**3GPP TSG-RAN4 Meeting #112 *R4-241xxxx***

**Maastricht, The Netherlands, 19 – 23 August, 2024**

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| --- |
| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** | 4860 | **rev** | 1 | **Current version:** |  |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network |  |

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| --- |
|  |
| ***Title:***  | CR on measurement accuracy requirements for FR2-NTN |
|  |  |
| ***Source to WG:*** | Huawei, HiSilicon, CATT, Nokia |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_NTN\_enh-Perf |  | ***Date:*** | 2024-08-05 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-18 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | RRM measurement accuracy requirements are FR2-NTN are missing. |
|  |  |
| ***Summary of change:*** | Define RRM measurement accuracy requirements are FR2-NTN. The difference compared to TN FR2 requirements are * Remove the 4dB RF margin in the intra-frequency RSRP relative accuracy requirements
* Relax all the accuracy numbers by 1dB
 |
|  |  |
| ***Consequences if not approved:*** | No RRM measurement accuracy requirements are FR2-NTN |
|  |  |
| ***Clauses affected:*** | All new clauses: 10.1.3C, 10.1.5C, 10.1.8C, 10.1.10C, 10.1.13C, 10.1.15C |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

<Start of Change 1>

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

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

##### 10.1.3C.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-NTN.

The accuracy requirements in Table 10.1.3C.1.1-1 are valid under the following conditions:

- Conditions defined in clause 10.3 of TS 38.101-5 [42] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.17 for a corresponding Band for each relevant SSB.

- The measured signals are in the directions within the declared minimum elevation angle supported for receiving.

Table 10.1.3C.1.1-1: SS-RSRP Intra frequency absolute accuracy in FR2-NTN

|  |  |
| --- | --- |
| 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 | ±10 | ≥-6 | Same value as SSB\_RP derived from annex B.2.17, according to UE VSAT type | N/A | -70 |
| ±9 | ±12 |  | N/A | -70 | -50 |
| Note 1: Values based on EIS as defined in clause 10.3 of TS 38.101-5 [42]. 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. |

##### 10.1.3C.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-NTN.

- Conditions defined in clause 10.3 of TS 38.101-5 [42] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.17 for a corresponding Band for each relevant SSB.

- The measured signals are in the directions within the declared minimum elevation angle supported for receiving.

Table 10.1.3C.1.2-1: SS-RSRP Intra frequency relative accuracy in FR2-NTN

|  |  |
| --- | --- |
| 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 | ±6 | ≥-6 | Same value as SSB\_RP derived from annex B.2.17, according to UE VSAT type | -50 |
| Note 1: Values based on EIS as defined in clause 10.3 of TS 38.101-5 [42]. 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. |

<End of Change 1>

<Start of Change 2>

10.1.5C Inter-frequency RSRP accuracy requirements for FR2-NTN

10.1.5C.1 Inter-frequency SS-RSRP accuracy requirements

10.1.5C.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-NTN that is on a different frequency than the serving cell.

The accuracy requirements in Table 10.1.5C.1.1-1 are valid under the following conditions:

- Conditions defined in clause 10.3 of TS 38.101-5 [42] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.18 for a corresponding Band for each relevant SSB.

- The measured signals are in the directions within the declared minimum elevation angle supported for receiving.

**Table 10.1.5C.1.1-1: SS-RSRP Inter frequency absolute accuracy in FR2-NTN**

|  |  |
| --- | --- |
| **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 | ±10 | ≥-4 | Same value as SSB\_RP derived from annex B.2.18, according to UE VSAT type | N/A | -70 |
| ±9 | ±12 |  | N/A | -70 | -50 |
| Note 1: Values based on EIS as defined in clause 10.3 of TS 38.101-5 [42]. 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. |

10.1.5C.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-NTN compared to the SS-RSRP measured from another cell on another frequency in FR2-NTN.

The accuracy requirements in Table 10.1.5C.1.2-1 are valid under the following conditions:

- Conditions defined in 38.101-5 [19] Clause 10.3 for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.18 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 within the declared minimum elevation angle supported for receiving.

**Table 10.1.5C.1.2-1: SS-RSRP Inter frequency relative accuracy in FR2-NTN**

|  |  |
| --- | --- |
| **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** |  |
| ±7 | ±10 | ≥-4 | Same value as SSB\_RP derived from annex B.2.18, according to UE VSAT type | -50 |
| Note 1: Values based on EIS as defined in clause 10.3 of TS 38.101-5 [42]. 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. |

<End of Change 2>

<Start of Change 3>

10.1.8C Intra-frequency RSRQ accuracy requirements for FR2-NTN

10.1.8C.1 Intra-frequency SS-RSRQ accuracy requirements in FR2-NTN

10.1.8C.1.1 Absolute SS-RSRQ Accuracy in FR2-NTN

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-NTN.

The accuracy requirements in Table 10.1.8C.1.1-1 are valid under the following conditions:

- Conditions defined in clause 10.3 of TS 38.101-5 [42] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.17 for a corresponding Band for each relevant SSB.

- The measured signals are in the directions within the declared minimum elevation angle supported for receiving.

