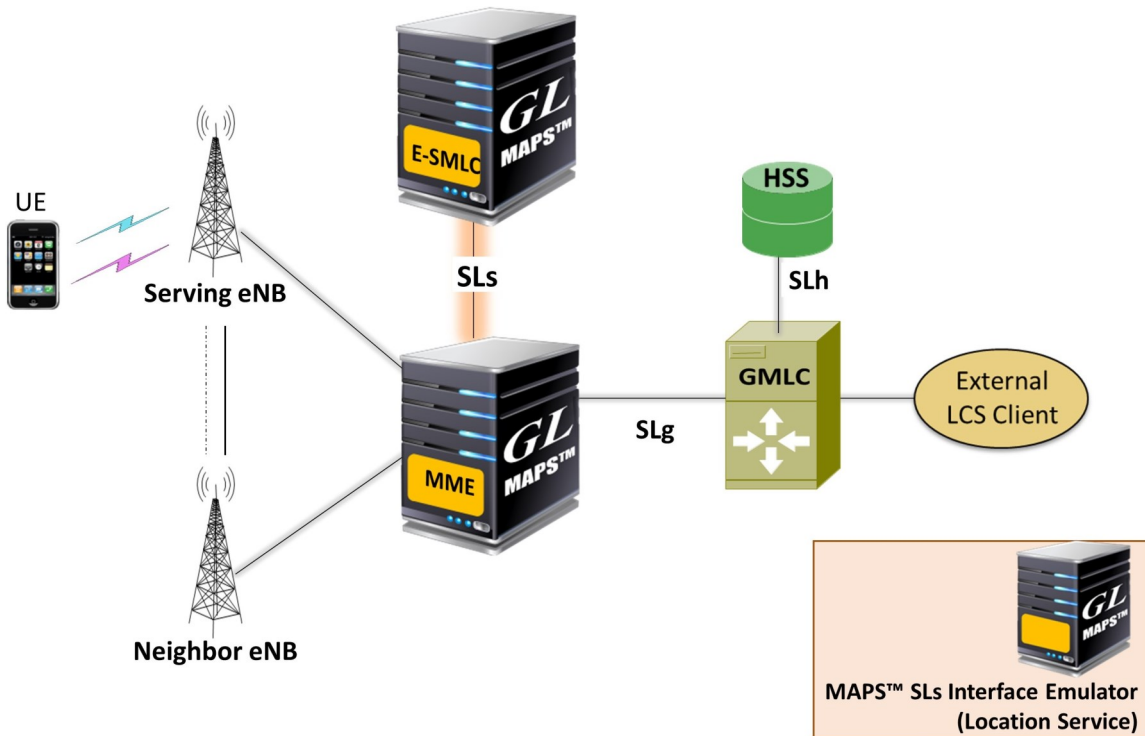# MAPS™ LTE SLs Interface Emulator

(Location Services Application Protocol (LCS-AP))

Overview

The figure above shows the architecture applicable to the positioning of a UE with E-UTRAN access. The SLs interface is used to convey LCS-AP (LCS Application Protocol) messages and parameters between the MME to the E-SMLC. It is also used for tunneling LTE Positioning Protocols (LPP between the E-SMLC and the target UE), which is transparent to the MME as described in 3GPP TS 36.305.

MAPS™ SLs emulator supports LCS AP protocol messages and LPP payload protocols required for simulating E-SMLC and MME network elements over SLs interface. MAPS™ SLs emulator supports UE based positioning method (A-GNSS) in LTE network.

MAPS™ SLs emulator supports simulation of location service procedures between E-SMLC and MME using UE based A-GNSS positioning method, thus testing either or both entities for all probable scenarios.

MAPS™ E-SMLC interacts with real-time MME requesting the current location of a subscriber by initiating LPP location requests on LCSAP sessions.

For more information, please visit MAPS™ LTE SLs Interface Emulator webpage.

Main Features

- Useful tool to simulate Location services procedures over SLs interface
- Emulator can be configured as MME, E-SMLC nodes and study the call flow and exchange of signaling messages between any of these nodes
- User-friendly GUI for generating hundreds of UE Signaling (Load Testing) over SCTP transport
- Ready scripts for LCS-AP and LPP procedures –
  - Location Service Request
  - Location Information Exchange
    ⇒ Request Capabilities (E-SMLC -> UE)
    ⇒ Provide Capabilities (UE -> E-SMLC)
    ⇒ Request Location Information (E-SMLC -> UE)
    ⇒ Provide Location Information (UE -> E-SMLC)
    ⇒ LPP Abort
    ⇒ LPP Error
    ⇒ LPP Ack
  - Location Abort procedure
  - Reset procedure
- Provides protocol trace with full message decoding of the LCS-AP and LPP messages

Testbed Configuration

The testbed setup window allows users to setup the required test environment with SCTP configuration for SLs interface.

