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Universal Mobile Telecommunications System (UMTS);
UTRAN Iupc interface Positioning Calculation Application Part (PCAP) signalling
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Contents

Foreword

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1 Scope

The present document specifies the *Positioning Calculation Application Part (PCAP)* between the Radio Network Controller (RNC) and the Stand-Alone SMLC (SAS). It fulfills the RNC-SAS communication requirements specified in [6] and thus defines the Iupc interface and its associated signaling procedures.

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 TS 25.450: "UTRAN Iupc interface general aspects and principles".

[2] 3GPP TS 25.451: "UTRAN Iupc interface layer 1".

[3] 3GPP TS 25.452: "UTRAN Iupc interface signalling transport".

[4] 3GPP TS 25.331: "Radio Resource Control (RRC) Protocol Specification".

[5] 3GPP TS 25.401: "UTRAN Overall Description".

[6] 3GPP TS 25.305: "Stage 2 functional specification of UE positioning in UTRAN".

[7] ITU-T Recommendation X.680 (07/2002): "Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation".

[8] ITU-T Recommendation X.681 07/2002): "Information technology - Abstract Syntax Notation One (ASN.1): Information object specification".

[9] ITU-T Recommendation X.691 (07/2002): "Information technology - ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)".

[10] ICD-GPS-200: (12 April 2000) "Navstar GPS Space Segment/Navigation User Interface".

[11] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".

[12] 3GPP TR 25.921: "Guidelines and principles for protocol description and error handling".

[13] 3GPP TS 25.133: "Requirements for support of Radio Resource management (FDD)".

[14] 3GPP TS 25.123: "Requirements for support of Radio Resource management (TDD)".

[15] 3GPP TS 22.071: "Location Services (LCS); Service Description; Stage1".

[16] 3GPP TS 25.212: "Multiplexing and Channel Coding (FDD)".

[17] 3GPP TS 25.213: "Spreading and Modulation (FDD)".

[18] 3GPP TS 25.223: "Spreading and Modulation (TDD)".

[19] 3GPP TS 25.221: "Physical channels and mapping of transport channels onto physical channels (TDD)".

[20] 3GPP TS 25.101: "User Equipment (UE) radio transmission and reception (FDD)".

[21] 3GPP TS 25.102: "UE radio transmission and reception (TDD)".

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

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

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

[25] IS-GPS-800, Navstar GPS Space Segment/User Segment L1C Interfaces, March 31, 2008.

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

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

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

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Stand-Alone SMLC (SAS): logical node that interconnects to the RNC over the Iupc interface via the PCAP protocol. An SAS performs the following procedures:

- provide GNSS (i.e. GPS or GANSS (e.g. Galileo)) related data to the RNC;
- performs the position calculation function based upon UE Positioning measurement data;
- in SAS centric mode, selects the positioning method and controls the positioning procedure.

Elementary Procedure: PCAP consists of Elementary Procedures (EPs).
An Elementary Procedure is a unit of interaction between the RNC and the SAS. An EP consists of an initiating message and possibly a response message. Two kinds of EPs are used:

- **Class 1:** Elementary Procedures with response (success or failure).
- **Class 2:** Elementary Procedures without response.

For Class 1 EPs, the types of responses can be as follows:

Successful:

- A signalling message explicitly indicates that the elementary procedure successfully completed with the receipt of the response.

Unsuccessful:

- A signalling message explicitly indicates that the EP failed.

Class 2 EPs are considered always successful.

Information Exchange Context: Information Exchange Context is created by the first Information Exchange Initiation Procedure initiated by the RNC and requested from the SAS.
The Information Exchange Context is deleted after the Information Exchange Termination or the Information Exchange Failure procedure when there is no more Information Exchange to be provided by the RNC to the SAS. The Information

Exchange Context is identified by an SCCP connection as, for Information Exchanges, only the connection oriented mode of the signalling bearer is used.

Positioning Initiation Context: In the SAS centric mode of operation each positioning request is assigned a unique logical connection identity, i.e., SCCP Source and Destination Local Reference numbers.

RNC Centric Mode of Operation: The RNC determines, initiates and controls the positioning method to be used for each positioning request.

SAS Centric Mode of Operation: The SAS determines, initiates and controls the positioning method to be used for each positioning request.

