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Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Radio Access Network;
Evolved Universal Terrestrial Radio Access Network
(E-UTRAN);
SLm interface general aspects and principles
(Release 11)

3GPP

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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document is an introduction to the 3GPP TS 36.45x series of technical specifications that define the SLm interface for the interconnection of the Evolved Serving Mobile Location Centre (E-SMLC) to the Location Measurement Unit (LMU) components of the Evolved Universal Terrestrial Radio Access Network (E-UTRAN).

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 36.305: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Architecture description".

[3] 3GPP TS 36.457: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); SLm interface layer 1".

[4] 3GPP TS 36.458: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); SLm interface signalling transport".

[5] 3GPP TS 36.459: "Evolved Universal Terrestrial Access (E-UTRA); SLm interface Application Protocol (SLmAP)".

[6] IETF RFC 4960 (2007-09): "Stream Control Transmission Protocol".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

3.2 Symbols

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

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] 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 [1].

E-SMLC	E-UTRAN Serving Mobile Location Centre
eNB	E-UTRAN Node B

EPC   Evolved Packet Core
EPS   Evolved Packet System
E-UTRAN   Evolved UTRAN
IP   Internet Protocol
LMU   Location Measurement Unit
LTE   Long Term Evolution
MME   Mobility Management Entity
O&M   Operation and Maintenance
QoS   Quality of Service
RNL   Radio Network Layer
SLm   SLm Control Plane Interface
SLmAP   SLm Application Protocol
SAP   Service Access Point
SCTP   Stream Control Transmission Protocol
TNL   Transport Network Layer
UTDOA   Uplink Time Difference of Arrival

3.4   Specification notations

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

Procedure   When referring to a procedure in the specification the Procedure Name is written with the first
                letters in each word in upper case characters followed by the word "procedure", e.g. Radio
                Network Layer procedures.

Message   When referring to a message in the specification the MESSAGE NAME is written with all letters
                in upper case characters followed by the word "message", e.g. RADIO LINK SETUP REQUEST
                message.

4   General aspects

4.1   E-UTRAN UTDOA architecture

The E-UTRAN is layered into a Radio Network Layer (RNL) and a Transport Network Layer (TNL). The E-UTRAN
architecture, i.e. the E-UTRAN logical nodes and interfaces between them, are defined as part of the Radio Network
Layer.

The overall architecture for UE positioning is described in TS 36.305 [2]. The E-UTRAN network based positioning
architecture consists of a set of LMUs (either standalone or eNB-integrated LMUs as described in TS 36.305 [2])
contained in the E-UTRAN connected to the E-SMLC in the EPC through the SLm.

This subclause specifies only the architecture of the SLm interface, and shall not constrain the network architecture of
either core or radio access networks.

The SLm interface is specified at the boundary between the LMUs and the E-SMLC. Figure 1 depicts the logical
division of the SLm interface. From the SLm perspective, the E-UTRAN access point is an LMU, and the EPC access
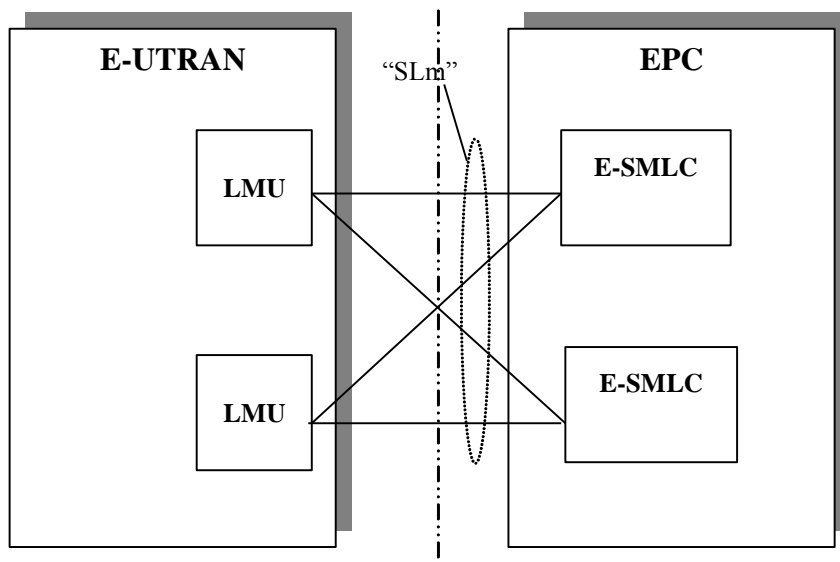point is the E-SMLC.

Figure1 SLm Interface architecture

The E-UTRAN may thus have several SLm access points towards the EPC. As a minimum, each SLm access point (in E-UTRAN or EPC) shall independently fulfil the requirements of the relevant SLm specifications (36.x1x series - see clause 7).

SLm is a logical interface.