SCTP Configuration parameters consists of source / destination IP address, port configurations to simulate MME and E-SMLC entities in SLs interface. MAPS™ can then generate and receive LCS-AP messages to/from valid IP Address in the LTE network. End user configuration profile used to configure MAPS™ LTE SLs with supported E-SMLC and MME parameters.
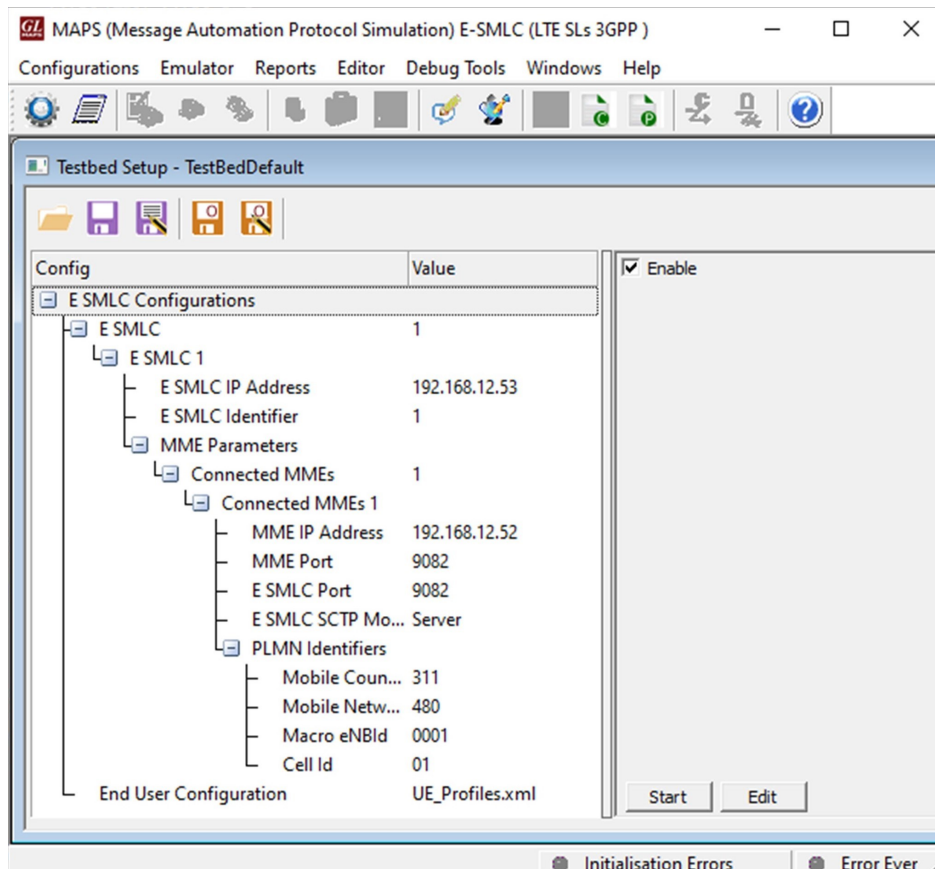

