**3GPP TSG-RAN4 Meeting #97-e *R4-2015788***

**Electronic Meeting, 2 – 13 November, 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **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 to introduce CSI-SINR accuracy requirements and report mapping | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_CSIRS\_L3meas-Perf | | | | |  | ***Date:*** | | | 2020-09-21 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | CSI-SINR accuracy and report mapping need to be defined. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce CSI-SINR accuracy and report mapping | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Performance requirements for CSI-RS measurement are incomplete. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 10.1.12.2, 10.1.13.2, 10.1.14.2, 10.1.15.2, 10.1.16 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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>

10.1.12.2 Intra-frequency CSI-SINR accuracy requirements in FR1

10.1.12.2.1 Absolute CSI-SINR Accuracy in FR1

Editor’s note: FFS whether and how the accuracy requriements are to be defined for the case where the timing offset between UE’s FFT window and the target CSI-RS is larger than [CP].

Editor’s note: FFS how to handle the upper limit of Ês/Iot in the CSI-SINR accuracy requirement together with the timing offset.

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.2.2 for a corresponding Band.

- The time difference between the reference timing for measurement and the receive timing of the target CSI-RS resource is no larger than [CP length]

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

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

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | | **Conditions** | | | | | | |
| **Normal condition** | **Extreme condition** | **CSI-RS Ês/Iot** | **Io Note 1 range** | | | | | |
| **NR operating band groups** | **Minimum Io** | | | | **Maximum Io** |
| **dB** | **dB** | **dB** |  | **dBm / SCS** | | | **dBm/BW Channel** | **dBm/BW Channel** |
| **SCS (kHz)** | | |
| TBD | TBD | ≥-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 |
| TBD | TBD | ≥-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. | | | | | | | | |

<End of Change 1>

<Start of Change 2>

10.1.13.2 Intra-frequency CSI-SINR accuracy requirements in FR2

10.1.13.2.1 Absolute CSI-SINR Accuracy in FR2

Editor’s note: FFS whether and how the accuracy requriements are to be defined for the case where the timing offset between UE’s FFT window and the target CSI-RS is larger than [CP].

Editor’s note: FFS how to handle the upper limit of Ês/Iot in the CSI-SINR accuracy requirement together with the timing offset.

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.2.3 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].

- The time difference between the reference timing for measurement and the receive timing of the target CSI-RS resource is no larger than [CP length]

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

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 1 | | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |
| TBD | TBD | ≥-3 | Same value as CSI\_RP in Table B.2.2-2, 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 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 2>

<Start of Change 3>

10.1.14.2 Inter-frequency CSI-SINR accuracy requirements in FR1

10.1.14.2.1 Aboslute Accuracy of CSI-SINR in FR1

Editor’s note: FFS whether and how the accuracy requriements are to be defined for the case where the timing offset between UE’s FFT window and the target CSI-RS is larger than [CP].

Editor’s note: FFS how to handle the upper limit of Ês/Iot in the CSI-SINR accuracy requirement together with the timing offset.

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.2.3 for a corresponding Band.

- The time difference between the reference timing for measurement and the receive timing of the target CSI-RS resource is no larger than [CP length]

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

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

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | | **Conditions** | | | | | | |
| **Normal condition** | **Extreme condition** | **CSI-RS Ês/Iot** | **Io Note 1 range** | | | | | |
| **NR operating band groups** | **Minimum Io** | | | | **Maximum Io** |
| **dB** | **dB** | **dB** |  | **dBm / SCS** | | | **dBm/BW Channel** | **dBm/BW Channel** |
| **SCS (kHz)** | | |
| TBD | TBD | ≥-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 |
| TBD | TBD | ≥-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. | | | | | | | | |

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.2.3 for a corresponding Band.

- |CSI-RS\_RP1dBm - CSI-RS\_RP2dBm| ≤ 27 dB

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

- The time difference between the reference timing for measurement and the receive timing of the target CSI-RS resource is no larger than [CP length]

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

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

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | | **Conditions** | | | | | | |
| **Normal condition** | **Extreme condition** | **CSI-RS Ês/Iot****Note 3** | **Io Note 1 range** | | | | | |
| **NR operating band groups** | **Minimum Io** | | | | **Maximum Io** |
| **dB** | **dB** | **dB** |  | **dBm / SCS** | | | **dBm/BW Channel** | **dBm/BW Channel** |
| **SCS (kHz)** | | |
| TBD | TBD | ≥-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 |
| TBD | TBD | ≥-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. | | | | | | | | |

<End of Change 3>

<Start of Change 4>

10.1.15.2 Inter-frequency CSI-SINR accuracy requirements in FR2

10.1.15.2.1 Aboslute Accuracy of CSI-SINR in FR2

Editor’s note: FFS whether and how the accuracy requriements are to be defined for the case where the timing offset between UE’s FFT window and the target CSI-RS is larger than [CP].

Editor’s note: FFS how to handle the upper limit of Ês/Iot in the CSI-SINR accuracy requirement together with the timing offset.

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.2.3 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].

- The time difference between the reference timing for measurement and the receive timing of the target CSI-RS resource is no larger than [CP length]

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

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 1 | | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |
| TBD | TBD | ≥-3 | Same value as CSI\_RP in Table B.2.2-2, 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 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. | | | | | |

10.1.15.2.2 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.2.3 for a corresponding Band.

- |CSI-RS\_RP1dBm - CSI-RS\_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 time difference between the reference timing for measurement and the receive timing of the target CSI-RS resource is no larger than [CP length]

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

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | |
| Normal condition | Extreme condition | CSI-RS Ês/Iot | Io Note 2 range | | |
|  |  |  | Minimum Io | | Maximum Io |
| dB | dB | dB | dBm / SCSCSI-RS Note 1 | | dBm/BWChannel |
|  |  |  | SCSCSI-RS = 60kHz | SCSCSI-RS = 120kHz |  |
| TBD | TBD | ≥-3 | Same value as CSI\_RP in Table B.2.2-2, 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 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>

### 10.1.16 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 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 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-RSRP 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 |

<End of Change 5>