**GPP TSG-RAN WG4 Meeting # 110 *R4-2403271***

**Athens, GR, 26 February – 01 March, 2024**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **Draft CR** | **Rev** | **-** | **Current version:** | **18.4.0** |  |
|  | | | | | | | | |
| *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 corrections for SL positioning | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos\_enh2-Core | | | | |  | ***Date:*** | | | 2024-02-19 |
|  |  | | | |  | |  | | |  |
| ***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 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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | TBD, square brackets, missing references, missing requirements in SL positioning core requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Different corrections.  Related agreements from RAN4#109:  *Agreements:*   * 1 sample for 1 Tx SL UE is one SL PRS resource within one slot. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | TBD, square brackets, missing references, missing requirements in SL positioning core requirements remain. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | Updated sections:  3.3, 12A.1, 12A,2, 12A.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **Y** |  | Test specifications | | | | TS 38.533 | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | R4-2402800 | | | | | | | | |

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [11] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [11].

AoA Angle of Arrival

AoD Angle of Departure

ATG Air to Ground

BFD Beam Failure Detection

BFD-RS BFD Reference Signal

BLER Block Error Rate

BM-RS Beam Management Reference Signal

BWP Bandwidth Part

CA Carrier Aggregation

CBD Candidate Beam Detection

CBW Channel Bandwidth

CC Component Carrier

CCA Clear Channel Assessment

CG-SDT Configured Grant Small Data Transmisison

CLI Cross Link Interference

CMR Channel Measurement Resource

CORESET Control Resource Set

CP Cyclic Prefix

CSI Channel-State Information

CSI-RS CSI Reference Signal

CSI-RSRP CSI Reference Signal based Reference Signal Received Power

CSI-RSRQ CSI Reference Signal based Reference Signal Received Quality

CSI-SINR CSI Reference Signal based Signal to Noise and Interference Ratio

CSI\_RP Received (linear) average power of the resource elements that carry NR CSI-RS signals and channels, measured at the UE antenna connector

DBT Discovery Burst Transmission

DC Dual Connectivity

DCI Downlink Control Information

DL Downlink

DL-AoD Downlink Angle-of-Departure

DL-TDOA Downlink Time Difference Of Arrival

DMRS Demodulation Reference Signal

DRX Discontinuous Reception

E-CID Enhanced Cell ID

eDRX Extended DRX

E-UTRA Evolved UTRA

E-UTRAN Evolved UTRAN

EMW Effective measurement window

EMWRP Effective measurement window repetition period

EN-DC E-UTRA-NR Dual Connectivity

FDD Frequency Division Duplex

FH Frequency Hopping

FR Frequency Range

GEO Geostationary Earth Orbit

HARQ Hybrid Automatic Repeat Request

HO Handover

GAP Refers to any of Measurement Gap, activated Pre-MG and NCSG

IMR Interference Measurement Resource

L1-RSRP Layer 1 RSRP

L1 SL-RSRP Layer 1 Sidelink RSRP which corresponds to PSCCH-RSRP and/or PSSCH-RSRP

LEO Low Earth Orbit

LMF Location Management Function

LPP LTE Positioning Protocol

LTM L1/L2 triggered mobility

MAC Medium Access Control

MCG Master Cell Group

MDT Minimization of Drive Tests

MG Measurement Gap

MGL Measurement Gap Length

MGRP Measurement Gap Repetition Period

MIB Master Information Block

ML Measurement Length

MN Master Node

MR-DC Multi-Radio Dual Connectivity

MUSIM Multi-Universal Subscriber Identity Module

NCSG Network Controlled Small Gap

NE-DC NR-E-UTRA Dual Connectivity

NGEN-DC NG-RAN E-UTRA-NR Dual Connectivity

NR New Radio

NR-DC NR-NR Dual Connectivity

NTN Non-Terrestrial Network

OFDM Orthogonal Frequency Division Multiplexing

OFDMA Orthogonal Frequency Division Multiple Access

OTDOA Observed Time Difference Of Arrival

PBCH Physical Broadcast Channel

PCC Primary Component Carrier

PCell Primary Cell

PDCCH Physical Downlink Control Channel

PDSCH Physical Downlink Shared Channel

PLMN Public Land Mobile Network

PRACH Physical RACH

Pre-MG Pre-configured Measurement Gap

ProSe Proximity-based Service

PRB Physical Resource Block

PRP PRS Received Power

PRS Positioning Reference Signal

PRS-RSRP Positioning Reference Signal based Reference Signal Received Power

PPW PRS Processing Window

PSBCH Physical Sidelink Broadcast Channel

PSBCH-RSRP Physical Sidelink Broadcast Channel DMRS based Reference Signal Received Power