Figure: Testbed Setup

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Pre-processing Tools

Message Editor

With message editor, users can build a template for each protocol message type. The value for each field may be changed in the message template prior to testing. The protocol fields comprises of mandatory fixed parameters, mandatory variable parameters, & optional variable parameters.
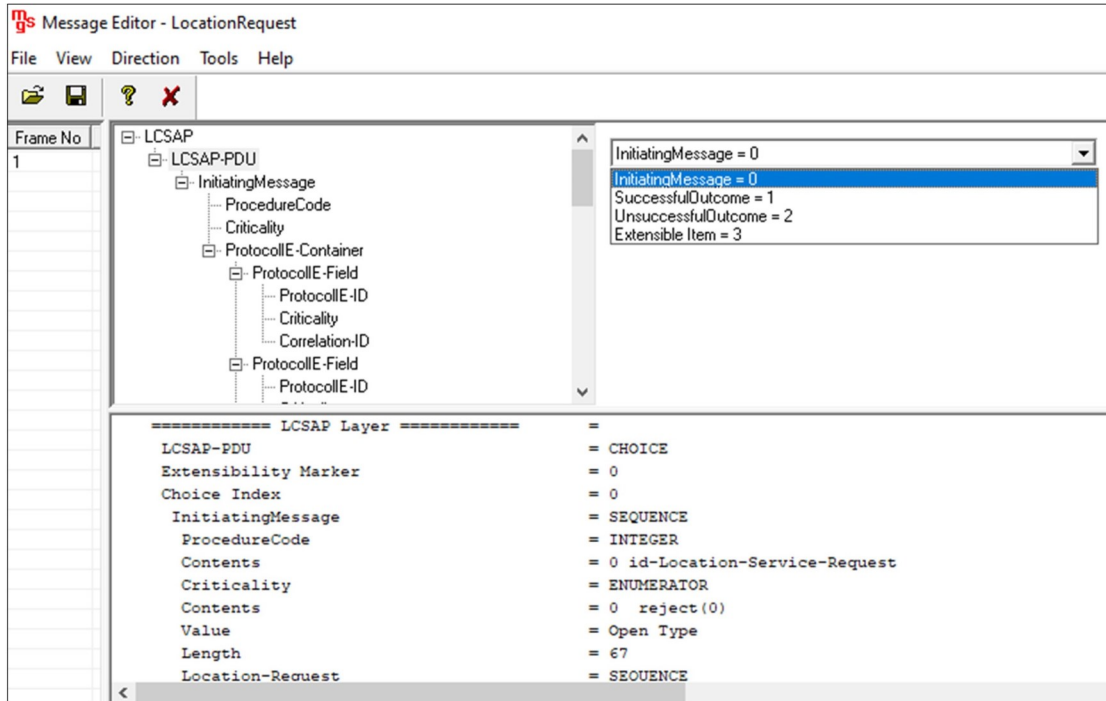

Figure: Message Editor

Script Editor

The script editor allows the user to create / edit scripts and access protocol fields as variables for the message template parameters. The script uses pre-defined message templates to perform send and receive actions.
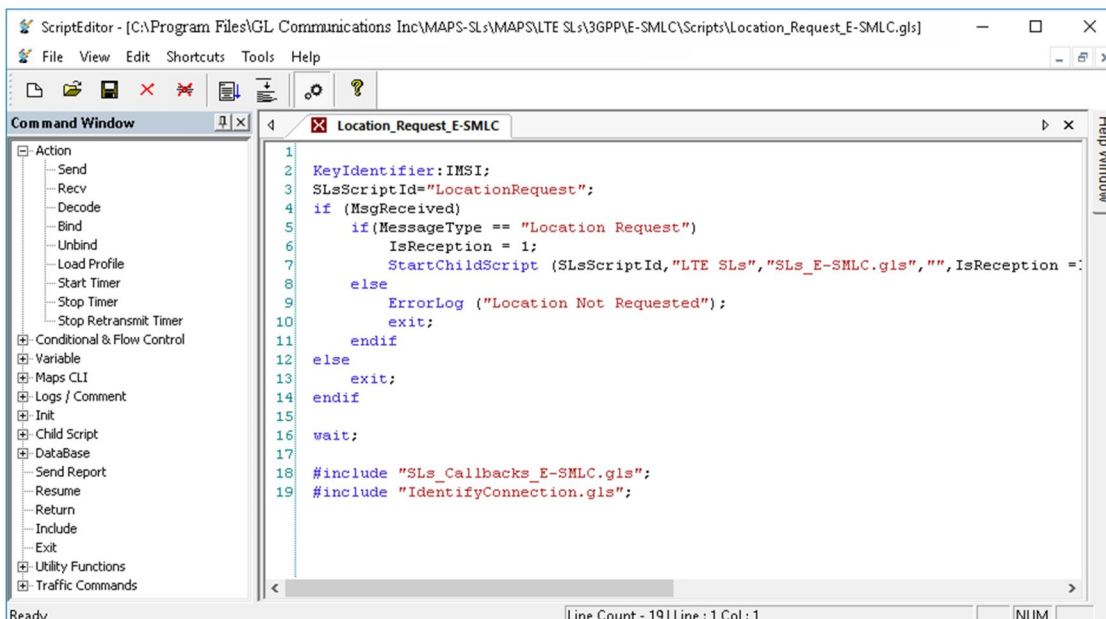

Figure: Script Editor

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Pre-processing Tools *(Contd.)*

Profile Editor

This feature allows loading profile to edit the values of the variables using GUI, replacing the original value of the variables in the message template. An XML file defines a set of multiple profiles with varying parameter values that allow users to configure call instances in call generation and to receive calls.

