | |

### 10.1A.9 Inter-frequency RSRQ accuracy requirements for FR2

#### 10.1A.9.1 Inter-frequency SS-RSRQ accuracy requirements in FR2

##### 10.1A.9.1.1 Absolute Accuracy of SS-RSRQ in FR2

The accuracy requirements in clause 10.1.10.1.1 shall apply.

##### 10.1A.9.1.2 Relative Accuracy of SS-RSRQ in FR2

The accuracy requirements in clause 10.1.10.1.2 shall apply.

### 10.1A.10 Intra-frequency SINR accuracy requirements for FR1

#### 10.1A.10.1 Intra-frequency SS-SINR accuracy requirements in FR1

##### 10.1A.10.1.1 Absolute SS-SINR Accuracy in FR1

The accuracy requirements in clause 10.1.12.1.1 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.10.1.1-1 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.

Table 10.1A.10.1.1-1: SS-SINR Intra frequency absolute accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 3 | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±3.0 | ±4 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±3.5 | ±4 | ≥-6 | 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: The requirements apply for SSB Ês/Iot ≤ 25 dB under non-HST scenarios.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: The requirements apply for SSB Ês/Iot ≤5 dB with SCS 15kHz or 30kHz under NR high speed scenarios. | | | | | | | |

### 10.1A.11 Intra-frequency SINR accuracy requirements for FR2

#### 10.1A.11.1 Intra-frequency SS-SINR accuracy requirements in FR2

##### 10.1A.11.1.1 Absolute SS-SINR Accuracy in FR2

The accuracy requirements in clause 10.1.13.1.1 shall apply.

### 10.1A.12 Inter-frequency SINR accuracy requirements for FR1

#### 10.1A.12.1 Inter-frequency SS-SINR accuracy requirements in FR1

##### 10.1A.12.1.1 Aboslute Accuracy of SS-SINR in FR1

The accuracy requirements in clause 10.1.14.1.1 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.12.1.1-1 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.

Table 10.1A.12.1.1-1: SS-SINR Inter frequency absolute accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 3 | Io Note 1 range | | | | |
|  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±4.0 | ±5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±4.5 | ±5 | ≥-6 | 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: The requirements apply for SSB Ês/Iot ≤ 25 dB.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

##### 10.1A.12.1.2 Relative Accuracy of SS-SINR in FR1

The accuracy requirements in clause 10.1.14.1.2 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.12.1.2-1 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.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

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

Table 10.1A.12.1.2-1: SS-SINR Inter frequency relative accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 2,4 | NR operating band groups Note 5 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 120 kHz | SCSSSB = 240 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±4.5 | ±5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| ±5 | ±5 | ≥-6 | 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 SSB Ês/Iot is the minimum SSB 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: The requirements apply for SSB Ês/Iot ≤ [25] dB.  NOTE 5: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

### 10.1A.13 Inter-frequency SINR accuracy requirements for FR2

#### 10.1A.13.1 Inter-frequency SS-SINR accuracy requirements in FR2

##### 10.1A.13.1.1 Aboslute Accuracy of SS-SINR in FR2

The accuracy requirements in clause 10.1.15.1.1 shall apply.

##### 10.1A.13.1.2 Relative Accuracy of SS-SINR in FR2

The accuracy requirements in clause 10.1.15.1.1 shall apply.

### 10.1A.14 L1-RSRP accuracy requirements for FR1

#### 10.1A.14.1 SSB based L1-RSRP accuracy requirements

##### 10.1A.14.1.1 Absolute Accuracy

The accuracy requirements in clause 10.1.19.1.1 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.14.1.1-1 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 L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

Table 10.1A.14.1.1-1: SSB based L1-RSRP absolute accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -121 | -118 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -70 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -70 |
| ±8.0 | ±12.5 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -70 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -70 |
| ±11.5 | ±14.5 | ≥-3 | 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 | -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. | | | | | | | |

##### 10.1A.14.1.2 Relative Accuracy

The accuracy requirements in clause 10.1.19.1.2 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.14.1.2-1 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 L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

