**3GPP TSG-RAN WG4 Meeting # 112-bis *R4-2416900***

**Hefei, CN, 14 – 18 October, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **draftCR** | **rev** | **1** | **Current version:** | **18.7.0** |  |
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| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)*** *on using this form: comprehensive instructions can be found at  <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:*** | draftCR on accuracy requirement and test cases for CPP | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos\_enh2-Perf | | | | |  | ***Date:*** | | | 2024-10-18 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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 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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The performance part, including accuracy requirements and test cases, is not complete for CPP. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | * Accuracy requirements for CPP are updated based on the agreements reached in adhoc session(s) in RAN4#112-bis. * Clauses in test cases are updated to correct references. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The performance part for CPP is not complete. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | New clauses 10.1.43, 10.1.44, A.3.34.4, A.6.6.30, A.6.7.20, A.6.8.6, A.6.9.6, A.7.6.25, A.7.7.17, A.7.8.6, A.7.9.6. | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.533 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | Corrections are based on updated version of big draftCR endorsed in RAN4#112. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | R4-2416329 | | | | | | | | |

## **--- Start of Change # 1 ---**

### 10.1.43 DL-RSCPD Measurements

#### 10.1.43.1 Introduction

The requirements in Clause 10.1.43 shall apply, provided the UE has received *NR-DL-TDOA-RequestLocationInformation* message with *nr-DL-PRS-RSCPD-Request* from LMF via LPP [34] requesting the UE to measure and report DL RSCPD measurement together with DL RSTD measurements defined in TS 38.215 [4]. The requirements in Clause 10.1.43 shall apply:

- when UE is in RRC\_CONNECTED state and the measurement is performed with MG,

- when UE is in RRC\_IDLE or RRC\_INACTIVE state.

#### 10.1.43.2 Measurement Accuracy Requirements

The accuracy requirements for DL RSCPD measurement are based on single measurement sample in single PFL and shall be within ±(X+Y) degree, provided that the following conditions are met:

* Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled for FR1.
* Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled for FR2.
* Conditions for DL RSCPD measurements are fulfilled according to Annex B.2.14 for a corresponding Band for each relevant PRS resource configured for measurement.
* The measurements to derive DL RSCPD are performed on PRS resources within same set of symbols.

The requirements in this clause are derived based on AWGN channel and on two-tap channel defined in 38.101-4 Annex B.2.4 (a = 1, τd=0.45 µs and fD=5 Hz).

X is defined in Table 10.1.43.2-1 for AWGN channel and Table 10.1.43.2-2 for two-tap channel for FR1.

X is defined in Table 10.1.43.2-3 for AWGN channel and Table 10.1.43.2-4 for two-tap channel for FR2.

Y is [TBD] degree for FR1 and [TBD] degree for FR2.

Table 10.1.43.2-1: DL RSCPD absolute accuracy in FR1 for AWGN channel

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy  (PRS Ês/Iot)ref ≥ -6dB  (PRS Ês/Iot)*i* ≥  -13dB | Accuracy  (PRS Ês/Iot)ref ≥ -3dB  (PRS Ês/Iot)*i* ≥  -6dB | Conditions | | | | | |
| 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 |
| degree | degree | kHz | RB |  |  | dBm/SCS | dBm/BWChannel |
| [16] | [3] | 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 |
|  |  | NR\_FDD\_FR1\_N | -120.5 | -50 |
| [11] | [5] | ≥ 52 | ≥ 1 | Note 5 | Note 5 | Note 5 |
| [8] | [4] | ≥ 104 | ≥ 1 | Note 5 | Note 5 | Note 5 |
| [6] | [3]] | 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 |
|  |  | NR\_FDD\_FR1\_N | -117.5 | -50 |
| [12] | [4] | ≥ 48 | ≥ 1 | Note 5 | Note 5 | Note 5 |
| [7] | [3] | 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 |
|  |  | NR\_FDD\_FR1\_N | -114.5 | -50 |
| 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: 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. | | | | | | | |

Table 10.1.43.2-2: DL RSCPD absolute accuracy in FR1 for two-tap channel.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy  (PRS Ês/Iot)ref ≥ -3dB  (PRS Ês/Iot)*i* ≥  -6dB | Conditions | | | | | |
| 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 |
| degree | kHz | RB |  |  | dBm/SCS | dBm/BWChannel |
| [7] | 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 |
|  |  | NR\_FDD\_FR1\_N | -120.5 | -50 |
| [7] | ≥ 52 | ≥ 1 | Note 5 | Note 5 | Note 5 |
| [5] | ≥ 104 | ≥ 1 | Note 5 | Note 5 | Note 5 |
| [5] | 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 |
|  |  | NR\_FDD\_FR1\_N | -117.5 | -50 |
| [6] | ≥ 48 | ≥ 1 | Note 5 | Note 5 | Note 5 |
| [5] | 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 |
|  |  | NR\_FDD\_FR1\_N | -114.5 | -50 |
| 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: 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. | | | | | | |

Table 10.1.43.2-3: DL RSCPD absolute accuracy in FR2 for AWGN channel

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy  (PRS Ês/Iot)ref ≥ -6dB  (PRS Ês/Iot)*i* ≥  -13dB | Accuracy  (PRS Ês/Iot)ref ≥ -3dB  (PRS Ês/Iot)*i* ≥  -6dB | Conditions | | | | |
| PRS SCS | PRS bandwidth  Note 1 | PRS resource repetition  () Note 2 | Io Note 3 range | |
| Minimum Io | Maximum Io |
| degree | degree | kHz | RB |  | dBm/SCS | dBm/BWChannel |
| [17] | [3] | 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 |
| [9] | [5] | ≥ 64 | ≥ 1 | Note 4 | Note 4 |
| [7] | [3] | ≥ 132 | ≥ 1 | Note 4 | Note 4 |
| [17] | [3] | 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 |
| [10] | [6] | ≥ 64 | ≥ 1 | Note 4 | Note 4 |
| 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: 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. | | | | | | |

Table 10.1.43.2-4: DL RSCPD absolute accuracy in FR2 for two-tap channel.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy  (PRS Ês/Iot)ref ≥ -3dB  (PRS Ês/Iot)*i* ≥  -6dB | Conditions | | | | |
| PRS SCS | PRS bandwidth  Note 1 | PRS resource repetition  () Note 2 | Io Note 3 range | |
| Maximum Io |
| degree | kHz | RB |  | dBm/SCS | dBm/BWChannel |
| [5] | 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 |
| [5] | ≥ 1 | Note 4 | Note 4 |
| [4] | ≥ 1 | Note 4 | Note 4 |
| [5] | 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 |
| [7] | ≥ 64 | ≥ 1 | Note 4 | Note 4 |
| 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: 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. | | | | | |

#### 10.1.43.3 Report Mapping

##### 10.1.43.3.1 Absolute DL RSCPD Measurement Reporting

The reporting range of DL RSCPD, as defined in Clause 5.1.43 of TS 38.215 [4], is defined from -180 degree to +180 degree. The reporting resolution is 0.1 degree.

