**3GPP TSG-RAN2 Meeting #118-e *Draft R2-2206245***

**Online, 9- 20 May, 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **36.305** | **CR** | **0109** | **rev** | **-** | **Current version:** | **17.0.0** |  |
|  | | | | | | | | |
| *For* [***HELP***](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 | **X** | Core Network |  |

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| ***Title:*** | 36.305 CR for Positioning WI | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Intel Corporation | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos\_enh-Core | | | | |  | ***Date:*** | | | 2022-04-25 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | To capture corrections into TS36.305. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | **R2-2204689**  Correct the publishing date of BDS system B3I signal ICD in references clause.  [**R2-2206260**](file:///C:\Users\mtk16923\Documents\3GPP%20Meetings\202205%20-%20RAN2_118-e,%20Online\Extracts\R2-2206260%20%5bAT118-e%5d%5b639%5d%5bPOS%5d%20Collection%20of%20views%20on%20integrity_Ericsson_Rapp.docx) **[AT118-e][639][POS] Collection of views on integrity proposals (Ericsson)**  Proposal 3 (modified) Move the PL definition to TS 38.305/36.305.  Proposal 4 Support appending “protection level and achievable target integrity risk” to 38.305 Section 7.3.4, step 1 paragraph  Proposal 5 (modified) Support the suggested change to Table 8.1.2.1b-1 and equivalent table in 36.305.  [Chair’s note: This proposal refers to the changes as amended by Swift in the email discussion; see the report for full changes] | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Error remains in TS36.305. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 3.1 3.2, | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.271: "Functional stage 2 description of Location Services (LCS)"

[3] 3GPP TS 22.071: "Location Services (LCS); Service description, Stage 1".

[4] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".

[5] 3GPP TS 36.306: "Evolved Universal Terrestrial Radio Access (E-UTRA); "User Equipment (UE) radio access capabilities".

[6] IS-GPS-200, Revision D, Navstar GPS Space Segment/Navigation User Interfaces, March 7th, 2006.

[7] IS-GPS-705, Navstar GPS Space Segment/User Segment L5 Interfaces, September 22, 2005.

[8] IS-GPS-800, Navstar GPS Space Segment/User Segment L1C Interfaces, September 4, 2008.

[9] Galileo OS Signal in Space ICD (OS SIS ICD), Draft 0, Galileo Joint Undertaking, May 23rd, 2006.

[10] Global Navigation Satellite System GLONASS Interface Control Document, Version 5, 2002.

[11] IS-QZSS, Quasi Zenith Satellite System Navigation Service Interface Specifications for QZSS, Ver.1.0, June 17, 2008.

[12] Specification for the Wide Area Augmentation System (WAAS), US Department of Transportation, Federal Aviation Administration, DTFA01-96-C-00025, 2001.

[13] RTCM 10402.3, RTCM Recommended Standards for Differential GNSS Service (v.2.3), August 20, 2001.

[14] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); "Radio Resource Control (RRC); Protocol specification".

[15] 3GPP TS 25.331: " Radio Resource Control (RRC); Protocol Specification".

[16] 3GPP TS 44.031: "Location Services (LCS); Mobile Station (MS) - Serving Mobile Location Centre (SMLC) Radio Resource LCS Protocol (RRLP)".

[17] OMA-AD-SUPL-V2\_0: "Secure User Plane Location Architecture Approved Version 2.0".

[18] OMA-TS-ULP-V2\_0\_6: "UserPlane Location Protocol Approved Version 2.0.6".

[19] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[20] 3GPP TS 36.214: "Evolved Universal Terrestrial Radio Access (E-UTRA); "Physical layer – Measurements".

[21] 3GPP TS 36.302: "Evolved Universal Terrestrial Radio Access (E-UTRA); "Services provided by the physical layer ".

[22] 3GPP TS 25.305: "Stage 2 functional specification of User Equipment (UE) positioning in UTRAN".

[23] 3GPP TS 43.059: "Functional stage 2 description of Location Services in GERAN".

[24] 3GPP TR 23.891: "Evaluation of LCS Control Plane Solutions for EPS".

[25] 3GPP TS 36.355: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol (LPP)".

[26] 3GPP TS 24.171: "Control Plane Location Services (LCS) procedures in the Evolved Packet System (EPS)".

[27] 3GPP TS 29.171: "Location Services (LCS); LCS Application Protocol (LCS-AP) between the Mobile Management Entity (MME) and Evolved Serving Mobile Location Centre (E-SMLC); SLs interface".

[28] BDS-SIS-ICD-B1I-3.0: "BeiDou Navigation Satellite System Signal In Space Interface Control Document Open Service Signal B1I (Version 3.0)", February, 2019.

[29] IEEE 802.11: "Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications".

[30] Bluetooth Special Interest Group: "Bluetooth Core Specification v4.2", December 2014.