Table 10.1A.14.1.2-1: SSB based L1-RSRP relative accuracy for 1Rx RedCap UE in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
|  |  |  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -118 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_B | -120.5 | -117.5 | N/A | -50 |
|  |  |  | NR\_TDD\_FR1\_C | -120 | -117 | N/A | -50 |
| ±6 | ±7 | ≥-3 | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -116.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -116 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_F | -118.5 | -115.5 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_G | -118 | -115 | N/A | -50 |
|  |  |  | NR\_FDD\_FR1\_H | -117.5 | -114.5 | N/A | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of SSBs to which the requirement applies.  NOTE 3: Void  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

#### 10.1A.14.2 CSI-RS based L1-RSRP accuracy requirements

##### 10.1A.14.2.1 Absolute Accuracy

The accuracy requirements in clause 10.1.19.2.2 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.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 L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.

- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1A.19.2.1-1.

Table 10.1A.14.2.1-1: CSI-RS based L1-RSRP absolute accuracy for 1Rx RedCap UE 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 |
| ±5.0 | ±9.5 | ≥-3 | 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 |
| ±8.5 | ±11.5 | ≥-3 | 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. | | | | | | | | |

##### 10.1A.14.2.2 Relative Accuracy

The accuracy requirements in clause 10.1.19.2.2 shall apply when RedCap UE is capable of 2Rx. When UE is only required to support 1RX, the absolute accuracy requirements in Table 10.1A.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 L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.

- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1A.14.2.2-1.

Table 10.1A.14.2.2-1: CSI-RS based L1-RSRP relative accuracy for 1Rx RedCap UE 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 |
| ±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 |
| 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. | | | | | | | | |

### 10.1A.15 L1-RSRP accuracy requirements for FR2

#### 10.1A.15.1 SSB based L1-RSRP accuracy requirements

##### 10.1A.15.1.1 Absolute Accuracy

The accuracy requirements in clause 10.1.20.1.1 shall apply.

##### 10.1A.15.1.2 Relative Accuracy

The accuracy requirements in clause 10.1.20.1.1 shall apply.

#### 10.1A.15.2 CSI-RS based L1-RSRP accuracy requirements

##### 10.1A.15.2.1 Absolute Accuracy

The accuracy requirements in clause 10.1.20.1.1 shall apply.

##### 10.1A.15.2.2 Relative Accuracy

The accuracy requirements in clause 10.1.20.1.1 shall apply.

## 10.2 E-UTRAN measurements

### 10.2.1 Introduction

Accuracy requirements for measurements on E-UTRAN carrier frequencies are specified in clause 10.2 and apply for UE in SA or NR-DC or NE-DC operation mode, unless otherwise specified.

Unless otherwise specified, the requirements in clause 10.2 are applicable for a UE:

- in RRC\_CONNECTED state

- performing measurements with appropriate measurement gaps according to clause 9.1.2.

- that is synchronised to the cell that is measured.

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in TS 36.300 [24].

The accuracy requirements of E-UTRA measurements in this clause are valid for the reported measurement result after layer 1 filtering. The accuracy requirements are verified from the measurement report at point D in the measurement model having the layer 3 filtering disabled.

If the UE needs measurement gaps to perform the inter-RAT NR ─ E-UTRAN FDD and NR ─ E-UTRAN TDD measurements, the relevant measurement procedure and measurement gap patterns stated in clause 9.1.2 shall apply.

### 10.2.2 E-UTRAN RSRP measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RSRP in RRC\_CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RSRP measurements in RRC\_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRP Accuracy Requirements in clause 9.1.3 of TS 36.133 [15].

The reporting range and mapping specified for RSRP measurements in clause 9.1.4 of TS 36.133 [15] shall apply.

### 10.2.3 E-UTRAN RSRQ measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RSRQ in RRC\_CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RSRQ measurements in RRC\_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRQ Accuracy Requirements in clause 9.1.6 of TS 36.133 [15].