The mapping of DL RSCPD measured quantity is defined in Table 10.1.43.3.1-1.

Table 10.1.43.3.1-1: DL RSCPD measurement report mapping

|  |  |  |
| --- | --- | --- |
| Reported value | Measured quantity value (DL RSCPD) | Unit |
| DL\_RSCPD\_0000 | -180 ≤ DL RSCPD < -179.9 | degree |
| DL\_RSCPD\_0001 | -179.9 ≤ DL RSCPD < -179.8 | degree |
| DL\_RSCPD\_0002 | -179.8 ≤ DL RSCPD < -179.7 | degree |
| … | … | … |
| DL\_RSCPD\_1798 | -0.2 ≤ DL RSCPD < -0.1 | degree |
| DL\_RSCPD\_1799 | -0.1 ≤ DL RSCPD < 0 | degree |
| DL\_RSCPD\_1800 | 0 ≤ DL RSCPD < 0.1 | degree |
| DL\_RSCPD\_1801 | 0.1 ≤ DL RSCPD < 0.2 | degree |
| DL\_RSCPD\_1802 | 0.2 ≤ DL RSCPD < 0.3 | degree |
| … | … | … |
| DL\_RSCPD\_3598 | 179.8 ≤ DL RSCPD < 179.9 | degree |
| DL\_RSCPD\_3599 | 179.9 ≤ DL RSCPD < 180 | degree |

### 10.1.44 DL-RSCP Measurements

#### 10.1.44.1 Introduction

The requirements in Clause 10.1.44 shall apply, provided the UE has received *NR-Multi-RTT-RequestLocationInformation* message with *nr-DL-PRS-RSCP-Request* from LMF via LPP [34] requesting the UE to measure and report DL RSCP measurement together with UE Rx-Tx time difference measurements defined in TS 38.215 [4].

The requirements in Clause 10.1.44 shall apply:

- when UE is in RRC\_CONNECTED state and the measurement is performed with MG,

- when UE is in RRC\_INACTIVE state.

#### 10.1.44.2 Measurement Accuracy Requirements

The relative accuracy of DL RSCP measurement in this clause is defined as accuracy of the difference between two DL RSCP measurements, each based on single measurement sample in single PFL.

The requirements in this clause are derived based on AWGN channel and based on two-tap channel defined in 38.101-4 Annex B.2.4 (a = 1, τd=0.45 µs and fD=5 Hz).

The DL RSCP relative measurement accuracy requirements in this clause shall not apply, if:

* NTA\_offset defined in Table 7.1.2-2 changes during the DL RSCP with UE Rx-Tx measurement period, or
* if the uplink transmission timing changes during the DL RSCP with UE Rx-Tx measurement period due to the network-configured Timing Advance.

The DL RSCP relative 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 DL RSCP with UE Rx-Tx measurement period due to the autonomous timing adjustment defined in clause 7.1.2 then:

- DL RSCP and 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.

- 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.

When a serving cell change occurs during the DL RSCP with UE Rx-Tx measurement period, UE Rx-Tx measurement accuracy requirements and DL RSCP measurement requirements do not apply.

The relative DL-RSCP accuracy requirements defined in clause 10.1.44 are valid under the following conditions:

* Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled for FR1.
* Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled for FR2.
* Conditions for DL RSCP measurements are fulfilled according to Annex B.2.14 for a corresponding Band for each relevant PRS resource configured for measurement.
* DL RSCP measurements to derive the relative accuracy are performed on PRS resources within the same set of symbols.

The accuracy requirement for relative DL-RSCP shall be within ±(X+Y) degree.

The values of X for relative DL-RSCP measurement in FR1 are defined in Table 10.1.44.2-1 for AWGN channel and in Table 10.1.44.2-2 for two-tap channel.

The values of X for relative DL-RSCP measurement in FR2 are defined in Table 10.1.44.2-3 for AWGN channel and in Table 10.1.44.2-4 for two-tap channel.

Y is [TBD] degree for FR1 and [TBD] degree for FR2.

Table 10.1.44.2-1: DL RSCP relative accuracy in FR1 for AWGN channel

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy  (PRS Ês/Iot)ref ≥ -3dB  (PRS Ês/Iot)*i* ≥  -13dB | Accuracy  (PRS Ês/Iot)ref ≥ 0dB  (PRS Ês/Iot)*i* ≥  -6dB | Conditions | | | | | |
| 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 |
| degree | degree | kHz | RB |  |  | dBm/SCS | dBm/BWChannel |
| [14] | [4] | 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 |
|  |  | NR\_FDD\_FR1\_N | -120.5 | -50 |
| [9] | [4] | ≥ 52 | ≥ 1 | Note 5 | Note 5 | Note 5 |
| [6] | [3] | ≥ 104 | ≥ 1 | Note 5 | Note 5 | Note 5 |
| [14] | [5] | 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 |
|  |  | NR\_FDD\_FR1\_N | -117.5 | -50 |
| [9] | [3] | ≥ 48 | ≥ 1 | Note 5 | Note 5 | Note 5 |
| [14] | [4] | 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 |
|  |  | NR\_FDD\_FR1\_N | -114.5 | -50 |
| 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: 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. | | | | | | | |