**Table 10.1.8C.1.1-1: SS-RSRQ Intra frequency absolute accuracy in FR2-NTN**

|  |  |
| --- | --- |
| **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 | ±5 | ≥-3 | Same value as SSB\_RP derived from annex B.2.17, according to UE VSAT type | -50 |
| ±4.5 | ±5 | ≥-6 |  |  |
| Note 1: Values based on EIS as defined in clause 10.3 of TS 38.101-5 [42]. 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. |

<End of Change 3>

<Start of Change 4>

10.1.10C Inter-frequency RSRQ accuracy requirements for FR2-NTN

10.1.10C.1 Inter-frequency SS-RSRQ accuracy requirements in FR2-NTN

10.1.10C.1.1 Absolute Accuracy of SS-RSRQ in FR2-NTN

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

The accuracy requirements in Table 10.1.10C.1.1-1 are valid under the following conditions:

- Conditions defined in clause 10.3 of TS 38.101-5 [42] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.18 for a corresponding Band for each relevant SSB.

- The measured signals are in the directions within the declared minimum elevation angle supported for receiving.

**Table 10.1.10C.1.1-1: SS-RSRQ Inter frequency absolute accuracy in FR2-NTN**

|  |  |
| --- | --- |
| **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 | ±5 | ≥-3 | Same value as SSB\_RP derived from annex B.2.18, according to UE VSAT type | -50 |
| ±4.5 | ±5 | ≥-4 |  |  |
| Note 1: Values based on EIS as defined in clause 10.3 of TS 38.101-5 [42]. 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. |

10.1.10C.1.2 Relative Accuracy of SS-RSRQ in FR2-NTN

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

The accuracy requirements in Table 10.1.10C.1.2-1 are valid under the following conditions:

- Conditions defined in clause 10.3 of TS 38.101-5 [42] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.18 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 within the declared minimum elevation angle supported for receiving.

**Table 10.1.10C.1.2-1: SS-RSRQ Inter frequency relative accuracy in FR2-NTN**

|  |  |
| --- | --- |
| **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 | ≥-3 | Same value as SSB\_RP derived from annex B.2.18, according to UE VSAT type | -50 |
| ±5 | ±5 | ≥-4 |  |  |
| Note 1: Values based on EIS as defined in clause 10.3 of TS 38.101-5 [42]. 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. |

<End of Change 4>

<Start of Change 5>

10.1.13C Intra-frequency SINR accuracy requirements for FR2-NTN

10.1.13C.1 Intra-frequency SS-SINR accuracy requirements in FR2-NTN

10.1.13C.1.1 Absolute SS-SINR Accuracy in FR2-NTN

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-NTN.

The accuracy requirements in Table 10.1.13C.1.1-1 are valid under the following conditions:

- Conditions defined in clause 10.3 of TS 38.101-5 [42] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.17 for a corresponding Band.

- The measured signals are in the directions within the declared minimum elevation angle supported for receiving.

**Table 10.1.13C.1.1-1: SS-SINR Intra frequency absolute accuracy in FR2-NTN**

|  |  |
| --- | --- |
| **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 | ≥-3 | Same value as SSB\_RP derived from annex B.2.17, according to UE VSAT type | -50 |
| ±4.5 | ±5 | ≥-6 |  |  |
| Note 1: Values based on EIS as defined in clause 10.3 of TS 38.101-5 [42]. 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. |

<End of Change 5>

<Start of Change 6>

10.1.15C Inter-frequency SINR accuracy requirements for FR2-NTN

10.1.15C.1 Inter-frequency SS-SINR accuracy requirements in FR2-NTN

10.1.15C.1.1 Aboslute Accuracy of SS-SINR in FR2-NTN

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

The accuracy requirements in Table 10.1.15C.1.1-1 are valid under the following conditions:

- Conditions defined in clause 10.3 of TS 38.101-5 [42] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.18 for a corresponding Band.

- The measured signals are in the directions within the declared minimum elevation angle supported for receiving.

**Table 10.1.15C.1.1-1: SS-SINR Inter frequency absolute accuracy in FR2-NTN**

|  |  |
| --- | --- |
| **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 | ≥-3 | Same value as SSB\_RP derived from annex B.2.18, according to UE VSAT type | -50 |
| ±4.5 | ±5 | ≥-4 |  |  |
| Note 1: Values based on EIS as defined in clause 10.3 of TS 38.101-5 [42]. 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. |

10.1.15C.1.2 Relative Accuracy of SS-SINR in FR2-NTN

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-NTN compared to the SS-SINR measured from another cell on a different frequency in FR2-NTN.

The accuracy requirements in Table 10.1.15C.1.2-1 are valid under the following conditions:

- Conditions defined in clause 10.3 of TS 38.101-5 [42] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.18 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 within the declared minimum elevation angle supported for receiving.

**Table 10.1.15C.1.2-1: SS-SINR Inter frequency relative accuracy in FR2-NTN**

|  |  |
| --- | --- |
| **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 derived from annex B.2.18, according to UE VSAT type | -50 |
| ±5 | ±5 | ≥-6 |  |  |
| Note 1: Values based on EIS as defined in clause 10.3 of TS 38.101-5 [42]. 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. |

<End of Change 6>