**3GPP TSG-RAN WG2 Meeting #126 *Draft\_R2-2405768***

**Fukuoka, Japan, 20 – 24 May 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  | **37.355** | **CR** | **0504** | **rev** | **1** | **Current version:** | **18.1.0** |  |
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| *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 | **X** |

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| ***Title:***  | Correction on NR NTN |
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| ***Source to WG:*** | CATT (Rapporteur) |
| ***Source to TSG:*** | R2 |
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| ***Work item code:*** | NR\_NTN\_enh -Core |  | ***Date:*** | 2024-05-20 |
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| ***Category:*** | **F** |  | ***Release:*** | Rel-18 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | 1. According to the LS R4-2406496 from RAN4, the capability of supporting single sample in UE Rx-Tx time difference measurement for single satellite based RTT should be added under the field *nr-NTN-MeasAndReport*.

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| RAN4 has discussed the requirements for UE Rx-Tx time difference measurement for single satellite based RTT for NW verified location, and agreed that the measurement periods are based on single sample. RAN4 also discussed the UE capability related to single sample measurement, and concluded that supporting single sample in UE Rx-Tx time difference measurement for single satellite based RTT is a component FG 44-3, and it does not require UE to support reduced sample number for TN positioning measurement (FG 27-3-1).RAN4 respectfully asks RAN1 and RAN2 to take the above information into account and update the feature list and UE capability as necessary. |

Furthermore, this capability has already been reflected in FG44-3 in the latest RAN1 feature list (R1-2405564), and thus should be captured in the specification accordingly.1. As per latest RAN1 UE feature list (R1-2405564), LPP capability *nr-NTN-MeasAndReport* can also be supported for the FR2-NTN operating bands, and this should be added into the Spec.
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| ***Summary of change:*** | 1. Capture the UE capability on Rx-Tx time difference based on single sample in LPP capability *nr-NTN-MeasAndReport*, according to latest RAN1 feature list.
2. Clarify in the field description of *nr-NTN-MeasAndReport* that it can also be present for the FR2-NTN operating bands in Table 5.2.3-1 in TS 38.101-5.
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| ***Consequences if not approved:*** | The function of UE Rx-Tx Measurement and Report for Multi-RTT with single satellite in NR NTN is not correctly specified. |
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| ***Clauses affected:*** | 6.5.12.6a |
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|  | **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 ...  |
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| ***Other comments:*** |  |
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| ***This CR's revision history:*** |  |

*START OF CHANGE*

#### 6.5.12.6a NR Multi-RTT Capability Information Elements

#### *– NR-Multi-RTT-MeasurementCapability*

The IE *NR-Multi-RTT-MeasurementCapability* defines the Multi-RTT measurement capability. The UE can include this IE only if the UE supports *NR-DL-PRS-ResourcesCapability* for Multi-RTT. Otherwise, the UE does not include this IE;

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NR-Multi-RTT-MeasurementCapability-r16 ::= SEQUENCE {

 maxNrOfRx-TX-MeasFR1-r16 INTEGER (1..4) OPTIONAL,

 maxNrOfRx-TX-MeasFR2-r16 INTEGER (1..4) OPTIONAL,

 supportOfRSRP-MeasFR1-r16 ENUMERATED { supported } OPTIONAL,

 supportOfRSRP-MeasFR2-r16 ENUMERATED { supported } OPTIONAL,

 srs-AssocPRS-MultiLayersFR1-r16 ENUMERATED { supported } OPTIONAL,

 srs-AssocPRS-MultiLayersFR2-r16 ENUMERATED { supported } OPTIONAL,

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 nr-UE-TEG-Capability-r17 NR-UE-TEG-Capability-r17 OPTIONAL,

 multi-RTT-MeasCapabilityBandList-r17 SEQUENCE (SIZE (1..nrMaxBands-r16)) OF

 Multi-RTT-MeasCapabilityPerBand-r17

 OPTIONAL

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}

Multi-RTT-MeasCapabilityPerBand-r17 ::= SEQUENCE {

 freqBandIndicatorNR-r17 FreqBandIndicatorNR-r16,

 supportOfDL-PRS-FirstPathRSRP-r17 ENUMERATED { supported } OPTIONAL,

 dl-PRS-MeasRRC-Inactive-r17 ENUMERATED { supported } OPTIONAL,

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 supportOfDL-PRS-BWA-RRC-Connected-r18 ENUMERATED { supported } OPTIONAL,