Table 10.1.44.2-2: DL RSCP relative accuracy in FR1 for two-tap channel

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy  (PRS Ês/Iot)ref ≥ 0dB  (PRS Ês/Iot)*i* ≥  -6dB | Conditions | | | | | |
| 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 |
| degree | kHz | RB |  |  | dBm/SCS | dBm/BWChannel |
| [9] | 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 |
|  |  | NR\_FDD\_FR1\_N | -120.5 | -50 |
| [7] | ≥ 52 | ≥ 1 | Note 5 | Note 5 | Note 5 |
| [5] | ≥ 104 | ≥ 1 | Note 5 | Note 5 | Note 5 |
| [7] | 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 |
|  |  | NR\_FDD\_FR1\_N | -117.5 | -50 |
| [5] | ≥ 48 | ≥ 1 | Note 5 | Note 5 | Note 5 |
| [7] | 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 |
|  |  | NR\_FDD\_FR1\_N | -114.5 | -50 |
| 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: 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. | | | | | | |

Table 10.1.44.2-3: DL RSCP relative accuracy in FR2 for AWGN channel

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy  (PRS Ês/Iot)ref ≥ -3dB  (PRS Ês/Iot)*i* ≥  -13dB | Accuracy  (PRS Ês/Iot)ref ≥ 0dB  (PRS Ês/Iot)*i* ≥  -6dB | Conditions | | | | |
| PRS SCS | PRS bandwidth  Note 1 | PRS resource repetition  () Note 2 | Io Note 3 range | |
| Minimum Io | Maximum Io |
| degree | degree | kHz | RB |  | dBm/SCS | dBm/BWChannel |
| [14] | [4] | 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 |
| [8] | [4] | ≥ 64 | ≥ 1 | Note 4 | Note 4 |
| [6] | [3] | ≥ 132 | ≥ 1 | Note 4 | Note 4 |
| [16] | [5] | 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 |
| [9] | [4] | ≥ 64 | ≥ 1 | Note 4 | Note 4 |
| 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: 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. | | | | | | |

Table 10.1.44.2-4: DL RSCP relative accuracy in FR2 for two-tap channel.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Accuracy  (PRS Ês/Iot)ref ≥ 0dB  (PRS Ês/Iot)*i* ≥  -6dB | Conditions | | | | |
| PRS SCS | PRS bandwidth  Note 1 | PRS resource repetition  () Note 2 | Io Note 3 range | |
| Minimum Io | Maximum Io |
| degree | kHz | RB |  | dBm/SCS | dBm/BWChannel |
| [8] | 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 |
| [5] | ≥ 64 | ≥ 1 | Note 4 | Note 4 |
| [3] | ≥ 132 | ≥ 1 | Note 4 | Note 4 |
| [9] | 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 |
| [6] | ≥ 64 | ≥ 1 | Note 4 | Note 4 |
| 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: 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. | | | | | |

#### 10.1.44.3 Report Mapping

Relative DL RSCP measurement reporting in clause 10.1.44.3.1 applies to report:

- gap-based DL RSCP measurement, and

- DL RSCP in RRC\_INACTIVE state.

##### 10.1.44.3.1 Relative DL RSCP Measurement Reporting

The reporting range of relative DL RSCP, as defined in Clause 5.1.42 of TS 38.215 [4], is defined from 0 degree to 360 degree. The reporting resolution is 0.1 degree.

The mapping of DL RSCP measured quantity is defined in Table 10.1.44.3.1-1.

Table 10.1.44.3.1-1: DL RSCP measurement report mapping

|  |  |  |
| --- | --- | --- |
| Reported value | Measured quantity value (DL RSCP) | Unit |
| DL\_RSCP\_0000 | 0 ≤ DL RSCP < 0.1 | degree |
| DL\_RSCP\_0001 | 0.1 ≤ DL RSCP < 0.2 | degree |
| DL\_RSCP\_0002 | 0.2 ≤ DL RSCP < 0.3 | degree |
| … | … | … |
| DL\_RSCP\_1798 | 179.8 ≤ DL RSCP < 179.9 | degree |
| DL\_RSCP\_1799 | 179.9 ≤ DL RSCP < 180 | degree |
| DL\_RSCP\_1800 | 180 ≤ DL RSCP < 180.1 | degree |
| DL\_RSCP\_1801 | 180.1 ≤ DL RSCP < 180.2 | degree |
| DL\_RSCP\_1802 | 180.2 ≤ DL RSCP < 180.3 | degree |
| … | … | … |
| DL\_RSCP\_3598 | 359.8 ≤ DL RSCP < 359.9 | degree |
| DL\_RSCP\_3599 | 359.9 ≤ DL RSCP < 360 | degree |

## **--- End of Change #1 ---**

## **--- Start of Change #2 ---**

### A.3.34.4 Testing principles for carrier phase measurement for positioning

In Annex A, test cases for measurement delay requirement and accuracy requirement for carrier phase measurement reported together with legacy positioning measurement are defined.

While verifying the UE capability to meet the requirements defined for the carrier phase measurement reported together with the legacy positioning measurement, a UE capable of both RSCPD with RSTD and RSCP with UE Rx-Tx time difference measurements is required to pass either RSCPD with RSTD measurement delay test or RSCP with UE Rx-Tx time difference measurement delay test.

When a UE is tested for DL RSCPD with RSTD measurement, then the UE shall pass tests for RSTD measurement and RSCPD measurement.

When a UE is tested for DL RSCP with UE Rx-Tx measurement, then the UE shall pass tests for UE Rx-Tx measurement and DL RSCP measurement.

## **--- End of Change # 2 ---**

## **--- Start of Change # 3 ---**

### A.6.6.30 RSCP Measurements

#### A.6.6.30.1 DL RSCP with UE Rx-Tx time difference measurement for single positioning frequency layer in FR1 SA

##### A.6.6.30.1.1 Test purpose and environment

The purpose of the test is to verify that the DL RSCP and UE Rx-Tx time difference measurements meet the requirements specified in clause 9.9.8.5 in AWGN propagation condition in FR1 in standalone scenario when single positioning frequency layer is configured for both DL RSCP measurement and UE Rx-Tx time difference measurement.

The supported test configurations are listed in Table A.6.6.30.1.1-1.

Table A.6.6.30.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 20 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 50 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). Both cells are on the same RF channel in FR1.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2. Both cells transmit PRS during T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The *NR-Multi-RTT-ProvideAssistanceData* message and *NR-Multi-RTT-RequestLocationInformation* message as defined in TS 37.355 [34], shall be provided to the UE during T1. In *NR-Multi-RTT-RequestLocationInformation,* the UE is configured to perform DL RSCP measurement via *nr-DL-PRS-RSCP-Request*. The UE is configured to perform both DL RSCP and UE Rx-Tx time difference measurements within the time window indicated to UE via *nr-DL-PRS-MeasurementTimeWindowsConfig*. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources to be measured within the configured time window.

