MAPS™ Lb Emulator

Location Services Emulation

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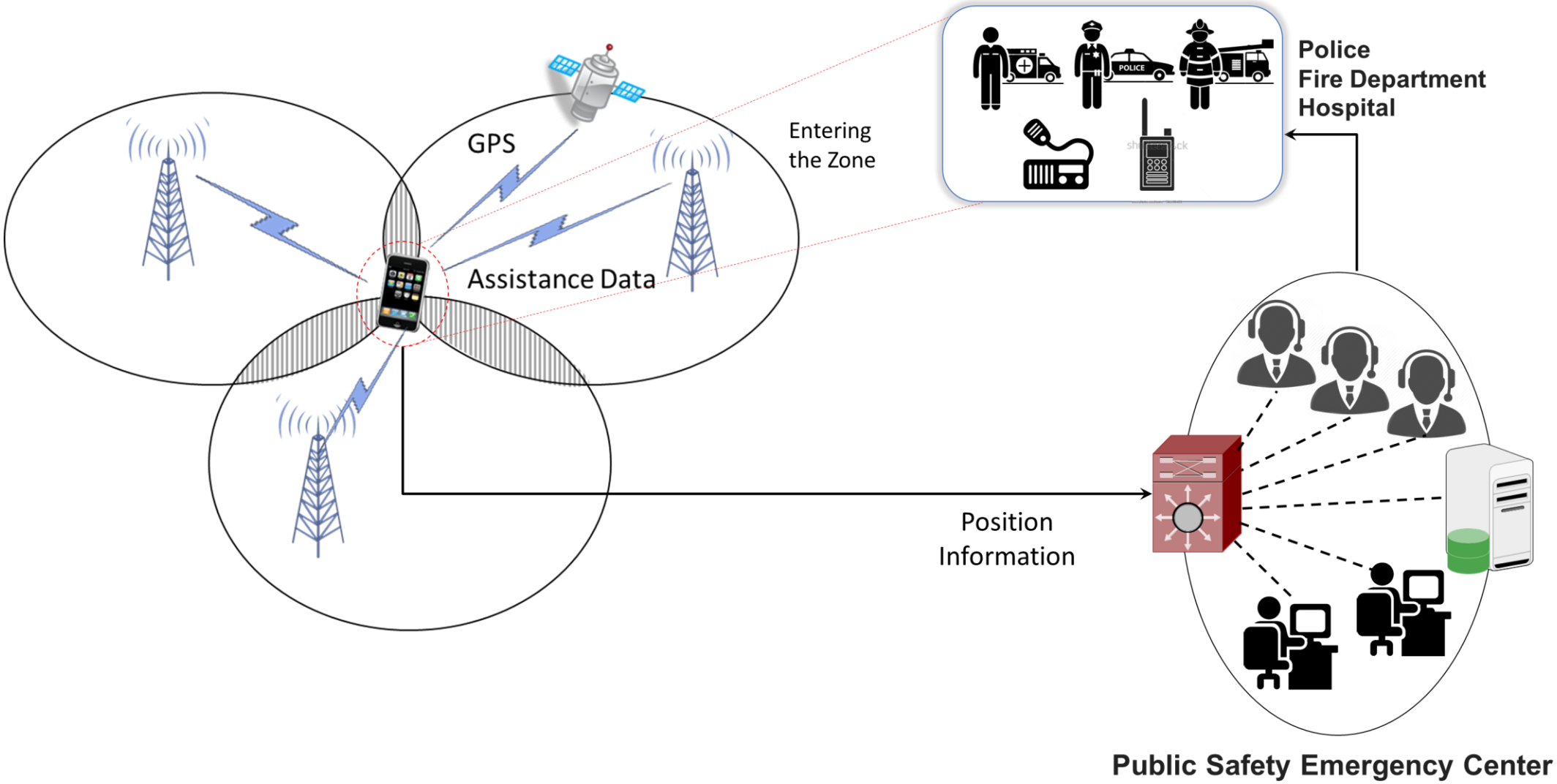
What is Location Service (LCS) ?



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Application of LCS

Public Safety Services

- Emergency Services, e.g. fire, police, ambulance, etc.
- Emergency Alert Services

Tracking Services

- Stolen phones, computers, other devices
- Vehicle tracking

Location Based Information Services

- Navigation
- City Sightseeing
- Finding nearest service, e.g. restaurant, bank, food store, etc.
- Mobile Yellow Pages
- Location Sensitive Internet

Up to date information

- Temperature, traffic services, etc.

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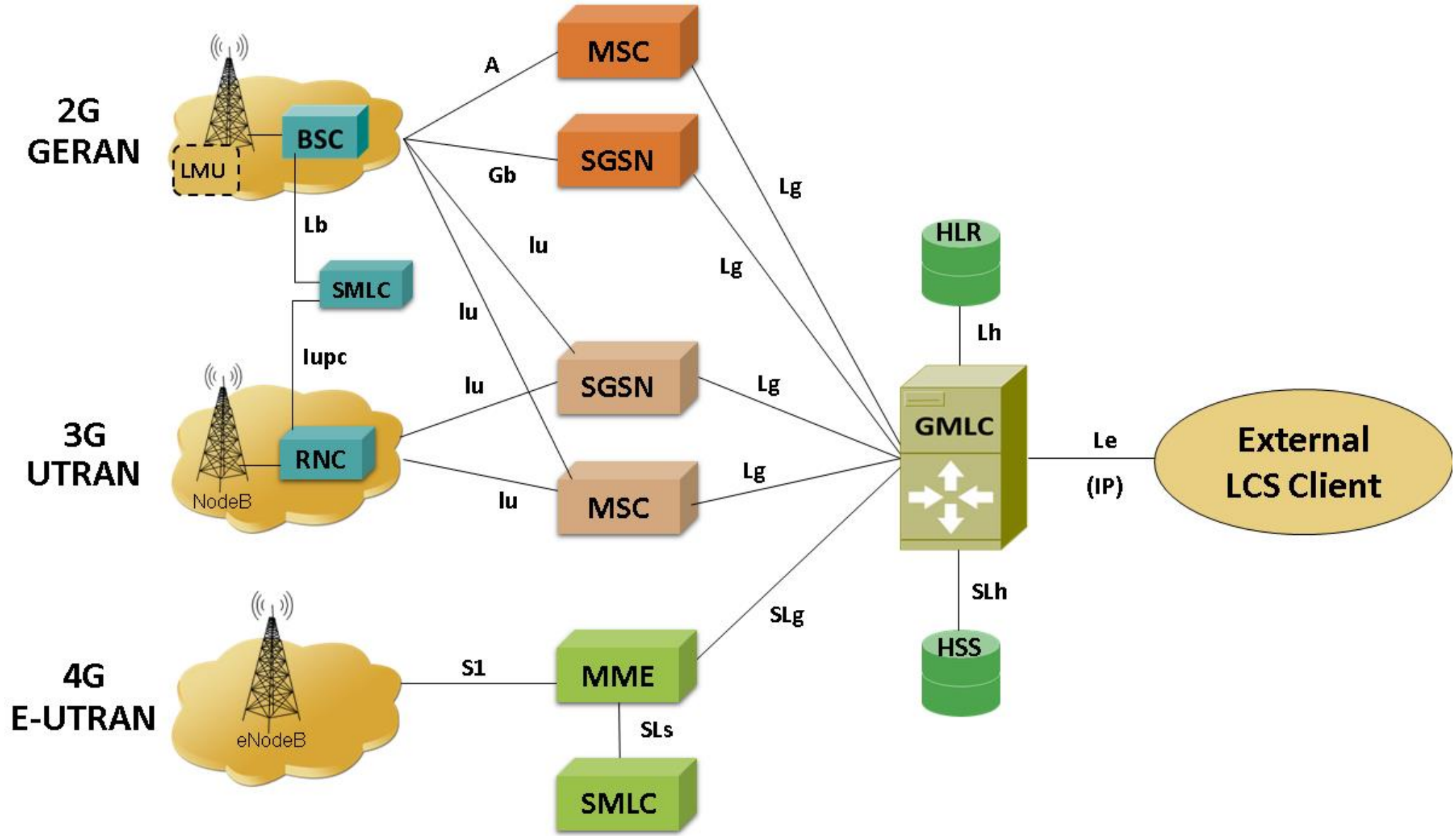
LCS Network Overview