The requirements for accuracy of E-UTRA RSRQ measurements in RRC\_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRQ Accuracy Requirements in clause 9.1.6 of TS 36.133 [15].

The reporting range and mapping specified for RSRQ measurements in clause 9.1.7 of TS 36.133 [15] shall apply.

### 10.2.4 E-UTRAN RSTD measurements

The requirements in this clause are valid for UE supporting this capability.

The measurement period is specified in clauses 9.4.4.1 and 9.4.4.2 for inter-RAT NR ─ E-UTRAN FDD and inter-RAT NR ─ E-UTRAN TDD RSTD measurements, respectively.

The accuracy requirements and the corresponding side conditions shall be the same as the inter-frequency measurement accuracy requirements for RSTD measurements in RRC\_CONNECTED in clause 9.1.10.2 of TS 36.133 [15].

If the UE needs measurement gaps to perform the inter-RAT NR ─ E-UTRAN FDD and NR ─ E-UTRAN TDD RSTD measurements, the relevant measurement procedure and measurement gap patterns stated in clause 9.1.2 shall apply.

The reporting range and mapping for the inter-RAT NR ─ E-UTRAN FDD and NR ─ E-UTRAN TDD RSTD measurements is the same as specified for RSTD measurements in TS 36.133 [15, clauses 9.1.10.3 and 9.1.10.4].

### 10.2.5 E-UTRAN RS-SINR measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RS-SINR in RRC\_CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RS-SINR measurements in RRC\_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RS-SINR Accuracy Requirements in clause 9.1.17.3 of TS 36.133 [15].

The reporting range and mapping for E-UTRA RS-SINR measurements shall be the same as specified for RS-SINR measurements in clause 9.1.17.1 of TS 36.133 [15].

### 10.2.6 E-UTRAN RSRP measurements for CA/DC Idle Mode Measurements

NOTE: This measurement is for CA/DC Idle Mode measurements between NR and E-UTRAN.

The requirements in this clause are applicable for a UE:

- in state RRC\_IDLE or RRC INACTIVE

- that is synchronised to the cell that is measured.

The requirements are for absolute accuracy of E-UTRA RSRP.

The measurement period of E-UTRA RSRP in RRC\_IDLE and RRC INACTIVE states are specified in clause 4.4.2.

The accuracy requirements of E-UTRA RSRP measurements in RRC\_IDLE and RRC INACTIVE states and the corresponding side conditions shall be as the inter-frequency RSRP Accuracy Requirements in clause 9.1.3B.2 of TS 36.133 [15].

The reporting range and mapping specified for RSRP measurements in clause 9.1.4 of TS 36.133 [15] shall apply.

### 10.2.7 E-UTRAN RSRQ measurements for CA/DC Idle Mode Measurements

NOTE: This measurement is for CA/DC Idle Mode measurements between NR and E-UTRAN.

The requirements in this clause are applicable for a UE:

- in state RRC\_IDLE or RRC INACTIVE

- that is synchronised to the cell that is measured.

The requirements are for absolute accuracy of E-UTRA RSRQ.

The measurement period of E-UTRA RSRQ in RRC\_IDLE and RRC INACTIVE states are specified in clause 4.4.2.

The accuracy requirements of E-UTRA RSRQ measurements in RRC\_IDLE and RRC INACTIVE states and the corresponding side conditions shall be as the inter-frequency RSRQ Accuracy Requirements in clause 9.1.6B.2 of TS 36.133 [15].

The reporting range and mapping specified for RSRQ measurements in clause 9.1.7 of TS 36.133 [15] shall apply.

## 10.3 UTRAN FDD Measurements

The requirements in this clause are applicable for a UE:

- in state RRC\_CONNECTED

- performing measurements according to clause 9.4.6 with appropriate measurement gaps

- that is synchronised to the cell that is measured.

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in TS 25.302 [30].

The accuracy requirements in this clause are valid for the reported measurement result after layer 1 filtering. The accuracy requirements are verified from the measurement report at point D in the measurement model having the layer 3 filtering disabled.