The UE is configured with measurement gap pattern ID #0 or ID #24 before T2.

The UE is configured to transmit positioning SRS during T2.

The general test parameters and cell specific test parameters are listed in Table A.6.6.30.1.1-2 and Table A.6.6.30.1.1-3.

Table A.6.6.30.1.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1, 2, 3 | Cell 1 | Cell 1 is the PCell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| Neighbour cell |  | 1, 2, 3 | Cell 2 | Cell 2 is a neighbour cell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| RF Channel Number |  | 1, 2, 3 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1 | 20: NRB,c = 106 |  |
| 2 | 20: NRB,c = 106 |  |
| 3 | 50: NRB,c = 133 |  |
| SSB configuration |  | 1 | SSB.1 FR1 |  |
|  |  | 2 | SSB.1 FR1 |  |
|  |  | 3 | SSB.2 FR1 |  |
| SMTC configuration |  | 1 | SMTC.2 |  |
|  |  | 2 | SMTC.1 |  |
|  |  | 3 | SMTC.1 |  |
| Measurement gap |  | 1, 2, 3 | GP#24 or GP#0 Note 1 |  |
| CP length |  | 1, 2, 3 | Normal |  |
| DRX |  | 1, 2, 3 | OFF |  |
| Time offset between serving and neighbour cells | μs | 1, 2, 3 | 3 | Synchronous cells |
| Time window configuration |  | 1, 2, 3 | MTW.1 | As specified in clause A.3.38 |
| T1 | s | 1, 2, 3 | 5 |  |
| T2 | s | 1, 2, 3 | 10 |  |
| NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | |

Table A.6.6.30.1.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | N/A | | N/A | |
|  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  |  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 1, 2, 3 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.1.1 FDD | | N/A | |
|  | 2 | TRS.1.1 TDD | |
|  |  | 3 | TRS.1.2 TDD | |
| Initial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.1 | | N/A | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | | N/A | |
| PRS configuration |  | 1 | PRS.1.2 FR1 | | PRS.1.2 FR1 | |
|  | 2 | PRS.1.2 FR1 | | PRS.1.2 FR1 | |
|  | 3 | PRS.2.2 FR1 | | PRS.2.2 FR1 | |
| PRS muting info |  | 1, 2, 3 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1 | POS-SRS.1 | | N/A | |
|  | 2 | POS-SRS.1 | | N/A | |
|  | 3 | POS-SRS.2 | | N/A | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| PRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -100 | -Infinity | -108 |
|  | 2 | -Infinity | -100 | -Infinity | -108 |
|  | 3 | -Infinity | -97 | -Infinity | -105 |
| Io | dBm/19.08 MHz | 1 | N/A | -64.57 | N/A | -64.57 |
| dBm/19.08 MHz | 2 | -64.57 | -64.57 |
| dBm/47.88 MHz | 3 | -60.59 | -60.59 |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | |
| NOTE 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 3: PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.6.6.30.1.2 Test requirements

The DL RSCP with UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9.8 with Nsample=4 for UE Rx-Tx time difference.

The UE shall perform and report the DL RSCP and UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified DL RSCP with UE Rx-Tx time difference measurement time specified in clause 9.9.8 starting from the beginning of time interval T2.

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

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%. The reported DL RSCP measurement shall be within the DL RSCP reporting range specified in clause 10.1.44 and the reported UE Rx-Tx measurement shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.

## **--- End of Change # 3 ---**

## **--- Start of Change # 4 ---**

### A.6.7.20 RSCP Measurements

#### A.6.7.20.1 RSCP with UE Rx-Tx time difference measurement accuracy in FR1 SA

##### A.6.7.20.1.1 Test purpose and environment

The purpose of the test is to verify that the accuracy of RSCP measurement with UE Rx-Tx time difference measurement is within the specified limits. This test will verify the requirements in clause 10.1.44.2. The test is conducted in AWGN propagation condition in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations in listed in Table A.6.7.20.1.1-1.

Table A.6.7.20.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 15 kHz SSB SCS, 20 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 50 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on the same RF channel in FR1.

The *NR-Multi-RTT-ProvideAssistanceData* , *NR-Multi-RTT-RequestLocationInformation* with *nr-DL-PRS-RSCP-Request* from LMF via LPP [34] and *NR-Multi-RTT-MeasurementCapability* as defined in TS 37.355 [34, clause 6.5.12.] to enable UE to perform and report RSCP in RRC CONNECTED, shall be provided to the UE before the start of the test.

The UE is configured with measurement gap pattern ID #0 or ID #24 before the test.

The UE is configured to transmit positioning SRS on Cell 1 during the test.

The test equipment measures the transmit timing of the UE using the transmitted SRS and measures the receive timing using the PRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE for each cell.

##### A.6.7.20.1.2 Test parameters

The RSCP with UE Rx-Tx time difference accuracy test parameters are given in Table A.6.7.20. 1.2-1.