There is only one SLm logical interface between an LMU and a given E-SMLC. However, an LMU can be connected to multiple E-SMLCs using different logical SLm interfaces.

4.2 SLm interface general principles

The general principles for the specification of the SLm interface are as follows:

- the SLm interface should be open;

- the SLm interface shall support the exchange of signalling information between the LMU and E-SMLC;

- from a logical standpoint, the SLm is a point-to-point interface between an LMU within the E-UTRAN and an E-SMLC in the EPC. A point-to-point logical interface should be feasible even in the absence of a physical direct connection between the LMU and E-SMLC.

4.3 SLm interface specification objectives

The SLm interface specification shall facilitate the following:

- inter-connection of E-SMLCs with LMUs supplied by different manufacturers;

- separation of SLm interface Radio Network functionality and Transport Network functionality to facilitate introduction of future technology.

4.4 SLm interface capabilities

The SLm interface supports:

- procedures to establish, maintain and release connections between the E-SMLC and LMUs;

- the separation of each LMU on the protocol level for specific signalling management;

- location services by transferring location requests from the E-SMLC to LMUs, and UL RTOA measurements from LMUs to E-SMLC;

4.5 SLm interface characteristics

4.5.1 Use of SCTP

The SCTP (IETF RFC 4960 [7]) is used to support the exchange of SLm Application Protocol (SLmAP) signalling messages between an LMU and an E-SMLC.

5 Functions of the SLm interface protocol

5.1 General

The following sections describe the functions to fulfil the SLm interface capabilities.

5.2 SLm link management function

The SLm signalling link management function provides a reliable transfer of the signalling between LMU and E-SMLC.

5.3 SLm interface management function

The error indication function is used by the LMU (respectively the E-SMLC) to indicate to the E-SMLC (respectively the LMU) that a logical error has occurred.

The reset procedure is used to initialize the peer entity after node setup and after a failure event has occurred. This procedure can be initiated by the E-SMLC or the LMU. The information about the LMU capabilities after a reset is preserved in the E-SMLC.

The SLm Setup procedure allows the exchange of application level data, e.g. capability, needed for the LMU and E-SMLC to interoperate correctly on the SLm interface. This procedure is originated by the LMU only and initiates the setup of the SLmAP contexts to the E-SMLC.

5.4 SLm location function

The location function is used by the E-SMLC to request the LMU to perform UL RTOA measurements. The LMU reports UL RTOA measurements back to the requesting E-SMLC.

6 SLm interface protocol structure

Editor's Note: Protocol Structure following the structure defined in TS 36.305 [2].

6.1 General

The network signalling over SLm consists of the SLm Application Protocol (SLmAP). The SLmAP consists of mechanisms to handle all procedures between the E-SMLC in the EPC and LMUs in the E-UTRAN.

Over the SLm interface the SLmAP protocol is, e.g., used to:

-   Request LMUs to perform UL RTOA measurements of target UE SRS transmissions.

-   Transfer of completed UL RTOA measurements from the LMU to the E-SMLC.

6.2 SLmAP

Figure 6.1 shows the protocol structure for SLmAP, following the structure described in TS 36.305 [2].
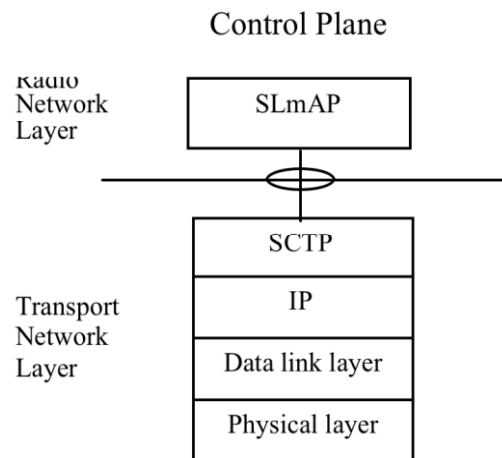

Figure 6.1: Interface protocol structure for SLmAP

The Transport Network Layer is based on IP transport, comprising SCTP on top of IP.

7 Other SLm interface specifications

Editor's Note: Description of the other related specifications.

7.1 E-UTRAN SLm interface: layer 1 (3GPP TS 36.457)

3GPP TS 36.457 [3] specifies the physical layer technologies that may be used to support the SLm interface.

7.2 E-UTRAN SLm interface: signalling transport (3GPP TS 36.458)

3GPP TS 36.458 [4] specifies the signalling bearers for the SLmAP for the SLm interface.

7.3 E-UTRAN SLm Interface: SLmAP Specification (3GPP TS 36.459)

3GPP TS 36.459 [5] specifies the SLmAP for radio network control plane signalling over the SLm interface.

Annex A (informative): Change history

Change history						
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	New
2012-12	58	RP-121766			Approved in RAN#58 and put under change control	11.0.0