[31] ATIS-0500027: "Recommendations for Establishing Wide Scale Indoor Location Performance", May 2015.

[32] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical channels and modulation".

[33] RTCM 10403.3, RTCM Recommended Standards for Differential GNSS Services (v.3.3), October 7, 2016.

[34] BDS-SIS-ICD-B1C-1.0: "BeiDou Navigation Satellite System Signal In Space Interface Control Document Open Service Signal B1C (Version 1.0)", December, 2017.

[35] IRNSS Signal-In-Space (SPS) Interface Control Document (ICD) for standard positioning service version 1.1, August 2017.

[36] IS-QZSS-L6-001, Quasi-Zenith Satellite System Interface Specification – Centimetre Level Augmentation Service, Cabinet Office, November 5, 2018.

[37] BDS-SIS-ICD-B3I-1.0: "BeiDou Navigation Satellite System Signal In Space Interface Control Document Open Service Signal B3I (Version 1.0)", February, 2018.

[38] BDS-SIS-ICD-B2a-1.0: "BeiDou Navigation Satellite System Signal In Space Interface Control Document Open Service Signal B2a (Version 1.0)", December, 2017.

[39] 3GPP TS 37.355: "Technical Specification Group Radio Access Network; LTE Positioning Protocol (LPP)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] apply.

As used in this document, the suffixes "-based" and "-assisted" refer respectively to the node that is responsible for making the positioning calculation (and which may also provide measurements) and a node that provides measurements (but which does not make the positioning calculation). Thus, an operation in which measurements are provided by the UE to the E-SMLC to be used in the computation of a position estimate is described as "UE-assisted" (and could also be called "E-SMLC-based"), while one in which the UE computes its own position is described as "UE-based".

Both standalone LMU and LMU integrated into an eNB are supported. As used in this document, LMU refers to both cases of a standalone LMU and an LMU integrated into an eNodeB unless explicitly mentioned otherwise.

**Positioning integrity**: A measure of the trust in the accuracy of the position-related data and the ability to provide associated alerts.

**Protection Level (PL):** A statistical upper-bound of the Positioning Error (PE) that ensures that, the probability per unit of time of the true error being greater than the AL and the PL being less than or equal to the AL, for longer than the TTA, is less than the required TIR, i.e., the PL satisfies the following inequality:   
 *Prob per unit of time* [((*PE>AL*) & (*PL<=AL*)) *for longer than TTA*] *< required TIR*  
When the PL bounds the positioning error in the horizontal plane or on the vertical axis then it is called Horizontal Protection Level (HPL) or Vertical Protection Level (VPL) respectively.  
A specific equation for the PL is not specified as this is implementation-defined. For the PL to be considered valid, it must simply satisfy the inequality above.

**State Space Representation (SSR)**: The state space representation provides information on the status of individual GNSS error sources. State parameter values are transmitted to UE. The user corrects his own observations of a single GNSS receiver with SSR corrections computed from these state parameters for his individual position, and performs RTK positioning with corrected observations. This contrasts with Observation Space Representation (OSR) which uses a lump-sum of distance-dependent GNSS errors instead of individual GNSS error sources. For OSR the representation of RTK network corrections in the observation space always uses GNSS observation of an actual reference station, which are then applied by the user to the conventional RTK algorithm.

**Transmission Point (TP)**: A set of geographically co-located transmit antennas for one cell, part of one cell or one PRS-only TP. Transmission Points can include base station (eNode B) antennas, remote radio heads, a remote antenna of a base station, an antenna of a PRS-only TP, etc. One cell can be formed by one or multiple transmission points. For a homogeneous deployment, each transmission point may correspond to one cell.

**PRS-only TP**: A TP which only transmits PRS signals for PRS-based TBS positioning and is not associated with a cell.

**Positioning integrity**: A measure of the trust in the accuracy of the position-related data and the ability to provide associated alerts.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply.

ADR Accumulated Delta Range

AoA Angle of Arrival

AP Access Point

ARP Antenna Reference Point

BDS BeiDou Navigation Satellite System

BSSID Basic Service Set Identifier

CID Cell-ID (positioning method)

CIoT Cellular IoT

CLAS Centimeter Level Augmentation Service

E-SMLC Enhanced Serving Mobile Location Centre

E-CID Enhanced Cell-ID (positioning method)

ECEF Earth-Centered, Earth-Fixed

ECI Earth-Centered-Inertial

EGNOS European Geostationary Navigation Overlay Service

E-UTRAN Evolved Universal Terrestrial Radio Access Network

FDMA Frequency Division Multiple Access

FKP Flächenkorrekturparameter (Engl: Area Correction Parameters)

GAGAN GPS Aided Geo Augmented Navigation

GLONASS GLObal'naya NAvigatsionnaya Sputnikovaya Sistema (Engl.: Global Navigation Satellite System)