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LCS Functional Entities

- **GMLC - Gateway Mobile Location Centre**
  - Central point of LCS architecture.
  - First node an external LCS client accesses in a GSM or UMTS network
  - Request routing information from the HLR (Home Location register) or HSS (Home Subscriber Server)
  - Receives final location estimates from the MSC, SGSN, or MME

- **SMLC/E-SMLC/SAS – Serving Mobile Location Server**
  - Server used for the locations calculation. It can calculate with information from LMU (where it is available), or measures of the network itself, such as TA (Timing Advance).

- **LMU – Location Measuring Unit**
  - Equipment required in each cell to enable the calculation of the OTDOA (based on the network location).

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MAPS™

MA - Message Automation

+

PS - Protocol Simulation

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MAPS™ Common Features

- Multi-protocol, Multi-interface Simulation
- Script based and protocol independent software architecture
- Auto generate and respond to signaling messages
- Traffic Handling Capabilities (requires additional license)
- Automated Bulk Call Generation / Stress Testing
- Easy script builder for quick testing to advance testing
- Customization of test configuration profiles
- Unlimited ability to customize the protocol fields and call control scenarios

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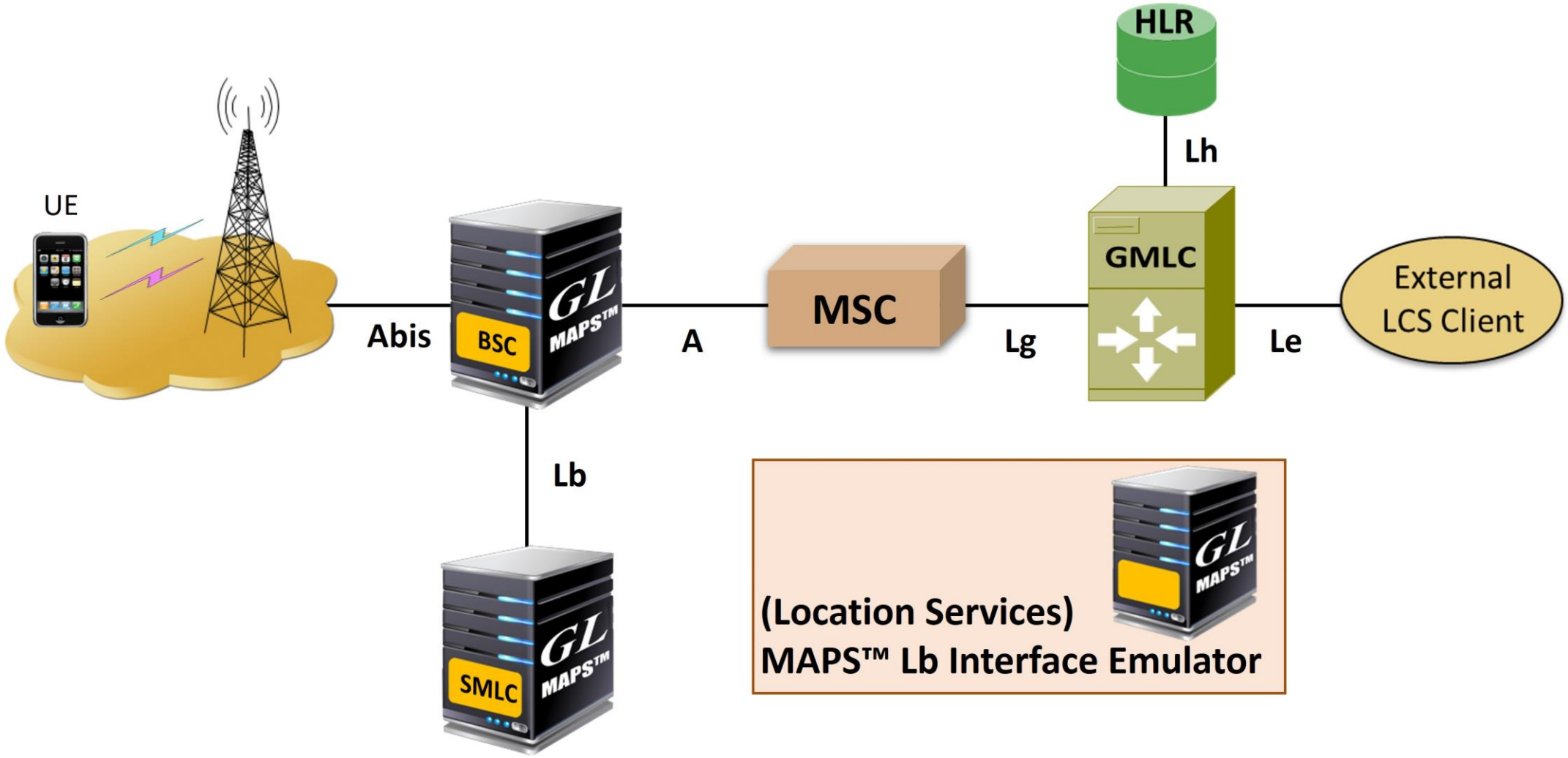
MAPS™ Lb Interface