 supportOfDL-PRS-BWA-RRC-Inactive-r18 ENUMERATED { supported } OPTIONAL,

 nr-NTN-MeasAndReport-r18 ENUMERATED { supported } OPTIONAL,

 nr-DL-PRS-RSCP-ReportingRRC-Connected-r18 ENUMERATED { supported } OPTIONAL,

 nr-DL-PRS-RSCP-ReportingRRC-Inactive-r18 ENUMERATED { supported } OPTIONAL,

 supportOfLegacyMeasurementInTimeWindow-r18 ENUMERATED { supported } OPTIONAL,

 assocSingleRx-Tx-WithUpToNsampleRSCP-r18 ENUMERATED { supported } OPTIONAL,

 supportOfRSCP-MeasurementInTimeWindow-r18 ENUMERATED { supported } OPTIONAL,

 supportOfSymbolTimeStampForRSCP-r18 ENUMERATED { supported } OPTIONAL,

 supportOfFinerTimingReportGranularityForPRS-Meas-r18 ENUMERATED { minus1, minus2,

 minus3, minus4, minus5, minus6} OPTIONAL

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}

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| *NR-Multi-RTT-MeasurementCapability* field descriptions |
| ***maxNrOfRx-TX-MeasFR1***Indicates the maximum number of UE Rx–Tx time difference measurements corresponding to a single SRS resource/resource set for positioning with each measurement corresponding to a single DL-PRS Resource/Resource Set on FR1. |
| ***maxNrOfRx-TX-MeasFR2***Indicates the maximum number of UE Rx–Tx time difference measurements corresponding to a single SRS resource/resource set for positioning with each measurement corresponding to a single DL-PRS Resource/Resource Set on FR2. |
| ***srs-AssocPRS-MultiLayersFR1***Indicates whether the UE supports measurements derived on one or more DL-PRS Resource/Resource Sets which may be in different positioning frequency layers for SRS transmitted in a single CC. DL-PRS and SRS may be on different bands. This is for FR1 only. |
| ***srs-AssocPRS-MultiLayersFR2***Indicates whether the UE supports measurements derived on one or more DL-PRS Resource/Resource Sets which may be in different positioning frequency layers for SRS transmitted in a single CC. DL-PRS and SRS may be on different bands. This is for FR2 only. |
| ***supportOfRSRP-MeasFR1***Indicates whether the UE supports RSRP measurement for Multi-RTT on FR1. |
| ***supportOfRSRP-MeasFR2***Indicates whether the UE supports RSRP measurement for Multi-RTT on FR2. |
| ***nr-UE-TEG-Capability***Indicates the UE TEG capability. |
| ***supportOfDL-PRS-FirstPathRSRP***Indicates whether the target device supports DL-PRS RSRPP of first path measurement for Multi-RTT. The UE can include this field only if the UE supports *prs-ProcessingCapabilityBandList*. Otherwise, the UE does not include this field. The UE supporting *additionalPathsReport* and *supportOfDL-PRS-FirstPathRSRP* shall support RSRPP reporting for K=1 or 2 additional paths. |
| ***dl-PRS-MeasRRC-Inactive***This field, if present, indicates that the target device supports DL-PRS measurement in RRC\_INACTIVE state. The UE can include this field only if the UE supports *maxNrOfDL-PRS-ResourceSetPerTrpPerFrequencyLayer, maxNrOfTRP-AcrossFreqs, maxNrOfPosLayer* and *dl-PRS-BufferType-RRC-Inactive*. Otherwise, the UE does not include this field.NOTE 1: The capabilities *NR-DL-PRS-ResourcesCapability, maxNrOfRx-TX-MeasFR1, maxNrOfRx-TX-MeasFR2, supportOfRSRP-MeasFR1, supportOfRSRP-MeasFR2, srs-AssocPRS-MultiLayersFR1, srs-AssocPRS-MultiLayersFR2, simul-NR-DL-AoD-Multi-RTT* are the same in RRC\_INACTIVE state. |
| ***supportOfDL-PRS-BWA-RRC-Connected***Indicates whether the target device supports DL-PRS bandwidth aggregation in RRC\_CONNECTED for Multi-RTT. The target device can include this field only if the target device supports *maxNrOfDL-PRS-ResourceSetPerTrpPerFrequencyLayer*, *maxNrOfTRP-AcrossFreqs*, *maxNrOfPosLayer* and *prs-BWA-TwoContiguousIntrabandInMG-RRC-Connected*. Otherwise, the UE does not include this field. |