Includes Location services transactions parameters such as originating LPP and AGNSS Request Capabilities, LPP Request Location Information, LCS Client type, LCS QOS, Location Estimate, geographical shapes of the location estimate, Positioning Method, and other related configurations required for LCS-AP, and LPP simulation.
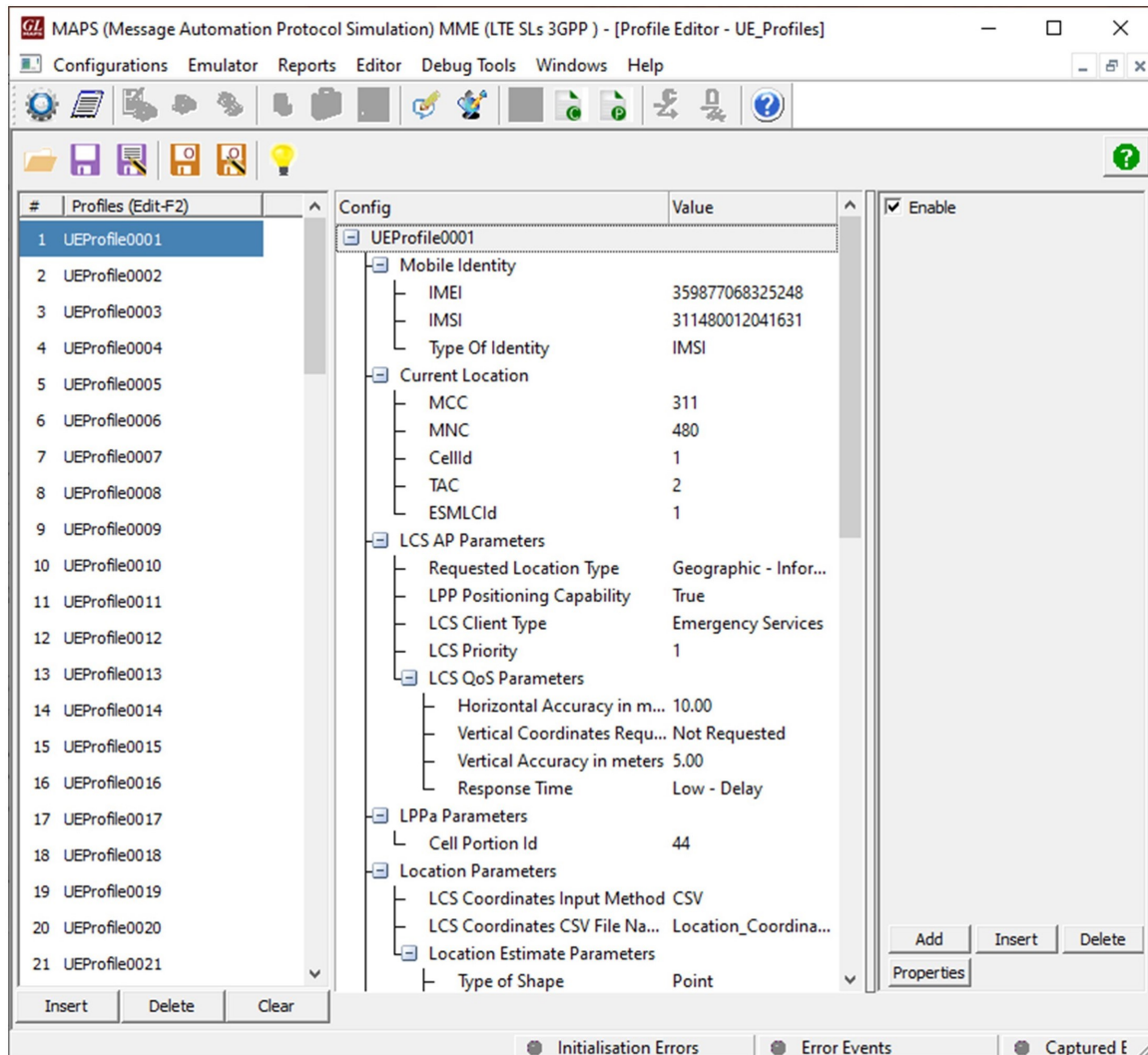

Figure: Profile Editor

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Call Generation and Call Reception

In call generation, MAPS™ is configured for the out going messages, while in call receive mode, it is configured to respond to incoming messages. Tests can be configured to run once, multiple iterations and continuously. Also, allows users to create multiple entries using quick configuration feature.