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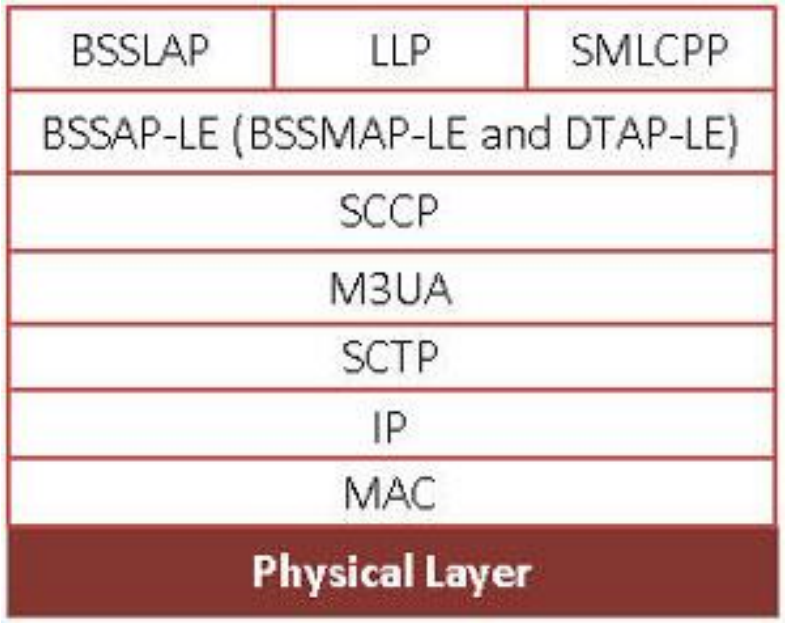
Supported Protocols



Supported Protocols	Standard / Specification Used
BSSLAP	3GPP TS 48.071
BSSMAP-LE	3GPP TS 49.031
SCCP	Q.713, CCITT (ITU-T) Blue Book
SCTP	RFC 4960

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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
- Logging of all messages in real-time
- Supports customization of placing and answering calls using Profile editor and Message editor.
- Provides protocol trace with full message decoding of the BSSAP-LE messages
- Script based & protocol independent software architecture
- Provides call reports with associated captured events and error events during call generation

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MAPS™ Lb Procedures

The following are the supported BSSAP-LE procedures:

- Location request procedure
- Location information exchange procedure
- TA Positioning procedure
- Reset Procedure

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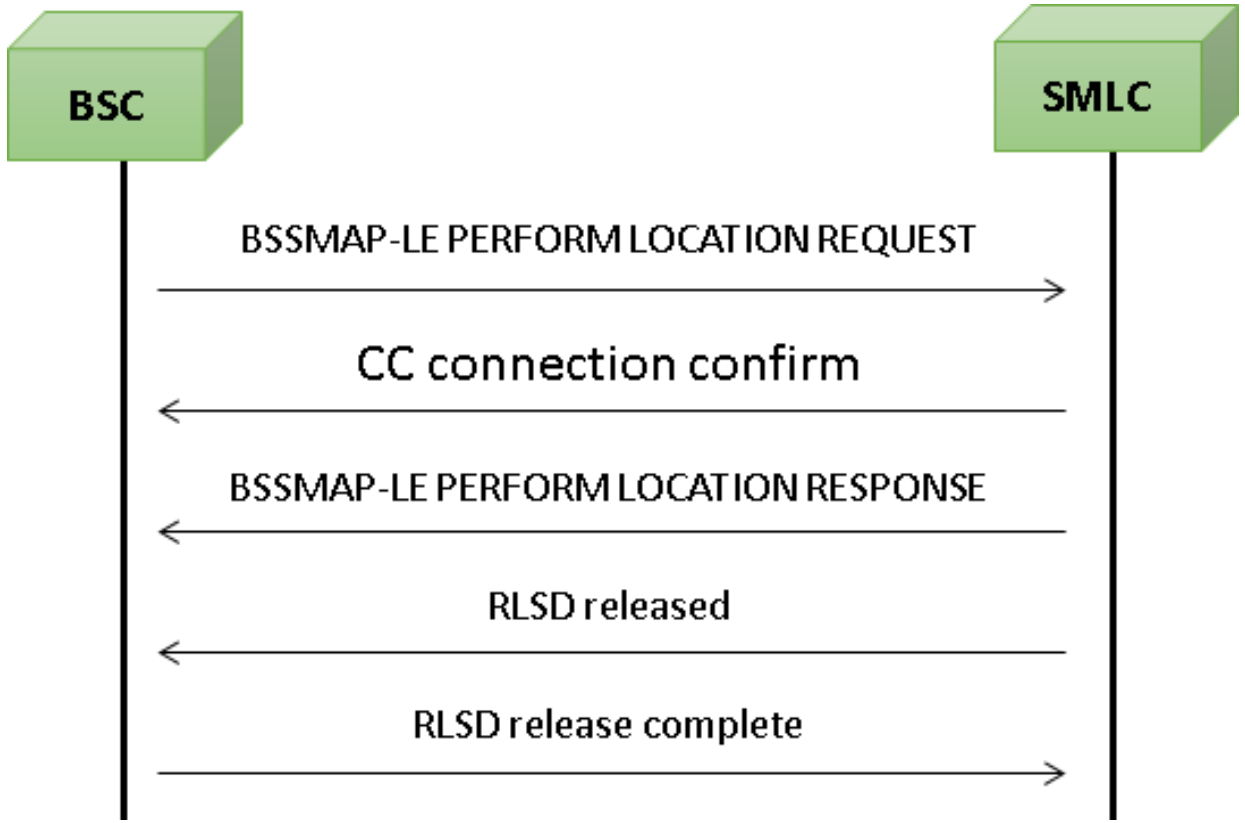
Location Request Procedure

- Transfer of BSSMAP-LE messages using an SCCP connection to support positioning of a particular target MS is as shown



