MAPS™ Lb Interface Emulator
(Base Station System Application Part LCS Extension (BSSAP-LE))

Overview
Accurate location services find its use in many public operations such as emergency services, vehicle tracking, stolen assets tracking, advertising, and social networking. Location Service is used to estimate the geographic location of a Mobile Station (MS) and/or valid Mobile Equipment (ME), expressed in latitude and longitude, represented in a well-defined universal format. LoCation Services (LCS) architecture follows a client/server model with a positioning node acting as the server providing information to external LSC clients.

An extension of the Base Station System Application Part (BSSAP) supports location services over SCTP in Geran. Lb interface procedures are initiated by BSS and is used to obtain the location estimate for a target MS. The procedure makes use of SCCP connection oriented signaling on the GSM Lb interface.

GL’s Message Automation and Protocol Simulation (MAPS™) communication protocols test tool platform is enhanced to support simulation of location services on GSM Lb interface. MAPS™ Lb interface emulator simulates network elements such as the SMLC (Serving Mobile Location Center) and BSC (Base Station Centre), as defined in 3GPP TS 49.031 specifications.

For more information on MAPS™ Lb, refer to www.gl.com/test-location-based-services-gsm-lb-interface.html

Main Features
- Useful tool to perform Location services testing over BSC <-> SMLC Lb interface
- Emulator can be configured as BSC, SMLC nodes and study the call flow and exchange of signaling messages between any of these nodes
- User-friendly GUI for BSSAP LCS Extension (BSSAP-LE) message exchange over M3UA/SCTP and SCCP
- Ready scripts for BSSAP-LE procedures –
  - Connection Oriented Location Service Request procedure
  - Connection Oriented Location Information Transfer procedure
  - TA (Timing Advance) Positioning procedure
- Provides protocol trace with full message decoding of the BSSAP messages.
- Supports customization of placing and answering calls using Profile editor and Message editor.
- Provides Call Statistics and Events Status.
- Automation, Remote access, and Schedulers to run tests 24/7
**Testbed Configuration**

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

**SCTP Configuration** parameters consist of source / destination IP address, port configurations to simulate BSC and SMLC entities in Lb interface. MAPS™ can then generate and receive BSSAP messages to/from valid IP Address in the GSM network.

End user configuration profile used to configure MAPS™ Lb with supported SMLC and BSC parameters.

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**Pre-processing Tools...**

**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.

**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 LCS Client type, LCS QOS, Location Estimate, Location Type, Positioning Method, and other related configurations required for BSSAP simulation.

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**Testbed Setup**

**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.

**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.

**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 LCS Client type, LCS QOS, Location Estimate, Location Type, Positioning Method, and other related configurations required for BSSAP simulation.

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**Figure: Testbed Setup**

**Figure: Message Editor**

**Figure: Script Editor**

**Figure: Profile Editor**
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™ Lb Emulator configured as BSC initiating Location Estimate Request procedure towards SMLC.

Typical GSM Lb Interface Procedures
The GSM Lb interface procedures can be divided as follows:
• Location request procedure
• Location information exchange procedure

Location Request Procedure
The Location Request procedure is applicable to the Lb interface. Its purpose is to obtain a location estimate for a target MS. The initiator of a location request is the BSC. The procedure makes use of SCCP connection oriented signaling on the Lb interface.

Transfer of BSSMAP-LE messages using SCCP connection to support positioning of a particular target MS is as shown in the figure below.

Figure: BSSAP Location Request Simulation at BSC

MAPS™ Lb Emulator configured as SMLC receives and processes the Location Request procedure.

Figure: BSSAP Location Request Simulation at SMLC

TA (Timing Advance) Positioning Procedure
TA (Timing Advance) positioning procedure is generic for a standalone SMLC or integrate SMLC in the BSC.
The SMLC sends a BSSAP-LE Connection Oriented Information message to the BSC serving a particular target MS. BSC returns the current TA value and current serving cell for the target MS to the SMLC in a BSSLAP TA response. TA response may also include the latest measurement results received from the target MS for the serving and neighboring cells.

Figure: TA Positioning Procedure
Supported Protocols and Specifications

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<thead>
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<th>Supported Protocols</th>
<th>Standard / Specification</th>
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<td>3GPP TS 48.071</td>
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<td>BSSMAP-LE</td>
<td>3GPP TS 49.031</td>
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<td>SCCP</td>
<td>Q.713, CCITT (ITU-T) Blue Book</td>
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<td>SCTP</td>
<td>RFC 4960</td>
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Buyer's Guide

PKS147 - MAPS Lb Interface Emulator

Related Software

PKS146 - MAPS™ LTE SGs Interface Emulator
PKS139 - MAPS™ Diameter Emulator
PKS148 - MAPS LTE SLs Interface Emulator
PKS140 - MAPS™ LTE S1 Interface
PKS142 - MAPS™ LTE eGTP (S3, S4, S5, S8, S10, S11 and S16) Interfaces
PKS164 - MAPS™ UMTS – Lu-PS Interface Emulation
PKS160 - MAPS™ UMTS – Lu-CS and Iuh Interface Emulation
PKS166 - MAPS™ UMTS Gn Gp Emulator
PKS131 - MAPS™ Gb Emulator over IP for BSC & SGSN
PKS132 - MAPS™ MAP IP Emulator
PKS134 - MAPS GSM Abis IP Emulator
PKS137 - MAPS™ GSM A IP Emulator
PKS127 - MAPS™ SIP - IMS
PKS130 - MAPS™ SIGTRAN (SS7 over IP)
PKS135 - MAPS™ ISDN SIGTRAN (ISDN over IP)

Related Software

PKV107 - LTE Protocol Analyzer
PKS120 - MAPS™ SIP
PKS121 - MAPS™ SIP Conformance Test Suite (Test Scripts)
PKS122 - MAPS™ MEGACO
PKS123 - MAPS™ MEGACO Conformance Test Suite (Test Scripts)
PKS124 - MAPS™ MGCP & Conformance Test Suite

ETH100 - Mobile Traffic - PacketCheck™
ETH101 - MobileTrafficCore - GTP
ETH102 - MobileTrafficCore - Gateway

For complete list of MAPS™ products, refer to [http://www.gl.com/maps.html](http://www.gl.com/maps.html) webpage.