Table A.6.7.20.1.2-1: RSCP with UE Rx-Tx time difference measurement accuracy test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Test 1** | |
|  |  | Cell 1 | Cell 2 |
| RF Channel Number |  | 1,2,3 | 1 | 1 |
| Measurement gap |  | 1,2,3 | GP#24 or GP#0 Note 4 | |
| DRX |  | 1,2,3 | OFF | |
| Time offset with Cell 1 | μs | 1, 2, 3 | N/A | 3 |
| TDD configuration |  | 1 | N/A | N/A |
|  | 2 | TDDConf.1.1 | TDDConf.1.1 |
|  |  | 3 | TDDConf.2.1 | TDDConf.2.1 |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | N/A |
|  | 2 | SR.1.1 TDD |  |
|  | 3 | SR.2.1 TDD |  |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | N/A |
|  | 2 | CR.1.1 TDD |
|  |  | 3 | CR.2.1 TDD |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | N/A |
|  | 2 | CCR.1.1 TDD |
|  | 3 | CCR.2.1 TDD |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS | dB | 1, 2, 3 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.1.1 FDD | N/A |
|  | 2 | TRS.1.1 TDD |
|  | 3 | TRS.1.2 TDD |
| Initial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | N/A |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.1 | N/A |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | N/A |
| PRS configuration |  | 1 | PRS.1.1 FR1 | PRS.1.1 FR1 |
|  |  | 2 | PRS.1.1 FR1 | PRS.1.1 FR1 |
|  |  | 3 | PRS.2.1 FR1 | PRS.2.1 FR1 |
| PRS BW |  | 1 | 52 PRBs | 52 PRBs |
|  | 2 | 52 PRBs | 52 PRBs |
|  | 3 | 48 PRBs | 48 PRBs |
| PRS Resource slot offset | slot | 1, 2, 3 | 0 | 4 |
| SRS configuration |  | 1 | POS-SRS.1 | N/A |
|  |  | 2 | POS-SRS.1 | N/A |
|  |  | 3 | POS-SRS.2 | N/A |
| Note 2 | dBm/SCS | 1 | -98 | |
|  | 2 | -98 | |
|  | 3 | -95 | |
| Note 2 | dBm/15 kHz | 1 | -98 | |
|  | 2 |  | |
|  | 3 |  | |
| PRS | dB | 1 | 0 | -6 |
|  | 2 |  |  |
|  |  | 3 |  |  |
| PRS | dB | 1 | 2.23 | -1.73 |
|  | 2 |  |  |
|  |  | 3 |  |  |
| PRP Note 3 | dBm/SCS kHz | 1 | -95.77 | -99.73 |
|  | 2 | -95.77 | -99.73 |
|  | 3 | -92.77 | -96.73 |
| Io | dBm/19.08 MHz | 1 | -61.71 | -61.71 |
| dBm/19.08 MHz | 2 | -61.71 | -61.71 |
| dBm/47.88 MHz | 3 | -57.73 | -57.73 |
| Propagation Condition |  | 1, 2, 3 | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | |

##### A.6.7.20.1.3 Test requirements

The RSCP reported with UE Rx-Tx time difference measurement fulfils RSCP measurement accuracy specified in clause 10.1.44.2 for both Cell 1 and Cell 2.

## **--- End of Change # 4 ---**

## **--- Start of Change # 5 ---**

### A.6.8.6 RSCP Measurements

#### A.6.8.6.1 DL RSCP with UE Rx-Tx time difference measurement for single positioning frequency layer in FR1 SA

##### A.6.8.6.1.1 Test purpose and environment

The purpose of the test is to verify that the DL RSCP and UE Rx-Tx time difference measurements in RRC\_INACTIVE state meet the requirements specified in clause 5.6.8.5 in AWGN propagation condition in FR1 in standalone scenario when single positioning frequency layer is configured for both DL RSCP measurement and UE Rx-Tx time difference measurement.

The supported test configurations are listed in Table A.6.8.6.1.1-1.

Table A.6.8.6.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 20 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 50 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). Both cells are on the same RF channel in FR1.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The *NR-Multi-RTT-ProvideAssistanceData* message and *NR-Multi-RTT-RequestLocationInformation* message as defined in TS 37.355 [34], shall be provided to the UE during T1. In *NR-Multi-RTT-RequestLocationInformation,* the UE is configured to perform DL RSCP measurement via *nr-DL-PRS-RSCP-Request*. The UE is configured to perform both DL RSCP and UE Rx-Tx time difference measurements within the time window indicated to UE via *nr-DL-PRS-MeasurementTimeWindowsConfig* but the time window periodicity is not configured. The last slot containing the two messages for the multi-RTTI assistance data and location information request is denoted as #n. In the next DL slot after slot #n, UE is released into RRC\_INACTIVE.

The beginning of the time interval T2 shall be aligned with the start of the configured time window containing the first PRS resource occasion occurring ΔT after the slot #n, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request.

The UE is configured to transmit positioning SRS during T2.

The general test parameters and cell specific test parameters are listed in Table A.6.8.6.1.1-2 and Table A.6.8.6.1.1-3.

Table A.6.8.6.1.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1, 2, 3 | Cell 1 | Cell 1 is the PCell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| Neighbour cell |  | 1, 2, 3 | Cell 2 | Cell 2 is a neighbour cell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| RF Channel Number |  | 1, 2, 3 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1 | 20: NRB,c = 106 |  |
| 2 | 20: NRB,c = 106 |  |
| 3 | 50: NRB,c = 133 |  |
| SSB configuration |  | 1 | SSB.1 FR1 |  |
|  |  | 2 | SSB.1 FR1 |  |
|  |  | 3 | SSB.2 FR1 |  |
| SMTC configuration |  | 1 | SMTC.2 |  |
|  |  | 2 | SMTC.1 |  |
|  |  | 3 | SMTC.1 |  |
| CP length |  | 1, 2, 3 | Normal |  |
| DRX cycle |  | 1, 2, 3 | 1.28s |  |
| Time offset between serving and neighbour cells | μs | 1, 2, 3 | 3 | Synchronous cells |
| Time window configuration |  | 1, 2, 3 | MTW.2 | As specified in clause A.3.38 |
| T1 | s | 1, 2, 3 | 5 |  |
| T2 | s | 1, 2, 3 | 10 |  |

Table A.6.8.6.1.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | N/A | | N/A | |
|  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  |  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 1, 2, 3 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.1.1 FDD | | N/A | |
|  | 2 | TRS.1.1 TDD | |
|  |  | 3 | TRS.1.2 TDD | |
| Initial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.1 | | N/A | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | | N/A | |
| PRS configuration |  | 1 | PRS.1.2 FR1 | | PRS.1.2 FR1 | |
|  | 2 | PRS.1.2 FR1 | | PRS.1.2 FR1 | |
|  | 3 | PRS.2.2 FR1 | | PRS.2.2 FR1 | |
| PRS muting info |  | 1, 2, 3 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1 | POS-SRS.1 | | N/A | |
|  | 2 | POS-SRS.1 | | N/A | |
|  | 3 | POS-SRS.2 | | N/A | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| PRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -100 | -Infinity | -108 |
|  | 2 | -Infinity | -100 | -Infinity | -108 |
|  | 3 | -Infinity | -97 | -Infinity | -105 |
| Io | dBm/19.08 MHz | 1 | N/A | -64.57 | N/A | -64.57 |
| dBm/19.08 MHz | 2 | -64.57 | -64.57 |
| dBm/47.88 MHz | 3 | -60.59 | -60.59 |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | | | | |

##### A.6.8.6.1.2 Test requirements

The DL RSCP with UE Rx-Tx time difference measurement time in RRC\_INACTIVE state fulfils the requirements specified in clause 5.6.8.