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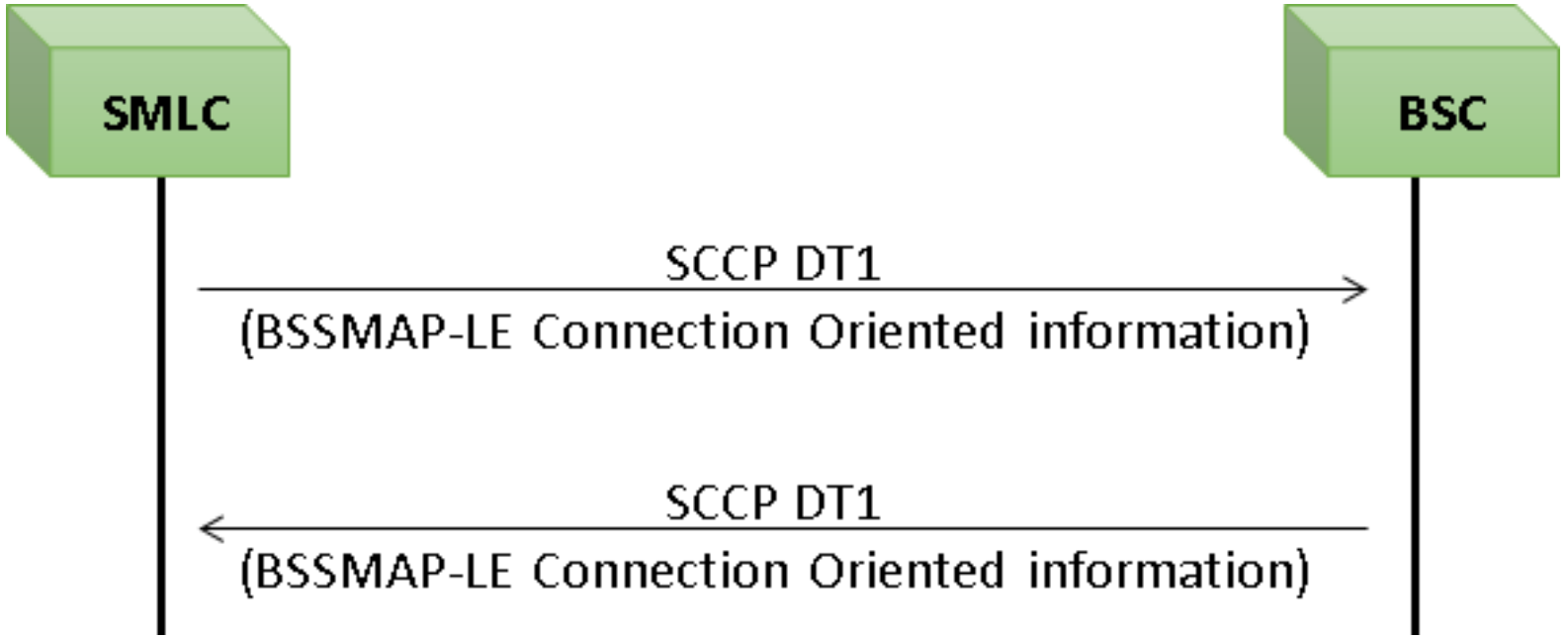
Connection Oriented Information Transfer

- SMLC uses the procedure shown below in order to obtain positioning related information from the BSC serving a particular target MS after a positioning request has been received from the BSC
- This procedure applies to positioning of an MS in both the CS and the PS domains



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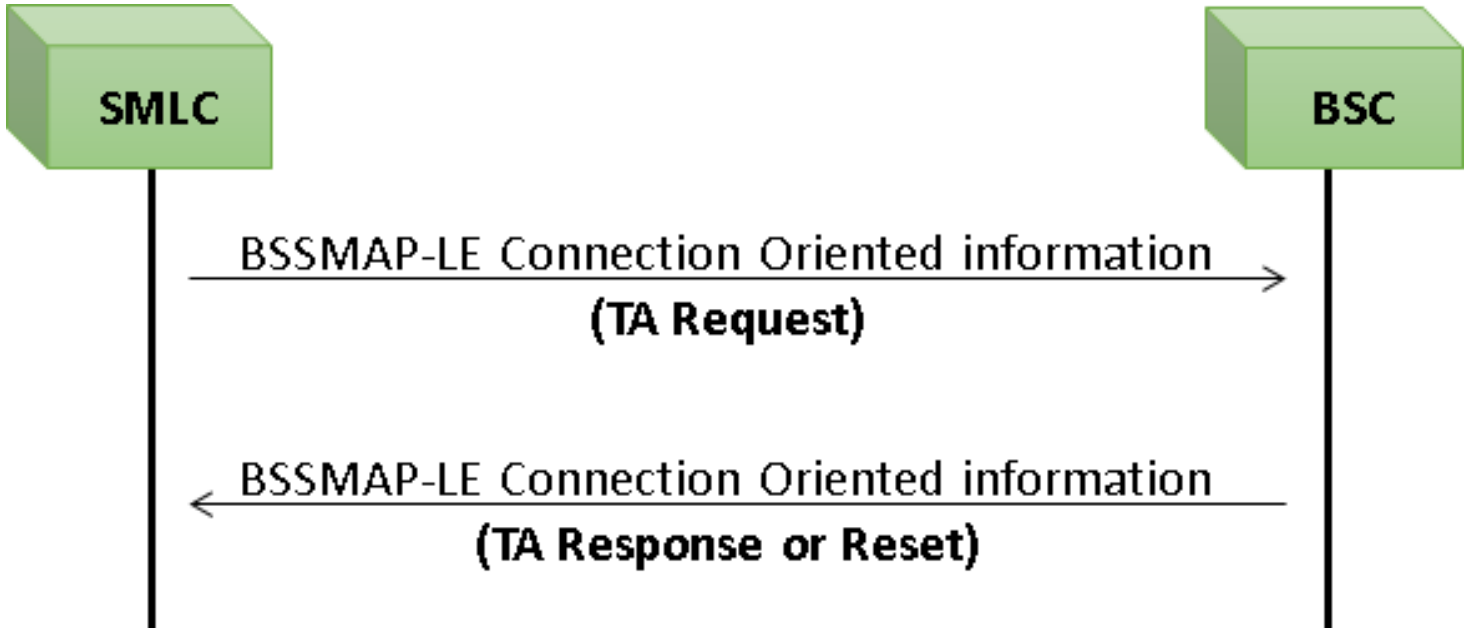
TA Positioning Procedure

- TA (Timing Advance) positioning procedure is generic for a standalone SMLC or integrate SMLC in the BSC



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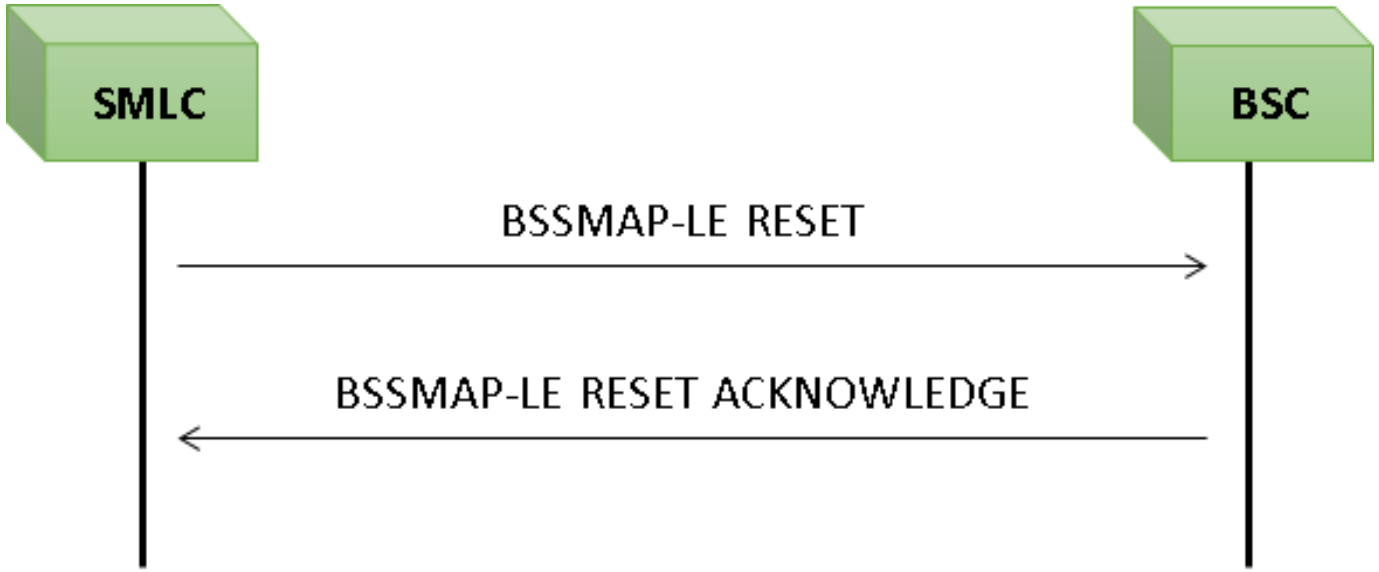
Reset Procedure