PSCCH Physical Sidelink Control Channel

PSCCH-RSRP Physical Sidelink Control Channel DMRS based Reference Signal Received Power

PSCell Primary SCell

PSS Primary Synchronization Signal

PSSCH Physical Sidelink Shared Channel

PSSCH-RSRP Physical Sidelink Shared Channel DMRS based Reference Signal Received Power

pTAG Primary Timing Advance Group

PTW Paging Time Window

PUCCH Physical Uplink Control Channel

PUSCH Physical Uplink Shared Channel

QCL Quasi Co-Location

RACH Random Access Channel

RAT Radio Access Technology

RLM Radio Link Monitoring

RLM-RS Reference Signal for RLM

RMSI Remaining Minimum System Information

RRC Radio Resource Control

RRH Remote Radio Head

RRM Radio Resource Management

RSCP Reference Signal Carrier Phase

RSCPD Reference Signal Carrier Phase Difference

RSSI Received Signal Strength Indicator

RSRP Reference Signal Received Power

RSRPP Reference Signal Received Path Power

RSRQ Reference Signal Received Quality

RSTD Reference Signal Time Difference

RTOA Relative Time Of Arrival

RTT Round Trip Time

S-SSB Sidelink Synchronization Signal Block

SCI Sidelink control information

SSB\_RP Received (linear) average power of the resource elements that carry NR SSB signals and channels, measured at the UE antenna connector or radiated interface boundary.

SA Standalone operation mode

SAB Satellite access band

SAN Satellite Access Node

SCC Secondary Component Carrier

SCCH Sidelink Control Channel

SCell Secondary Cell

SCG Secondary Cell Group

SCS Subcarrier Spacing

SCSSSB SSB subcarrier spacing

SDL Supplementary Downlink

SDT Small Data Transmission

SFN System Frame Number

SFTD SFN and Frame Timing DifferenceSI System Information

SIB System Information Block

SL Sidelink

SL AoA Sidelink AoA

SL PRS-RSRP Sidelink PRS-based RSRP

SL PRS-RSRPP Sidelink PRS-based RSRPP

SL RSTD Sidelink RSTD

SL RTOA Sidelink RTOA

SL Rx-Tx Sidelink Receive-Transmit time difference

SL-PRS Sidelink PRS

SL-RSSI Sidelink Received Signal Strength Indicator

SLPP Sidelink Positioning Protocol

SLSS Sidelink Synchronization Signal

SMTC SSB-based Measurement Timing configuration

SpCell Special Cell

SRS Sounding Reference Signal

SRS-RSRP Sounding Reference Signal based Reference Signal Received Power

SS-RSRP Synchronization Signal based Reference Signal Received Power

SS-RSRQ Synchronization Signal based Reference Signal Received Quality

SS-SINR Synchronization Signal based Signal to Noise and Interference Ratio

SSB Synchronization Signal Block

SSB\_RP Received (linear) average power of the resource elements that carry NR SSB signals and channels, measured at the UE antenna connector.

SSS Secondary Synchronization Signal

sTAG Secondary Timing Advance Group

SUL Supplementary Uplink

TA Timing Advance

TAG Timing Advance Group

TCI Transmission Configuration Indicator

TDD Time Division Duplex

TDOA Time Difference Of Arrival

TN Terrestrial Network

TRP Transmission-Reception Point

TTI Transmission Time Interval

U2N UE-to-Network

U2U UE-to-UE

UE User Equipment

UL Uplink

V2X Vehicle-to-Everything service

VIL Visible Interruption Length

VIRP Visible Interruption Repetition Period

VSAT Very Small Aperture Terminal

**--- clauses without change ---**

# 12A NR Sidelink Measurements for Positioning

12A.1 Introduction

Clause 12A contains requirements for UE capable of V2X or 5G ProSe operation, which is also capable of performing SL positioning measurements defined in TS 38.215 [4], including SL RSTD, SL PRS-RSRP, SL Rx-Tx time difference, SL PRS-RSRPP measurements, SL AoA, and SL RTOA, provided that:

- The SL-PRS are received on NR PC5 interface within a single sidelink BWP on a single carrier,

- The UE is in any cell selection state or the UE is inside NG-RAN coverage while configured for SL positioning operation on a sidelink carrier, which is dedicated to only sidelink operation, and configured with only a PCell on WAN carrier, and

- The measuring UE is the location target UE or an anchor UE, and

- The UE is not required to monitor PSCCH, which is associated with SL-PRS in the same slot, outside the SL-DRX active time.