The UE shall perform and report the DL RSCP and UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified DL RSCP with UE Rx-Tx time difference measurement time specified in clause 5.6.8 starting from the beginning of time interval T2.

NOTE: The actual overall delays measured in the test may be higher than the time duration above because of the uncertainty in acquiring the first available PRACH occasion to transition to RRC\_CONNECTED state to report the measurements.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported DL RSCP measurement for each correct event shall be within the DL RSCP reporting range specified in clause 10.1.44 and the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.

## **--- End of Change # 5 ---**

## **--- Start of Change # 6 ---**

### A.6.9.6 RSCP Measurements

#### A.6.9.6.1 RSCP with UE Rx-Tx time difference measurement accuracy in FR1 SA

##### A.6.9.6.1.1 Test purpose and environment

The purpose of the test is to verify the accuracy of RSCP measurement reported with UE Rx-Tx time difference measurement in RRC\_INACTIVE is within the specified limits. This test will verify the requirements in clause 10.1.44.2. The test is conducted in AWGN propagation condition in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations in listed in Table A.6.9. 6.1.1-1.

Table A.6.9. 6.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 15 kHz SSB SCS, 20 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 50 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on the same RF channel in FR1.

The *NR-Multi-RTT-ProvideAssistanceData* , *NR-Multi-RTT-RequestLocationInformation* with *nr-DL-PRS-RSCP-Request* from LMF via LPP [34] and *NR-Multi-RTT-MeasurementCapability* as defined in TS 37.355 [34, clause 6.5.12] to enable UE to perform and report RSCP in RRC INACTIVE, shall be provided to the UE before the start of the test.

The UE is configured to transmit positioning SRS on Cell 1 during the test.

The test equipment measures the transmit timing of the UE using the transmitted SRS and measures the receive timing using the PRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE for each cell.

##### A.6.9.6.1.2 Test parameters

The RSCP with UE Rx-Tx time difference accuracy test parameters are given in Table A.6.9. 6.1.2-1.

Table A.6.9. 6.1.2-1: RSCP with UE Rx-Tx time difference measurement accuracy test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Test 1** | |
|  |  | Cell 1 | Cell 2 |
| RF Channel Number |  | 1,2,3 | 1 | 1 |
| Measurement gap |  | 1,2,3 | GP#24 or GP#0 Note 4 | |
| DRX |  | 1,2,3 | 1.28s | |
| Time offset with Cell 1 | μs | 1, 2, 3 | N/A | 3 |
| TDD configuration |  | 1 | N/A | N/A |
|  | 2 | TDDConf.1.1 | TDDConf.1.1 |
|  |  | 3 | TDDConf.2.1 | TDDConf.2.1 |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | N/A |
|  | 2 | SR.1.1 TDD |  |
|  | 3 | SR.2.1 TDD |  |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | N/A |
|  | 2 | CR.1.1 TDD |
|  |  | 3 | CR.2.1 TDD |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | N/A |
|  | 2 | CCR.1.1 TDD |
|  | 3 | CCR.2.1 TDD |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS | dB | 1, 2, 3 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.1.1 FDD | N/A |
|  | 2 | TRS.1.1 TDD |
|  | 3 | TRS.1.2 TDD |
| Initial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | N/A |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.1 | N/A |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | N/A |
| PRS configuration |  | 1 | PRS.1.1 FR1 | PRS.1.1 FR1 |
|  |  | 2 | PRS.1.1 FR1 | PRS.1.1 FR1 |
|  |  | 3 | PRS.2.1 FR1 | PRS.2.1 FR1 |
| PRS BW |  | 1 | 52 PRBs | 52 PRBs |
|  | 2 | 52 PRBs | 52 PRBs |
|  | 3 | 48 PRBs | 48 PRBs |
| PRS Resource slot offset | slot | 1, 2, 3 | 0 | 4 |
| SRS configuration |  | 1 | POS-SRS.1 | N/A |
|  |  | 2 | POS-SRS.1 | N/A |
|  |  | 3 | POS-SRS.2 | N/A |
| Note 2 | dBm/SCS | 1 | -98 | |
|  | 2 | -98 | |
|  | 3 | -95 | |
| Note 2 | dBm/15 kHz | 1 | -98 | |
|  | 2 |  | |
|  | 3 |  | |
| PRS | dB | 1 | 0 | -6 |
|  | 2 |  |  |
|  |  | 3 |  |  |
| PRS | dB | 1 | 2.23 | -1.73 |
|  | 2 |  |  |
|  |  | 3 |  |  |
| PRP Note 3 | dBm/SCS kHz | 1 | -95.77 | -99.73 |
|  | 2 | -95.77 | -99.73 |
|  | 3 | -92.77 | -96.73 |
| Io | dBm/19.08 MHz | 1 | -61.71 | -61.71 |
| dBm/19.08 MHz | 2 | -61.71 | -61.71 |
| dBm/47.88 MHz | 3 | -57.73 | -57.73 |
| Propagation Condition |  | 1, 2, 3 | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | |

##### A.6.9.6.1.3 Test requirements

The RSCP with UE Rx-Tx time difference measurement fulfils RSCP measurement accuracy specified in clause 10.1.44.2 for both Cell 1 and Cell 2.

## **--- End of Change # 6 ---**

## **--- Start of Change # 7 ---**

## A.7.6.25 RSCP measurements

A.7.6.25.1 DL RSCP with UE Rx-Tx time difference measurements for single positioning frequency layer in FR2 SA

#### A.7.6.25.1.1 Test purpose and environment

The purpose of the test is to verify that the DL RSCP and UE Rx-Tx time difference measurements meet the requirements specified in clause 9.9.8.5 in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured for both DL RSCP measurement and UE Rx-Tx time difference measurement.

The supported test configurations are listed in Table A.7.6.25.1.1-1.