- The Reset procedure is an optional procedure applicable to the BSSAP-LE
- It enables SMLC or BSC that has undergone a failure with loss of location service transactions to indicate this to a partner entity



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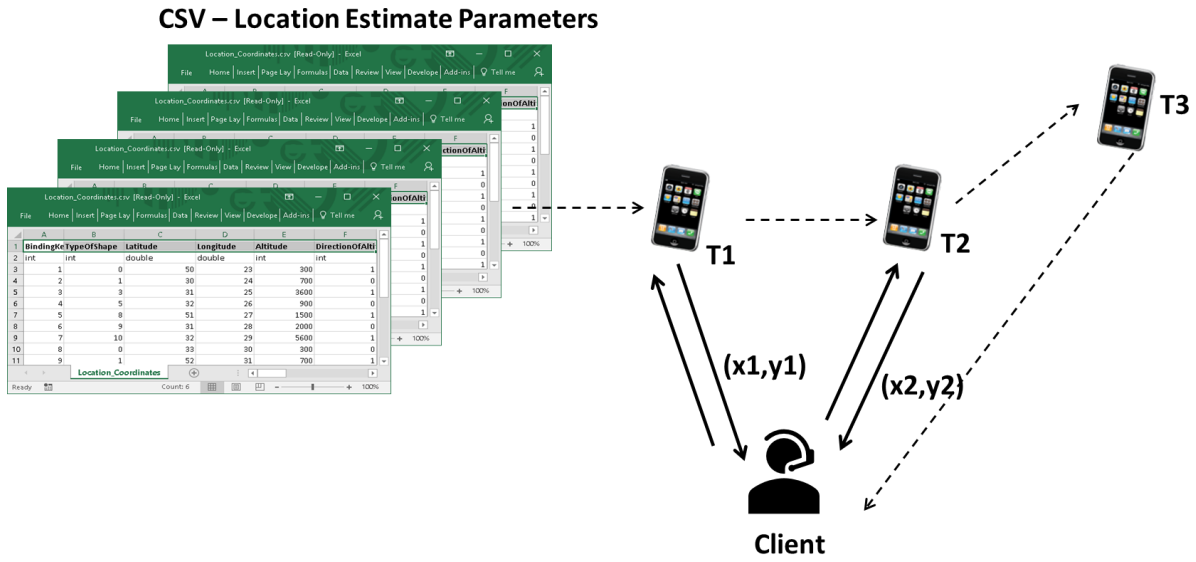
Location Service Simulation

- MAPS™ supports simulation of different Positioning methods and Position Estimation of a Mobile Stations (MS) in universal coordinates.
- Location estimate parameters such as Type of Shape and coordinates can be input through conventional user profiles or can be fetched from a CSV file
- Co-ordinates indicate different position of MS at different intervals of time
- Report is sent either periodically at specified time duration or at once when requested.



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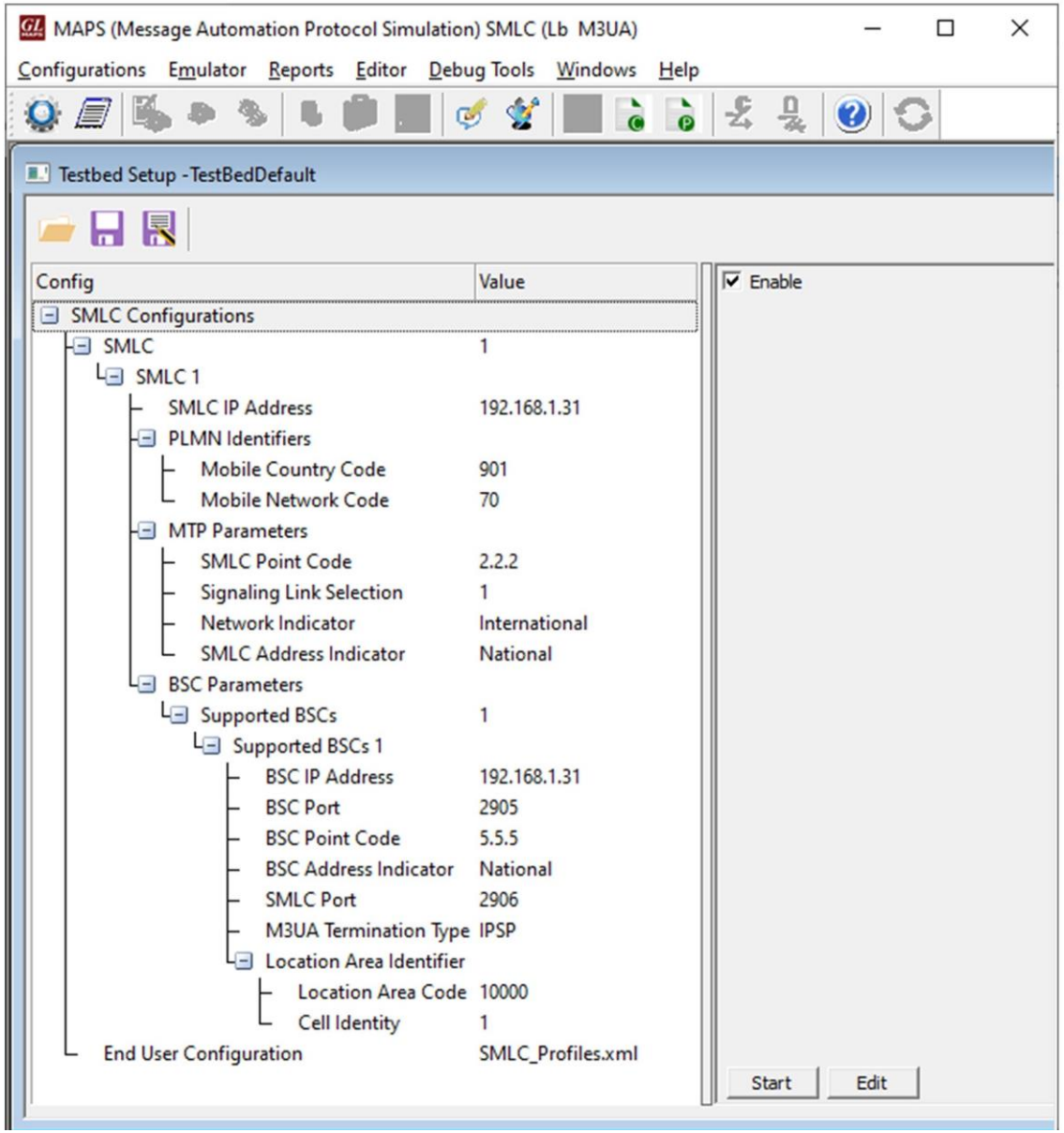
Testbed Setup