NOTE 1: Any cell selection state refers to a UE that is out of network coverage and is not associated with a serving cell on any carrier as defined in TS 38.304 [1].

NOTE 2: When a UE in RRC\_CONNECTED state is performing transmissions and/or reception for SL positioning operation, the UE shall meet all the requirements specified in Clause 9 assuming that UE has a dedicated RX/TX chain for the sidelink operation. Otherwise, the UE may interrup the SL positioning measurements in order to meet the measurement requirements specified in Clause 9.

Prior to performing SL-PRS based measurements, the target UE may need to perform the discovery procedure to discover anchor UEs according to TS 38.305 [22].

12A.2 SL-RSTD measurements

12A.2.1 Introduction

The requirements in clause 12A.2 apply for SL RSTD measurements of the first and additional paths.

The requirements in clause 12A.2 shall apply provided the UE has received a *RequestLocationInformation* message from LMF or another UE via SLPP [37] requesting the UE to measure and report SL RSTD measurements defined in TS 38.215 [4] based on SL-PRS.

12A.2.2 Requirements Applicability

The requirements in clause 12A.2 apply for periodic, aperiodic, and triggered RSTD measurements, provided:

- SL RSTD related side conditions given in clause TBD for FR1 are fulfilled, for a corresponding Band,

- The measurement capability in Clause 12A.2.3 is not exceeded.

12A.2.3 Measurement Capability

UE SL RSTD measurement capability is as indicated by the UE in:

*SL-TDOA-ProvideCapabilities*, according to TS 38.355 [37],

FG41-1-1.

12A.2.4 Measurement Reporting Requirements

The measurement reporting delay is defined as the time between the moment when the measurement report is triggered and the moment when the UE starts to transmit the measurement report over the air interface.

For UE reporting to LMF, this requirement assumes that the measurement report is not delayed by other SLPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x TTIDCCH where TTIDCCH is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration.

For UE reporting to another UE, this requirement assumes that the measurement report is not delayed by other SLPP signalling on the STCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the transmitted STCH. The delay uncertainty is: 2 x TTISTCH where TTISTCH is the duration of subframe or slot or subslot when the measurement report is transmitted on the PSSCH with subframe or slot or subslot duration.

This measurement reporting delay excludes any delay caused by no SL resources for UE to send the measurement report.

The reported SL RSTD measurement values contained in measurement reports shall be based on the measurement report mapping requirements specified in clauses TBD.

The SL RSTD measurements performed and reported according to this section shall meet the SL RSTD measurement accuracy requirements in clause TBD, for each measured SL-PRS resource.

12A.2.5 Measurements Period Requirements

When the physical layer receives the last of *SL-TDOA-ProvideAssistanceData* and *SL-TDOA-RequestLocationInformation* from LMF or another UE via SLPP [37]*,* the UE shall be able to perform multiple SL RSTD measurements based on SL-PRS from one or more other SL UEs (up to the UE capability specified in Clause 12A.2.3), with each SL RSTD measurement including measurement on the measured target link and the reference link, as defined in TS 38.215 [4], during the measurement period defined as:

,

where

S is the number of samples per measured link, defined below:

= 1 for SL-PRS bandwidth>48 PRBs,

= 4 for SL-PRS bandwidth≤48 PRBs,

is defined for SL-PRS sample *s*, which is received within a slot where the UE receives SCI and the associated SL-PRS within its capabilities [Components 2 and 3 of FG 41-1-1], as:

, for *s*<*S*, where and are the beginning of the first slot of SL-PRS sample *s+1* and SL-PRS sample *s*, respectively,

for *s*=*S*, is the time for completing the last sample of the SL RSTD measurement,

is the SL-PRS duration for SL-PRS sample *s* of the SL RSTD measurement,

is the processing time given by the UE capability in [Components 4 of FG 41-1-1].If the synchronization reference source changes during at the measuring UE or at the UE configured to transmit SL-PRS for the target measured or reference link for the SL RSTD measurement, e.g., known from the UE’s own synchronization source or from *SL-RTD-Info* [37], while the UE is performing the SL RSTD measurement, then the UE shall restart the SL RSTD measurement after the synchronization reference source change.