**Table A.7.6.25.1.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 120 kHz SSB and PRS SCS, 200 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). Both cells are on the same RF channel in FR2.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2. Both cells transmit PRS during T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The *NR-Multi-RTT-ProvideAssistanceData* message and *NR-Multi-RTT-RequestLocationInformation* message as defined in TS 37.355 [34], shall be provided to the UE during T1. In *NR-Multi-RTT-RequestLocationInformation,* the UE is configured to perform DL RSCP measurement via *nr-DL-PRS-RSCP-Request*. The UE is configured to perform both DL RSCP and UE Rx-Tx time difference measurements within the time window indicated to UE via *nr-DL-PRS-MeasurementTimeWindowsConfig*. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources to be measured within the configured time window.

The UE is configured with measurement gap pattern ID #0 or ID #24 before T2.

The UE is configured to transmit positioning SRS during T2.

The general test parameters and cell specific test parameters are listed in Table A.7.6.25.1.1-2 and Table A.7.6.25.1.1-3.

**Table A.7.6.25.1.1-2: General test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| Active cell |  | 1 | Cell 1 | Cell 1 is the PCell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| Neighbour cell |  | 1 | Cell 2 | Cell 2 is a neighbour cell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| RF Channel Number |  | 1 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1 | 200: NRB,c = 132 |  |
| SSB configuration |  | 1 | SSB.2 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| Measurement gap |  | 1 | GP#24 or GP#13 Note 1 |  |
| CP length |  | 1 | Normal |  |
| DRX |  | 1 | OFF |  |
| Time offset between serving and neighbour cells | μs | 1 | 3 | Synchronous cells |
| Time window configuration |  | 1 | MTW.1 | As specified in clause A.3.38 |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 20 |  |
| NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | |

**Table A.7.6.25.1.1-3: Cell specific test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
|  |  | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 |  | 1 | Rough | | Rough | |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 1 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | | N/A | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | | N/A | |
| PRS configuration |  | 1 | PRS.1.1 FR2 | | PRS.1.1 FR2 | |
| PRS muting info |  | 1 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1 | POS-SRS.3 | | N/A | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
| PRS | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -10 |
| PRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -91 | -Infinity | -99 |
| Io | dBm/190.08 MHz | 1 | N/A | -54.62 | N/A | -54.62 |
| Propagation Condition |  | 1 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: Calculation of Es/Iot includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | |

#### A.7.6.25.1.2 Test requirements

The DL RSCP with UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9.8 with Nsample=4 for UE Rx-Tx time difference.

The UE shall perform and report the DL RSCP and UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified DL RSCP with UE Rx-Tx time difference measurement time specified in clause 9.9.8 starting from the beginning of time interval T2.

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

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%. The reported DL RSCP measurement shall be within the DL RSCP reporting range specified in clause 10.1.44 and the reported UE Rx-Tx measurement shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.

## **--- End of Change # 7 ---**

## **--- Start of Change # 8 ---**

### A.7.7.17 RSCP with UE Rx-Tx time difference measurements

#### A.7.7.17.1 RSCP with UE Rx-Tx time difference measurement accuracy in FR2 SA

##### A.7.7.17.1.1 Test purpose and environment

The purpose of the test is to verify that the accuracy of DL RSCP measurement reported with UE Rx-Tx time difference measurement is within the specified limits. This test will verify the requirements in clause 10.1.44.2. The test is conducted in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configuration is listed in Table A.7.7.12.2.1-1.

**Table A.7.7.12.2.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 120 kHz SSB and PRS SCS, 200 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on the same RF channel in FR2.

The *NR-Multi-RTT-ProvideAssistanceData*, *NR-Multi-RTT-RequestLocationInformation* with *nr-DL-PRS-RSCP-Request* from LMF via LPP [34] and *NR-Multi-RTT-MeasurementCapability* as defined in TS 37.355 [34, clause 6.5.12.] to enable UE to perform and report RSCP in RRC CONNECTED, shall be provided to the UE before the start of the test.

The UE is configured with measurement gap pattern ID #13 or ID #24 before the test.

The UE is configured to transmit positioning SRS on Cell 1 during the test.

The test equipment measures the transmit timing of the UE using the transmitted SRS and measures the receive timing using the PRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE for each cell.

##### A.7.7.17.1.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.7.7.17.1.2-1.

Table A.7.7.17.1.2-1: RSCP with UE Rx-Tx time difference measurement accuracy test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Test 1 | |
|  | Cell 1 | Cell 2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 6 |  | 1 | Rough | Rough |
| Measurement gap |  | 1 | GP#24 or GP#13 Note 7 | |
| DRX |  | 1 | OFF | |
| Time offset with Cell 1 | μs | 1 | N/A | 3 |
| TDD configuration |  | 1 | TDDConf.3.1 | TDDConf.3.1 |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | N/A |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | N/A |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | N/A |
| OCNG Patterns |  | 1 | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS | dB | 1 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSS |
| EPRE ratio of OCNG to OCNG DMRS |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.2.1 TDD | N/A |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | N/A |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | N/A |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | N/A |
| PRS configuration |  | 1 | PRS.1.1 FR2 | PRS.1.1 FR2 |
| PRS BW |  | 1 | 64 PRBs | 64 PRBs |
| PRS Resource slot offset | slot | 1 | 0 | 4 |
| SRS configuration |  | 1 | POS-SRS.3 | N/A |
| Note 1 | dBm/SCS | 1 | -89 | |
| Note 1 | dBm/15 kHz | 1 | -98 | |
| PRS | dB | 1 | 0 | -6 |
| PRS | dB | 1 | 2.23 | -1.73 |
| PRP Note 3 | dBm/SCS kHz | 1 | -86.77 | -90.73 |
| Io | dBm/190.08 MHz | 1 | -51.76 | -51.76 |
| Propagation Condition |  | 1 | AWGN | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: PRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 7: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured.  Note 8: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | |

##### A.7.7.17.1.3 Test requirements

The RSCP with UE Rx-Tx time difference measurements fulfils the RSCP measurement accuracy requirements specified in clause 10.1.44.2 for both Cell 1 and Cell 2.

## **--- End of Change # 8 ---**

## **--- Start of Change # 9 ---**

A.7.8.6 RSCP Measurements

A.7.8.6.1 DL RSCP with UE Rx-Tx time difference measurements in RRC\_INACTIVE for single positioning frequency layer in FR2 SA

A.7.8.6.1.1 Test purpose and environment

The purpose of the test is to verify that the DL RSCP and UE Rx-Tx time difference measurements in RRC\_INACTIVE state meet the requirements specified in clause 5.6.8.5 in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured for both DL RSCP measurement and UE Rx-Tx time difference measurement.