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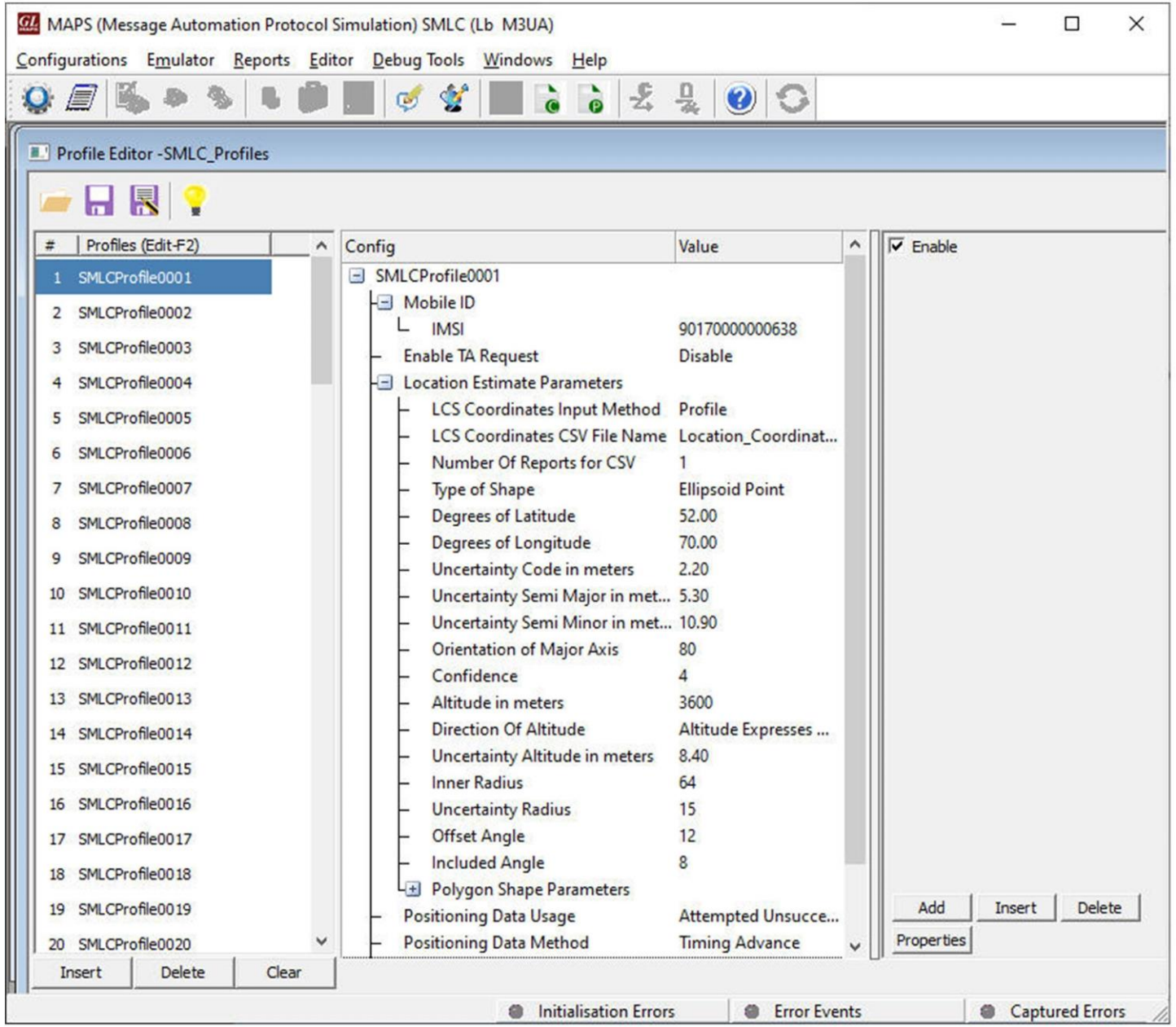
Profile Configuration