The editor allows to run the added scripts sequentially (order in which the scripts are added in the window) or randomly (any script from the list of added script as per the call flow requirements).

The test scripts are started manually at call generation; and at the call reception, the script is automatically triggered by incoming messages.

The screen below is the MAPS™ SLs Emulator configured as MME initiating LPP location requests on LCSAP sessions towards E-SMLC.

Figure: Location Service Simulation at MME

MAPS™ SLs Emulator configured as E-SMLC receives and processes the LPP location service procedure requests.

Figure: Location Service Simulation at E-SMLC

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Typical LTE SLs Interface Procedures

The LTE SLs interface procedures can be divided as follows:

- Location service request procedure
- Location information exchange LPP procedure
  - Request Capabilities (E-SMLC → UE)
  - Provide Capabilities (UE → E-SMLC)
  - Request Location Information (E-SMLC → UE)
  - Provide Location Information (UE → E-SMLC)
  - LPP Abort
  - LPP Error
  - LPP Ack
- Abort Procedure
- Reset Procedure

Location Service Request and Information Exchange LPP Procedure

The location service request procedure is used to obtain the location estimate for a target UE in E-UTRAN. Connection Oriented Information transfer procedure enables two-way transfer of LPP messages between E-SMLC and MME. The procedure is only valid while a location request procedure for the target UE is ongoing.
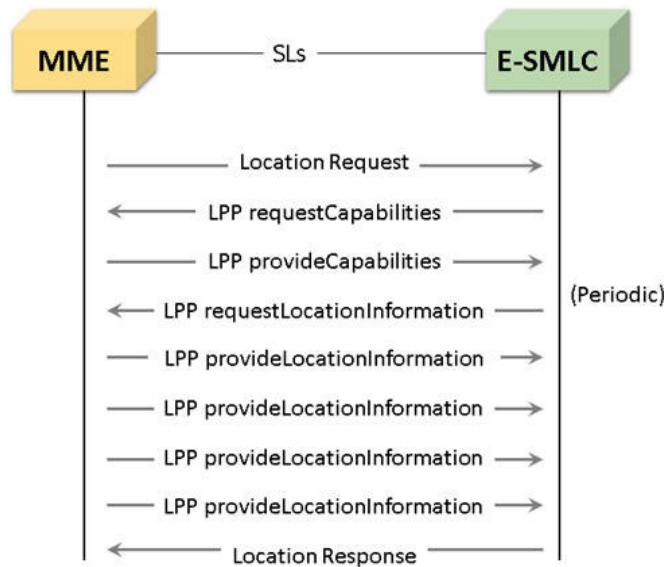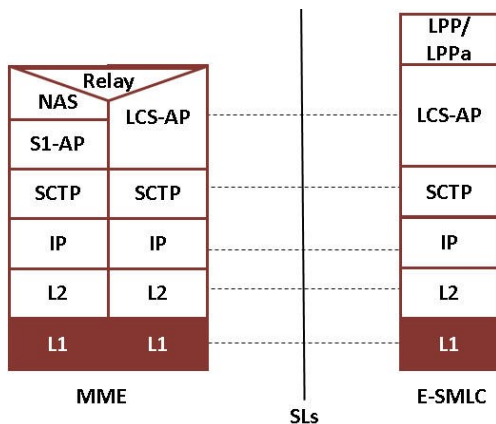

Figure: Typical SLs interface LCS-AP LPP Procedure

Supported Protocols and Specifications

Supported Protocols	Standard / Specification Used
SLs (LCS AP)	3GPP TS 29.171 V14.0.0 (2016-12)
SCTP	RFC 4960
LPP	3GPP TS 36.355 V14.0.0 (2016-12), 36.305

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Buyer's Guide

Item No	Product Description
PKS148	MAPS™ LTE SLs Interface Emulator

Item No	Related Software
PKS146	MAPS™ LTE SGs Interface Emulator
PKS147	MAPS™ Lb Interface Emulator
PKS140	MAPS™ LTE S1 Interface
PKS142	MAPS™ LTE eGTP (S3, S4, S5, S8, S10, S11 and S16) Interfaces.
ETH100	Mobile Traffic - PacketCheck™
ETH101	MobileTrafficCore - GTP
ETH102	MobileTrafficCore - Gateway

For more information, please visit Signaling and Traffic Simulator webpage.