The supported test configurations are listed in Table A.7.8.6.1.1-1.

**Table A.7.8.6.1.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 120 kHz SSB and PRS SCS, 200 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). Both cells are on the same RF channel in FR2.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The *NR-Multi-RTT-ProvideAssistanceData* message and *NR-Multi-RTT-RequestLocationInformation* message as defined in TS 37.355 [34], shall be provided to the UE during T1. In *NR-Multi-RTT-RequestLocationInformation,* the UE is configured to perform DL RSCP measurement via *nr-DL-PRS-RSCP-Request*. The UE is configured to perform both DL RSCP and UE Rx-Tx time difference measurements within the time window indicated to UE via *nr-DL-PRS-MeasurementTimeWindowsConfig,* but the time window periodicity is not configured. The last slot containing the two messages for the multi-RTTI assistance data and location information request is denoted as #n. In the next DL slot after slot #n, UE is released into RRC\_INACTIVE.

The beginning of the time interval T2 shall be aligned with the start of the configured time window containing the first PRS resource occasion occurring ΔT after the slot #n, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request.

The UE is configured to transmit positioning SRS during T2.

The general test parameters and cell specific test parameters are listed in Table A.7.8.6.1.1-2 and Table A.7.8.6.1.1-3.

**Table A.7.8.6.1.1-2: General test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| Active cell |  | 1 | Cell 1 | Cell 1 is the PCell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| Neighbour cell |  | 1 | Cell 2 | Cell 2 is a neighbour cell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| RF Channel Number |  | 1 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1 | 200: NRB,c = 132 |  |
| SSB configuration |  | 1 | SSB.2 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| CP length |  | 1 | Normal |  |
| DRX cycle |  | 1 | 0.64s |  |
| Time offset between serving and neighbour cells | μs | 1 | 3 | Synchronous cells |
| Time window configuration |  | 1 | MTW.2 | As specified in clause A.3.38 |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 20 |  |

**Table A.7.8.6.1.1-3: Cell specific test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
|  |  | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 |  | 1 | Rough | | Rough | |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 1 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | | N/A | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | | N/A | |
| PRS configuration |  | 1 | PRS.1.1 FR2 | | PRS.1.1 FR2 | |
| PRS muting info |  | 1 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1 | POS-SRS.3 | | N/A | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
| PRS | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -10 |
| PRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -91 | -Infinity | -99 |
| Io | dBm/190.08 MHz | 1 | N/A | -54.62 | N/A | -54.62 |
| Propagation Condition |  | 1 | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: Calculation of Es/Iot includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4.  Note 9: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | | | | |

A.7.8.6.1.2 Test requirements

The DL RSCP with UE Rx-Tx time difference measurement time in RRC\_INACTIVE state fulfils the requirements specified in clause 5.6.8.

The UE shall perform and report the DL RSCP and UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified DL RSCP with UE Rx-Tx time difference measurement time specified in clause 5.6.8 starting from the beginning of time interval T2.

NOTE: The actual overall delays measured in the test may be higher than the time duration above because of the uncertainty in acquiring the first available PRACH occasion to transition to RRC\_CONNECTED state to report the measurements.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported DL RSCP measurement for each correct event shall be within the DL RSCP reporting range specified in clause 10.1.44 and the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.

## **--- End of Change # 9 ---**

## **--- Start of Change # 10 ---**

### A.7.9.6 RSCP Measurements

#### A.7.9.6.1 RSCP with UE Rx-Tx time difference measurement accuracy in FR2 SA

##### A.7.9.6.1.1 Test purpose and environment

The purpose of the test is to verify that the accuracy of DL RSCP measurement reported with UE Rx-Tx time difference measurement in RRC\_INACTIVE is within the specified limits. This test will verify the requirements in clause 10.1.44.2. The test is conducted in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configuration is listed in Table A.7.9. 6.1.1-1.

**Table A.7.9.6.1.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 120 kHz SSB and PRS SCS, 200 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on the same RF channel in FR2.

The *NR-Multi-RTT-ProvideAssistanceData* , *NR-Multi-RTT-RequestLocationInformation* with *nr-DL-PRS-RSCP-Request* from LMF via LPP [34] and *NR-Multi-RTT-MeasurementCapability* as defined in TS 37.355 [34, clause 6.5.12] to enable UE to perform and report RSCP in RRC INACTIVE, shall be provided to the UE before the start of the test.

The UE is configured to transmit positioning SRS on Cell 1 during the test.

The test equipment measures the transmit timing of the UE using the transmitted SRS and measures the receive timing using the PRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE for each cell.

##### A.7.9.6.1.2 Test parameters

The test parameters are given in Table A.7.9. 6.1.2-1.

Table A.7.9. 6.1.2-1: RSCP with UE Rx-Tx time difference measurement accuracy test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Test 1 | |
|  | Cell 1 | Cell 2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 6 |  | 1 | Rough | Rough |
| DRX | s | 1 | 0.64 | |
| Time offset with Cell 1 | μs | 1 | N/A | 3 |
| TDD configuration |  | 1 | TDDConf.3.1 | TDDConf.3.1 |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | N/A |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | N/A |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | N/A |
| OCNG Patterns |  | 1 | OP.1 | OP.1 |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | N/A |
| PRS configuration |  | 1 | PRS.1.1 FR2 | PRS.1.2 FR2 |
| PRS Resource slot offset | slot | 1 | 0 | 4 |
| SRS configuration |  | 1 | POS-SRS.3 | N/A |
| Note 1 | dBm/SCS | 1 | -89 | |
| Note 1 | dBm/15 kHz | 1 | -98 | |
| PRS | dB | 1 | -2.41 | -12.12 |
| PRS | dB | 1 | -2 | -10 |
| PRS-RSRP Note 2 | dBm/SCS kHz | 1 | -91 | -99 |
| Io | dBm/190.08 MHz | 1 | -54.62 | -54.62 |
| Propagation Condition |  | 1 | AWGN | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  Note 7: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | |

##### A.7.9.6.1.3 Test requirements

The RSCP measurement reported with UE Rx-Tx time difference measurements fulfils the RSCP measurement accuracy requirements specified in clause 10.1.44.2 for both Cell 1 and Cell 2.

## **--- End of Change # 10 ---**