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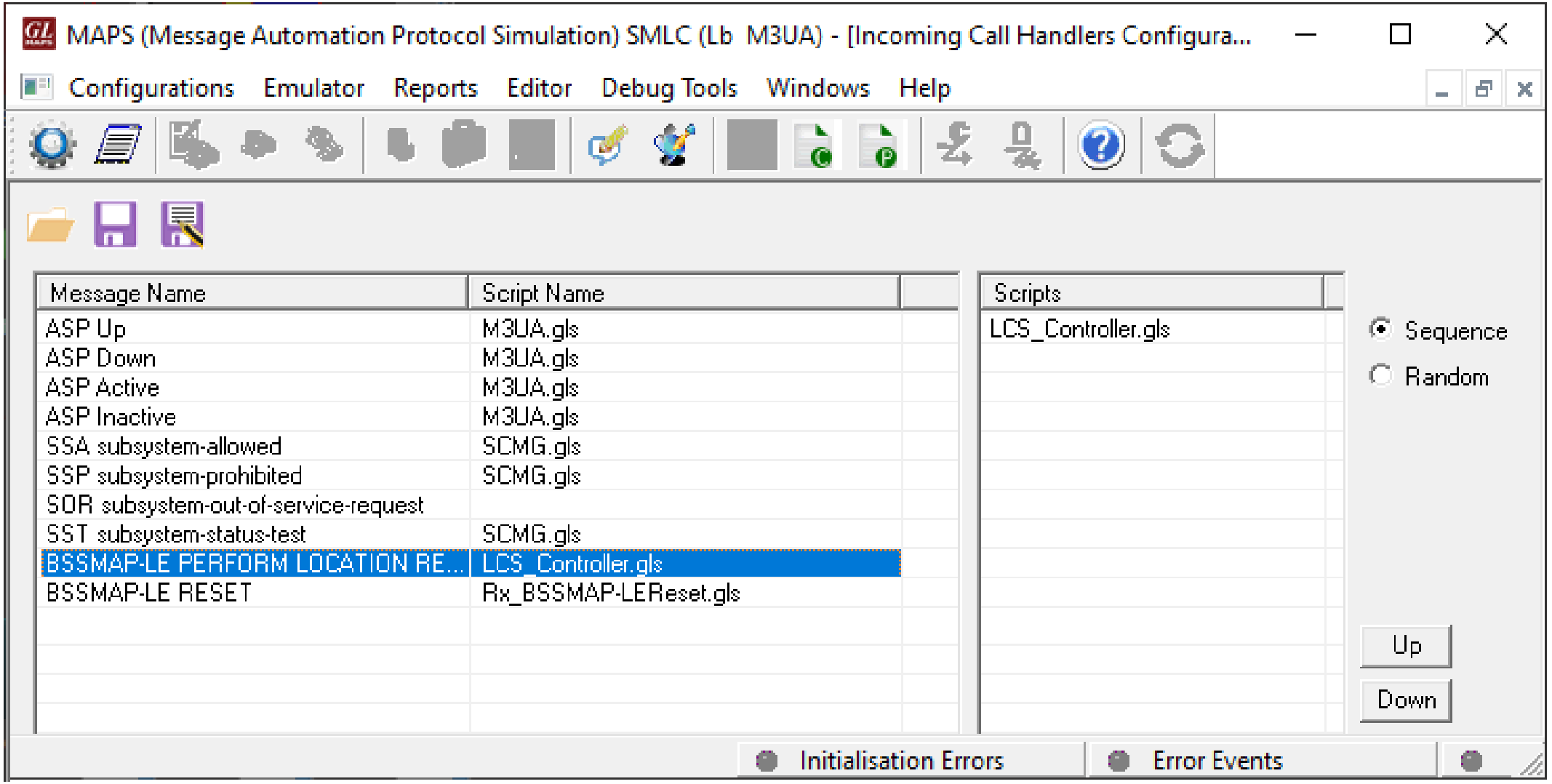
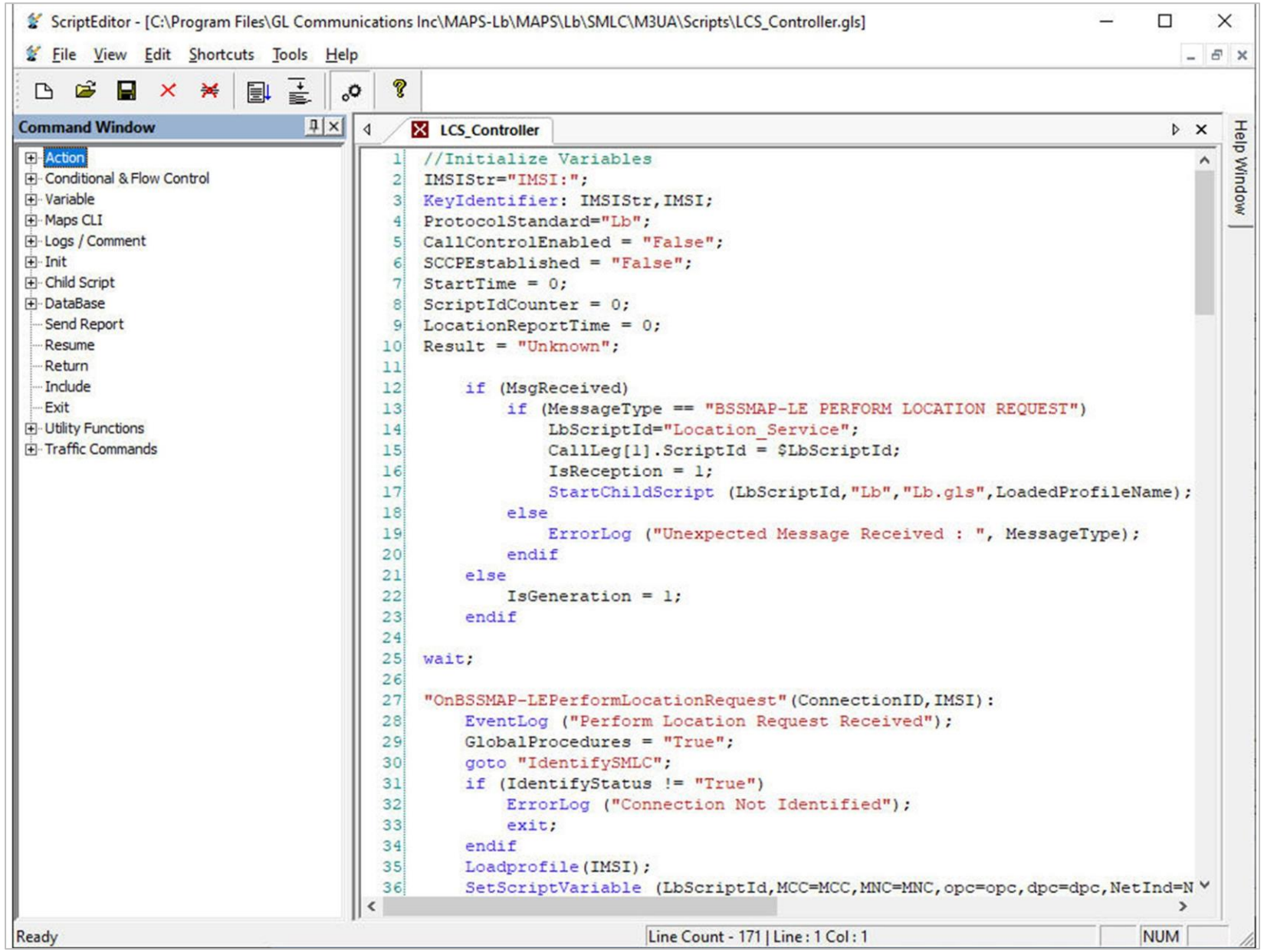
Incoming Call Handler Configuration