Positioning Event: The activity associated with the positioning of a UE resulting from the reception of UE positioning request from the CN.

3.2 Abbreviations

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

A-GANSS	Assisted GANSS
A-GPS	Assisted GPS
ASN.1	Abstract Syntax Notation One
CN	Core Network
CRNC	Controlling RNC
DGANSS	Differential GANSS
DGPS	Differential GPS
ECEF	Earth-Centered, Earth-Fixed
ECI	Earth-Centered-Inertial
EGNOS	European Geostationary Navigation Overlay Service
EP	Elementary Procedure
FDD	Frequency Division Duplex
GAGAN	GPS Aided Geo Augmented NavigationGANSS Galileo and Additional Navigation Satellite Systems
GLONASS	GLObal'naya NAvigatsionnaya Sputnikovaya Sistema (Engl.: Global Navigation Satellite System)
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
ICD	Interface Control Document
MSAS	Multi-functional Satellite Augmentation System
MSC	Mobile services Switching Center
OTDOA	Observed Time Difference Of Arrival
PCAP	Positioning Calculation Application Part
PRC	Pseudorange Correction
PRN	Pseudo-Random Noise
QZSS	Quasi-Zenith Satellite System
RNC	Radio Network Controller
RNS	Radio Network Subsystem
RRC	Radio Resource Control
SAS	Stand-Alone SMLC
SBAS	Satellite Based Augmentation System
SCCP	Signalling Connection Control Part
SIB	System Information Block
SMLC	Serving Mobile Location Center
SRNC	Serving RNC
SRNS	Serving RNS
SV	Space Vehicle
TDD	Time Division Duplex
TOD	Time of Day
TOW	Time of Week
UE	User Equipment
UTC	Universal Coordinated Time
U-TDOA	Uplink Time Difference Of Arrival
UTRAN	Universal Terrestrial Radio Access Network

WAAS Wide Area Augmentation System
WGS-84 World Geodetic System 1984

4 General

4.1 Procedure Specification Principles

The principle for specifying the procedure logic is to specify the functional behaviour of the SAS exactly and completely. The RNC functional behaviour is left unspecified.

The following specification principles have been applied for the procedure text in clause 8:

- The procedure text discriminates between:

  1) Functionality which "shall" be executed:

     - The procedure text indicates that the receiving node "shall" perform a certain function Y under a certain condition. If the receiving node supports procedure X but cannot perform functionality Y requested in the REQUEST message of a Class 1 EP, the receiving node shall respond with the message used to report unsuccessful outcome for this procedure, containing an appropriate cause value.

  2) Functionality which "shall, if supported" be executed:

     - The procedure text indicates that the receiving node "shall, if supported," perform a certain function Y under a certain condition. If the receiving node supports procedure X, but does not support functionality Y, the receiving node shall proceed with the execution of the EP, possibly informing the requesting node about the not supported functionality.

- Any required inclusion of an optional IE in a response message is explicitly indicated in the procedure text. If the procedure text does not explicitly indicate that an optional IE shall be included in a response message, the optional IE shall not be included.

4.2 Forwards and Backwards Compatibility

The forwards and backwards compatibility of the protocol is assured by mechanism where all current and future messages, and IEs or groups of related IEs, include Id and criticality fields that are coded in a standard format that will not be changed in the future. These parts can always be decoded regardless of the standard version.

4.3 Specification Notations

For the purposes of the present document, the following notations apply:

[FDD] This tagging of a word indicates that the word preceding the tag "[FDD]" applies only to FDD. This tagging of a heading indicates that the heading preceding the tag "[FDD]" and the section following the heading applies only to FDD.

[TDD] This tagging of a word indicates that the word preceding the tag "[TDD]" applies only to TDD, including 3.84Mcps TDD, 7.68Mcps TDD and 1.28Mcps TDD. This tagging of a heading indicates that the heading preceding the tag "[TDD]" and the section following the heading applies only to TDD, including 3.84Mcps TDD, 7.68Mcps TDD and 1.28Mcps TDD.

[3.84Mcps TDD] This tagging of a word indicates that the word preceding the tag "[3.84Mcps TDD]" applies only to 3.84Mcps TDD. This tagging of a heading indicates that the heading preceding the tag "[3.84Mcps TDD]" and the section following the heading applies only to 3.84Mcps TDD.

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