### 10.3.1 UTRAN FDD CPICH RSCP

NOTE: This measurement is for handover between E-UTRAN and UTRAN FDD.

The requirements in this clause are valid for terminals supporting this capability.

The measurement period for RRC\_CONNECTED state is specified in clause 9.4.6.

In RRC\_CONNECTED state the accuracy requirements shall meet the absolute accuracy requirements in table 10.3.1-1, under the following conditions:

- CPICH Ec/Io condition for a detectable cell is as specified in clause 9.4.6;

- SCH\_Ec/Io condition for a detectable cell is as specified in clause 9.4.6.

Table 10.3.1-1: UTRAN FDD CPICH\_RSCP absolute accuracy

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | |
| Normal condition | Extreme condition | Io range | | |
|  |  | UTRA operating bands | Minimum Io | Maximum Io |
| dB | dB |  | dBm/3.84 MHz | dBm/3.84 MHz |
|  |  | Band I, IV, VI, X XI, XIX and XXI | -94 | -70 |
|  |  | Band IX | -93 | -70 |
| ±6 | ±9 | Band II, V and VII | -92 | -70 |
|  |  | Band III, VIII, XII, XIII, XIV , XX and XXII | -91 | -70 |
|  |  | Band XXV, XXVI Note 1 | -90.5 | -70 |
| ±8 | ±11 | Note 2 | -70 | -50 |
| NOTE 1: For Band XXVI, the condition has the minimum Io of -92 dBm/3.84 MHz when the carrier frequency of the assigned UTRA channel is within 869-894 MHz for the UE which supports both Band V and Band XXVI operating frequencies.  NOTE 2: The same bands apply for this requirement as for the corresponding highest accuracy requirement. | | | | |

If the UE, in RRC\_CONNECTED state, needs measurement gaps to perform UTRAN FDD measurements, the relevant UTRAN FDD measurement procedure and measurement gap pattern stated in clause 9.4.6 shall apply.

The reporting range and mapping specified for FDD CPICH RSCP in TS 25.133 [29] shall apply.

### 10.3.2 UTRAN FDD CPICH Ec/No

NOTE: This measurement is for handover between E-UTRAN and UTRAN FDD.

The requirements in this clause are valid for terminals supporting this capability.

The measurement period for RRC\_CONNECTED state is specified in clause 9.4.6.

In RRC\_CONNECTED state the accuracy requirements shall be the same as the inter-frequency measurement accuracy requirements for FDD CPICH Ec/No in TS 25.133 [29].

If the UE, in RRC\_CONNECTED state, needs measurement gaps to perform UTRAN FDD measurements, the UTRAN FDD measurement procedure and measurement gap pattern stated in clause 9.4.6 shall apply.

The reporting range and mapping specified for FDD CPICH Ec/No in TS 25.133 [29] shall apply.

## 10.4 V2X measurements

### 10.4.1 Introduction

The requirements in this section are applicable for a UE capable of V2X sidelink communication.

The accuracy requirements in this clause are:

- applicable for AWGN radio propagation conditions,

- assume independent interference (noise) at each receiver antenna port.

### 10.4.2 Intra-frequency PSBCH-RSRP accuracy requirements for FR1

#### 10.4.2.1 PSBCH-RSRP Absolute Accuracy

The requirements for absolute accuracy of PSBCH-RSRP in this clause apply to a V2X synchronization source on the same frequency as that of the own V2X UE performing the measurement in FR1.

The accuracy requirements in Table 10.4.2.1-1 are valid under the following conditions:

- Demodulation reference signals are transmitted from one port.

- Conditions defined in Clause 7.3E of TS38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for PSBCH-RSRP measurements are fulfilled according to Annex B.4.2 for a corresponding Band for each relevant PSBCH-DMRS.