| ***supportOfDL-PRS-BWA-RRC-Inactive***Indicates whether the target device supports DL-PRS bandwidth aggregation in RRC\_INACTIVE for Multi-RTT. The target device can include this field only if the target device supports *dl-PRS-MeasRRC-Inactive* and *prs-BWA-TwoContiguousIntrabandInMG-RRC-IdleandInactive*. Otherwise, the target device does not include this field. |
| ***nr-NTN-MeasAndReport***This field, if present, indicates that the UE supports UE Rx-Tx Measurement and Report for Multi-RTT with single satellite in NTN with the following capabilities:- UE Rx-Tx time difference based on single sample and UE Rx-Tx time difference offset measurement and report for Multi-RTT positioning;- Reporting DL timing drift due to Doppler over the service link associated with the UE Rx-Tx time difference measurement period.NOTE 2: This field is only present, if *freqBandIndicatorNR* indicates the bands in Table 5.2.2-1 and Table 5.2.3-1 in TS 38.101-5 [54]. |
| ***nr-DL-PRS-RSCP-ReportingRRC-Connected***This field, if present, indicates that the target device supports reporting RSCP in RRC CONNECTED. The UE can include this field only if the UE supports *maxNrOfRx-TX-MeasFR1, maxNrOfRx-TX-MeasFR2, supportOfRSRP-MeasFR1* and *supportOfRSRP-MeasFR2*. Otherwise, the UE does not include this field.NOTE 3: RSCP is reported together with UE Rx-Tx time difference measurement. |
| ***nr-DL-PRS-RSCP-ReportingRRC-Inactive***This field, if present, indicates that the target device supports reporting RSCP in RRC INACTIVE. The UE can include this field only if the UE supports *dl-PRS-MeasRRC-Inactive*. Otherwise, the UE does not include this field.NOTE 4: RSCP is reported together with UE Rx-Tx time difference measurement. |
| ***supportOfLegacyMeasurementInTimeWindow***This field, if present, indicates that the target device supports performing legacy measurements inside the indicated time window only for Multi-RTT. The UE can include this field only if the UE supports *maxNrOfDL-PRS-ResourcesPerResourceSet and maxNrOfDL-PRS-ResourcesPerPositioningFrequencylayer*. Otherwise, the UE does not include this field. |
| ***assocSingleRx-Tx-WithUpToNsampleRSCP***This field, if present, indicates that the target device supports associating a single Rx-Tx measurement with up to N\_sample RSCP measurement. The UE can include this field only if the UE supports one of *nr-DL-PRS-RSCP-ReportingRRC-Connected* and *nr-DL-PRS-RSCP-ReportingRRC-Inactive*. Otherwise, the UE does not include this field. |
| ***supportOfRSCP-MeasurementInTimeWindow***This field, if present, indicates that the target device supports RSCP measurement on indicated DL-PRS resource sets within the indicated time window(s) for UE assisted positioning. The UE can include this field only if the UE supports *supportedBandwidthPRS*, *dl-PRS-BufferType*, *durationOfPRS-Processing*, *maxNumOfDL-PRS-ResProcessedPerSlot*. Otherwise, the UE does not include this field. |
| ***supportOfSymbolTimeStampForRSCP***This field, if present, indicates that the target device supports reporting timestamp with OFDM symbol index associated with RSCP measurement. The UE can include this field only if the UE supports one of *nr-DL-PRS-RSCP-ReportingRRC-Connected* and *nr-DL-PRS-RSCP-ReportingRRC-Inactive*. Otherwise, the UE does not include this field. |
| ***supportOfFinerTimingReportGranularityForPRS-Meas***This field, if present, indicates that the target device supports finer timing reporting granularity for DL-PRS measurement. |

*END OF CHANGE*