**3GPP TSG-RAN4 Meeting #97-e *R4-20XXXX***

**Electronic meeting, Nov. 2-13, 2020**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **Draft** | **rev** | **1** | **Current version:** | **16.5.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | CR on performance requirement for CSI-RSRQ L3 measurement | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | CATT | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_CSIRS\_L3meas-Perf | | | | |  | ***Date:*** | | | 2020-10-15 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The performance requirements for CSI-RSRQ L3 measurement need to be specified. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce the performance requirements for CSI-RSRQ L3 measurement. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The performance requirements for CSI-RSRQ L3 measurement are missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 10.1.7, 10.1.7.2, 10.1.8, 10.1.8.2, 10.1.9, 10.1.9.2, 10.1.10, 10.1.10.2, 10.1.11, 10.1.11.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

<Start of Change 1>

# 10 Measurement Performance requirements

## 10.1 NR measurements

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

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

##### 10.1.7.2.1 Absolute CSI-RSRQ Accuracy

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

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

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

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

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

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

- The timing offset between UE’s FFT window and the target CSI-RS is smaller than or equal to [TBD]

*Editor’s note: whether and how to define the accuracy requirements when the timing offset between UE’s FFT window and the target CSI-RS is larger than [TBD].*

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 |
| [TBD] | [TBD] | | ≥-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 |
| [TBD] | [TBD] | | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
|  | | NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

<End of Change 1>

<Start of Change 2>

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

#### 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 associated SSB.

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

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

- The 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 UE’s FFT window and the target CSI-RS is smaller than or equal to [TBD]

*Editor’s note: whether and how to define the accuracy requirements when the timing offset between UE’s FFT window and the target CSI-RS is larger than [TBD].*

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

<End of Change 2>

<Start of Change 3>

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

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

##### 10.1.9.2.1 Absolute CSI-RSRQ Accuracy

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

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

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

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

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

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

- The timing offset between UE’s FFT window and the target CSI-RS is smaller than or equal to [TBD]

*Editor’s note: whether and how to define the accuracy requirements when the timing offset between UE’s FFT window and the target CSI-RS is larger than [TBD].*

Table 10.1.9.2.1-1: 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 |
| [TBD] | [TBD] | | ≥-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 |
| [TBD] | [TBD] | | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
|  | | NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

##### 10.1.9.2.2 Relative CSI-RSRQ Accuracy

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

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

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

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

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

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

- The timing offset between UE’s FFT window and the target CSI-RS is smaller than or equal to [TBD]

*Editor’s note: whether and how to define the accuracy requirements when the timing offset between UE’s FFT window and the target CSI-RS is larger than [TBD].*

Table 10.1.9.2.2-1: CSI-RSRQ Intra 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 |
| [TBD] | [TBD] | | ≥-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 |
| [TBD] | [TBD] | | ≥-6 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 |
|  | | NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter CSi-RS Ês/Iot is the minimum CSI-RS Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2. | | | | | | | |

<End of Change 3>

<Start of Change 4>

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

#### 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 38.101-1 [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.y for a corresponding Band for each relevant CSI-RS.

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

- The timing offset between UE’s FFT window and the target CSI-RS is smaller than or equal to [TBD]

*Editor’s note: whether and how to define the accuracy requirements when the timing offset between UE’s FFT window and the target CSI-RS is larger than [TBD].*

Table 10.1.10.2.1-1: 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 = 120kHz | SCSCSI-RS = 60kHz |  |
| [TBD] | [TBD] | ≥-3 | Same value as CSI\_RP in Table B.2.9-2, according to UE Power class, operating band and angle of arrival | | -50 |
| [TBD] | [TBD] | ≥-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 FR1.

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 38.101-1 [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.y for a corresponding Band for each relevant CSI-RS.

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

- The timing offset between UE’s FFT window and the target CSI-RS is smaller than or equal to [TBD]

*Editor’s note: whether and how to define the accuracy requirements when the timing offset between UE’s FFT window and the target CSI-RS is larger than [TBD].*

Table 10.1.10.2.2-1: CSI-RSRQ 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 / SCSCSI-RS Note 1 | | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 120kHz | SCSCSI-RS = 60kHz |  |
| [TBD] | [TBD] | ≥-3 | Same value as CSI\_RP in Table B.2.9-2, according to UE Power class, operating band and angle of arrival | | -50 |
| [TBD] | [TBD] | ≥-4 |  | |  |
| Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.  Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.  Note 3: The parameter CSI-RS Ês/Iot is the minimum CSI-RS Ês/Iot of the pair of cells to which the requirement applies.  Note 4: In the test cases, the CSI-RS Ês/Iot and related parameters may need to be adjusted to ensure Ês/Iot at UE baseband is above the value defined in this table. | | | | | |

<End of Change 4>

<Start of Change 5>

### 10.1.11 RSRQ report mapping

10.1.11.2 CSI-RSRQ measurement report mapping

The reporting range of CSI-RSRQ is defined from -43 dB to 20 dB with 0.5 dB resolution. The mapping of measured quantity is defined in Table 10.1.11.1-2. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.11.1-2: CSI-RSRQ measurement report mapping

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

<End of Change 5>