**Table 10.4.2.1-1: Intra-frequency PSBCH-RSRP absolute accuracy in FR1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | | **Conditions** | | | | | | |
| **Normal condition** | **Extreme condition** | **Ês/Iot Note 3** | **Io Note 1 range** | | | | | |
| **NR V2X operating band groups Note 2** | **Minimum Io** | | | | **Maximum Io** |
| **dB** | **dB** | **dB** |  | **dBm / SCSSL** | | | **dBm/BWChannel** | **dBm/BWChannel** |
| **SCSSL = 15 kHz** | **SCSSL = 30 kHz** | **SCSSL = 60 kHz** |
| ±4.5 | ±9 | ≥-6 | NR\_TDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -70 |
| NR\_TDD\_FR1\_J | -116.5 | -113.5 | -110.5 | N/A | -70 |
| ±8 | ±11 | ≥-6 | NR\_TDD\_FR1\_B,  NR\_TDD\_FR1\_J | N/A | N/A | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR V2X operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 3: Ês/Iot for a SyncRef UE is the Ês/Iot of PSBCH-DMRS. | | | | | | | | |

#### 10.4.2.2 PSBCH-RSRP Relative Accuracy

The relative accuracy of PSBCH-RSRP is defined as the PSBCH-RSRP measured from one V2X synchronization source compared to the PSBCH-RSRP measured from another V2X synchronization source on the same frequency in FR1.

The accuracy requirements in Table 10.4.2.2-1 are valid under the following conditions:

- Demodulation reference signals are transmitted from one port.

- Conditions defined in Clause 7.3E of TS38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for PSBCH-RSRP accuracy measurements are fulfilled according to Annex B.4.2 for a corresponding Band for each relevant PSBCH-DMRS.

**Table 10.4.2.2-1: Intra-frequency PSBCH-RSRP relative accuracy in FR1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | | **Conditions** | | | | | | |
| **Normal condition** | **Extreme condition** | **Ês/Iot Note 3** | **Io Note 1 range** | | | | | |
| **NR V2X operating band groups Note 2** | **Minimum Io** | | | | **Maximum Io** |
| **dB** | **dB** | **dB** |  | **dBm / SCSSL** | | | **dBm/BWChannel** | **dBm/BWChannel** |
| **SCSSL = 15 kHz** | **SCSSL = 30 kHz** | **SCSSL = 60 kHz** |
| ±2 | ±3 | ≥-3 | NR\_TDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -50 |
| NR\_TDD\_FR1\_J | -116.5 | -113.5 | -110.5 | N/A | -50 |
| ±3 | ±3 | ≥-6 | Note 4 | Note 4 | Note 4 | Note 4 | N/A | Note 4 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR V2X operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 3: Ês/Iot for a SyncRef UE is the Ês/Iot of PSBCH-DMRS.  NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement. | | | | | | | | |

### 10.4.3 Intra-Frequency SL-RSSI Measurement Accuracy Requirements for FR1

#### 10.4.3.1 Absolute SL-RSSI Accuracy

The intra-frequency SL-RSSI requirements are specified in Table 10.4.3.1-1. The requirements apply for measurement period of 1slot and for any configured measurement bandwidth larger than 10 RBs, provided that:

- All symbols duing each RSSI measurement duration are available for RSSI sampling within the same measurement interval.

Table 10.4.3.1-1: Intra-frequency SL-RSSI absolute accuracy

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | Io Note 1 range | | | | |
| NR V2X operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB |  | dBm/SCSSL | | | dBm/BWChannel |
| SCSSL = 15kHz | SCSSL = 30kHz | SCSSL = 60kHz |
| ±2.5 | ±5.5 | NR\_TDD\_FR1\_B | -120.5 | -117.5 | -114.5 | -50 |
| NR\_TDD\_FR1\_J | -116.5 | -113.5 | -110.5 | -50 |
| ±4.5 | ±7.5 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR V2X operating band groups are as defined in Section 3.5 for the corresponding NR operating bands.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement. | | | | | | |

### 10.4.4 Intra-Frequency L1 SL-RSRP Measurement Accuracy Requirements for FR1

#### 10.4.4.1 Absolute L1 SL-RSRP Accuracy

The requirements for absolute accuracy of L1 SL-RSRP in this clause apply to a UE performing PSCCH-RSRP and/or PSSCH-RSRP measurements on the same frequency as used by operating V2X sidelink communication.