If the synchronization reference source changes at the measuring UE or at the UE configured to transmit SL-PRS for the target measured or reference link for the SL RSTD measurement, while the measuring UE is performing the SL RSTD measurement, then the measuring UE shall restart the SL RSTD measurement and shall send the measurement report no later than:

,

where K is the number of restarts due to the synchronization source changes.

12A.3 SL-RSRP measurements

12A.3.1 Introduction

The requirements in clause 12A.3 apply for SL PRS-RSRP measurements and for SL PRS-RSRP path measurements of the first and additional paths.

The requirements in clause 12A.3 shall apply provided the UE has received a *RequestLocationInformation* message from LMF or another UE via SLPP [37] requesting the UE to measure and report SL PRS-RSRP measurements defined in TS 38.215 [4] based on SL-PRS.

12A.3.2 Requirements Applicability

The requirements in clause 12A.3 apply for periodic, aperiodic, and triggered SL PRS-RSRP measurements, provided:

- SL PRS-RSRP related side conditions given in clause TBD for FR1 are fulfilled, for a corresponding Band,

- The measurement capability in Clause 12A.3.3 is not exceeded.

12A.3.3 Measurement Capability

UE SL PRS-RSRP measurement capability is as indicated by the UE in:

*SL-TDOA-ProvideCapabilities, SL-RTT-ProvideCapabilities, SL-AOA-ProvideCapabilities,* or *SL-TOA-ProvideCapabilities*, according to TS 38.355 [37],

FG41-1-1.

12A.3.4 Measurement Reporting Requirements

The measurement reporting delay is defined as the time between the moment when the measurement report is triggered and the moment when the UE starts to transmit the measurement report over the air interface.

For UE reporting to LMF, this requirement assumes that the measurement report is not delayed by other SLPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x TTIDCCH where TTIDCCH is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration.

For UE reporting to another UE, this requirement assumes that the measurement report is not delayed by other SLPP signalling on the STCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the transmitted STCH. The delay uncertainty is: 2 x TTISTCH where TTISTCH is the duration of subframe or slot or subslot when the measurement report is transmitted on the PSSCH with subframe or slot or subslot duration.

This measurement reporting delay excludes any delay caused by no SL resources for UE to send the measurement report.

The reported SL PRS-RSRP measurement values contained in measurement reports shall be based on the measurement report mapping requirements specified in clauses TBD.

The SL PRS-RSRP measurements performed and reported according to this section shall meet the SL PRS-RSRP measurement accuracy requirements in clause TBD, for each measured SL-PRS resource.

12A.3.5 Measurements Period Requirements

When the physical layer receives the last of:

- *SL-TDOA-ProvideAssistanceData* and SL*-TDOA-RequestLocationInformation*, or

- *SL-AOA-ProvideAssistanceData* and *SL-AOA-RequestLocationInformation*, or

- *SL-TOA-ProvideAssistanceData* and *SL-TOA-RequestLocationInformation*, or

- *SL-RTT-ProvideAssistanceData* and *SL-RTT-RequestLocationInformation*,

from LMF or another UE via SLPP [37]*,* the UE shall be able to perform multiple SL PRS-RSRP measurements based on SL-PRS from one or more other SL UEs (up to the UE capability specified in Clause 12A.3.3), as defined in TS 38.215 [4], during the measurement period defined as:

,

where

S is the number of samples per measured link, defined below:

= 1 for SL-PRS bandwidth>48 PRBs,

= 4 for SL-PRS bandwidth≤48 PRBs,

is defined for SL-PRS sample *s*, which is received within a slot where the UE receives SCI and the associated SL-PRS within its capabilities [Components 2 and 3 of FG 41-1-1], as:

, for *s*<*S*, where and are the beginning of the first slot of SL-PRS sample *s*+1 and SL-PRS samples *s*, respectively,

for *s*=*S*, is the time for completing the last sample of the SL PRS-RSRP measurement,

is the SL-PRS duration for SL-PRS sample *s* of the SL PRS-RSRP measurement,

is the processing time given by the UE capability in [Components 4 of FG 41-1-1].

If the synchronization reference source changes during at the measuring UE or at the UE configured to transmit SL-PRS for the SL PRS-RSRP measurement, while the measuring UE is performing the SL PRS-RSRP measurement, e.g., known from the UE’s own synchronization source or from *SL-RTD-Info* [37], then the UE shall continue performing the SL PRS-RSRP measurement after the synchronization reference source change, while meeting the measurement period defined in this clause and the accuracy requirements in clause TBD.