GMLC Gateway Mobile Location Center

GNSS Global Navigation Satellite System

GPS Global Positioning System

GRS80 Geodetic Reference System 1980

HESSID Homogeneous Extended Service Set Identifier

IoT Internet of Things

LCS LoCation Services

LCS-AP LCS Application Protocol

LMU Location Measurement Unit

LPP LTE Positioning Protocol

LPPa LTE Positioning Protocol Annex

MAC Master Auxiliary Concept

MBS Metropolitan Beacon System

MO-LR Mobile Originated Location Request

MT-LR Mobile Terminated Location Request

NavIC NAVigation with Indian Constellation

NB-IoT NarrowBand Internet of Things

NI-LR Network Induced Location Request

N-RTK Network – Real-Time Kinematic

OTDOA Observed Time Difference Of Arrival

PDU Protocol Data Unit

posSIB Positioning SIB

PPP Precise Point Positioning

PPP-RTK Precise Point Positioning – Real-Time Kinematic

PRS Positioning Reference Signal

QZSS Quasi-Zenith Satellite System

RRM Radio Resource Management

RSSI Received Signal Strength Indicator

RTK Real-Time Kinematic

SBAS Space Based Augmentation System

SET SUPL Enabled Terminal

SIB System Information Block

SLP SUPL Location Platform

SSID Service Set Identifier

SSR State Space Representation

STEC Slant TEC

SUPL Secure User Plane Location

TADV Timing Advance

TBS Terrestrial Beacon System

TEC Total Electron Content

TP Transmission Point

UE User Equipment

URA User Range Accuracy

UTDOA Uplink Time Difference of Arrival

WAAS Wide Area Augmentation System

WGS-84 World Geodetic System 1984

WLAN Wireless Local Area Network

/\*\*\*Skip unrelated parts\*\*\*/

8.1.2.1b Mapping of integrity parameters

Table 8.1.2.1b-1 shows the mapping between the integrity fields and the SSR assistance data according to the Integrity Principle of Operation (Clause 8.1.1a). The corresponding field descriptions for each of the field names listed in Table 8.1.2.1b-1 are specified under Clause 6.5.2.2 of TS 37.355 [39].

**Table 8.1.2.1b-1: Mapping of Integrity Parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Error** | **GNSS Assistance Data** | **Integrity Fields** | | | | |
| **Integrity Alerts** | **Integrity Bounds (Mean)** | **Integrity Bounds (StdDev)** | **Residual Risks** | **Integrity Correlation Times** |
| Orbit | SSR Orbit Corrections | Real-Time Integrity  (see Clause 8.1.2.1.8) | Mean Orbit Error  Mean Orbit Rate Error  (Calculated according to Equation 8.1.2.1.21-1) | Variance Orbit Error  Variance Orbit Rate Error  (Calculated according to Equation 8.1.2.1.21-1) | Probability of Onset of Constellation Fault  Probability of Onset of Satellite Fault  Mean Constellation Fault Duration  Mean Satellite Fault Duration | Orbit Range Error Correlation Time  Orbit Range Rate Error Correlation Time |
| Clock | SSR Clock Corrections | Mean Clock Error | Standard Deviation Clock Error  Standard Deviation Clock Rate Error | Clock Range Error Correlation Time  Clock Range Rate Error Correlation Time |
| Code Bias | SSR Code Bias | Mean Code Bias Error  Mean Code Bias Rate Error | Standard Deviation Code Bias Error  Standard Deviation Code Bias Rate Error |  |
| Phase Bias | SSR Phase Bias | Mean Phase Bias Error  Mean Phase Bias Rate Error | Standard Deviation Phase Bias Error  Standard Deviation Phase Bias Rate Error |
| Ionosphere | SSR STEC Correction | Ionosphere DNU | Mean Ionospherre Error  Mean Ionospherre Rate Error | Standard Deviation Ionosphere Error  Standard Deviation Ionosphere Rate Error | Probability of Onset of Ionosphere Fault  Mean Ionosphere Fault Duration | Ionosphere Range Error Correlation Time  Ionosphere Range Rate Error Correlation Time |
| Troposphere Vertical Hydro Static Delay | SSR Gridded Corrections | Troposphere DNU | Mean Troposphere Vertical Hydro Static Delay Error  Mean Troposphere Vertical Hydro Static Delay Rate Error | Standard Deviation Troposphere Vertical Hydro Static Delay Error  Standard Deviation Troposphere Vertical Hydro Static Delay Rate Error | Probability of Onset of Troposphere Fault  Mean Troposphere Fault Duration | Troposphere Range Error Correlation Time  Troposphere Range Rate Error Correlation Time |
| TroposphereVertical WetDelay | Mean Troposphere Vertical Wet Delay Error  Mean Troposphere Vertical Wet Delay Rate Error | Standard Deviation Troposphere Vertical Wet Delay Error  Standard Deviation Troposphere Vertical Wet Delay Rate Error |