The accuracy requirements in Table 10.4.4.1-1 are valid under the following conditions:

- Demodulation reference signals for PSCCH and/or PSSCH are transmitted from one port.

- Conditions defined in clause 7.3E of TS38.101-1 [18] for reference sensitivity are fulfilled.

- PSCCH-RSRP|dBm and/or PSSCH-RSRP|dBm according to Annex B.4.4 for a corresponding Band are fulfilled.

Table 10.4.4.1-1: Intra-frequency L1 SL-RSRP absolute accuracy for UE capable of V2X sidelink communication

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | Ês/Iot Note 3 | Io Note 1 range | | | | | |
| NR V2X operating band groups Note 2 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm/SCS | | | dBm/BWChannel | dBm/BWChannel |
| SCS = 15kHz | SCS = 30kHz | SCS = 60kHz |
| ± 4.5 | ± 9 | ≥0 dB | NR\_TDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -70 |
| NR\_TDD\_FR1\_J | -116.5 | -113.5 | -110.5 | N/A | -70 |
| ± 8 | ± 11 | ≥0 dB | NR\_TDD\_FR1\_B NR\_TDD\_FR1\_J | N/A | N/A | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR V2X operating band groups are as defined in Section 3.5 for the corresponding NR operating bands.  NOTE 3: The parameter Ês/Iot is the Ês/Iot of PSCCH-DMRS and/or PSSCH-DMRS. | | | | | | | | |

### 10.4.5 Intra-Frequency Discovery Signal Measurement Accuracy Requirements

The requirements in this clause are applicable for a remote sidelink UE:

- is out of coverage on the frequency used for sidelink, and

- that is synchronised to the sidelink relay UE that is measured.

#### 10.4.5.1 Absolute Discovery Signal Measurement Accuracy

The requirements for absolute accuracy of discovery signal measurement in this clause apply to a sidelink UE performing SD-RSRP measurements for direct to indirect path swich or SL-RSRP measurements for indirect to direct path switch on the same frequency as used by the sidelink relay UE transmitting the relay Discovery message.

The accuracy requirements in Table 10.4.5.1-1 are valid under the following conditions:

- Demodulation reference signals for PSCCH and/or PSSCH are transmitted from one port.

- Conditions defined in clause 7.3E of TS38.101-1 [18] for reference sensitivity are fulfilled.

- PSCCH-RSRP|dBm and/or PSSCH-RSRP|dBm according to Annex B.4.4 for a corresponding Band are fulfilled.

Table 10.4.5.1-1: Intra-frequency discovery signal measurement absolute accuracy for a remote sidelink UE [2] capable of sidelink Communication and sidelink Discovery and configured by upper layers for relay operation.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | |
| Normal condition | Extreme condition | Ês/Iot Note 3 | Io Note 1 range | | | | | |
| NR V2X operating band groups Note 2 | Minimum Io | | | | Maximum Io |
| dB | dB | dB |  | dBm/SCS | | | dBm/BWChannel | dBm/BWChannel |
| SCS = 15kHz | SCS = 30kHz | SCS = 60kHz |
| ± 4.5 | ± 9 | ≥0 dB | NR\_TDD\_FR1\_B | -120.5 | -117.5 | -114.5 | N/A | -70 |
| NR\_TDD\_FR1\_J | -116.5 | -113.5 | -110.5 | N/A | -70 |
| ± 8 | ± 11 | ≥0 dB | NR\_TDD\_FR1\_B NR\_TDD\_FR1\_J | N/A | N/A | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR sidelink operating band groups are as defined in Section 3.5 for the corresponding NR operating bands.  NOTE 3: The parameter Ês/Iot is the Ês/Iot of PSCCH-DMRS and/or PSSCH-DMRS. | | | | | | | | |

# 11 Void