Script Editor



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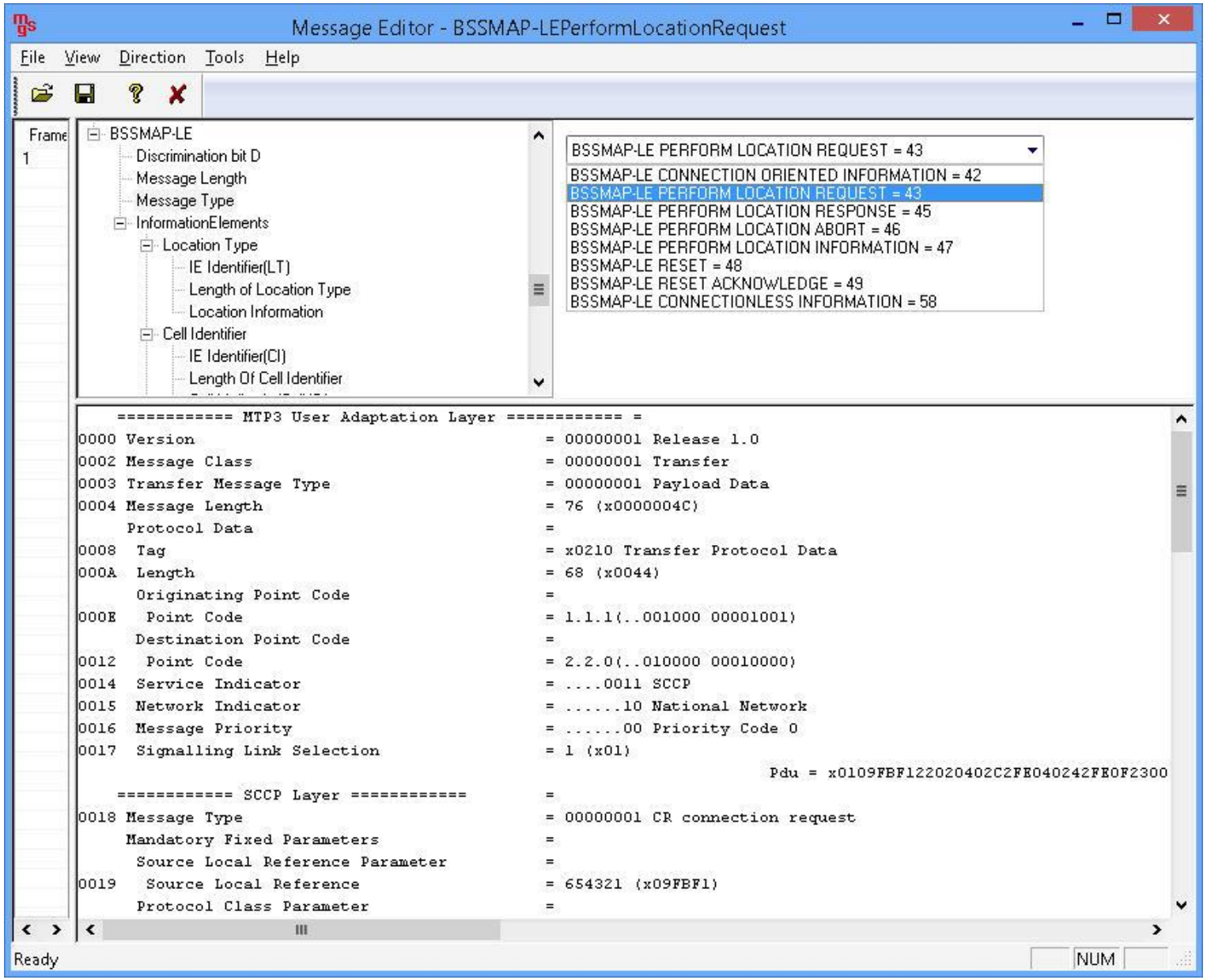
Message Editor



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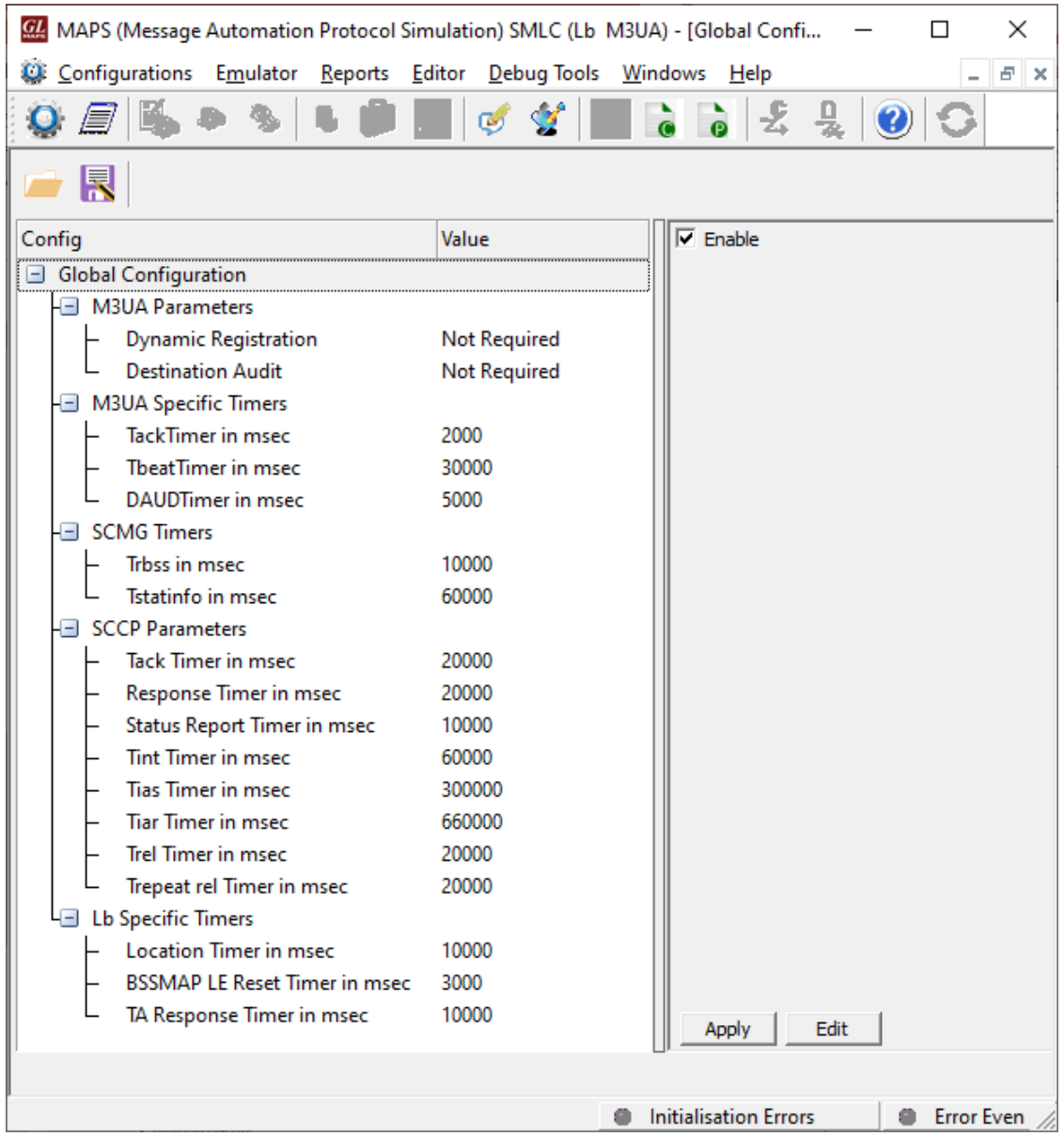
Global Configuration



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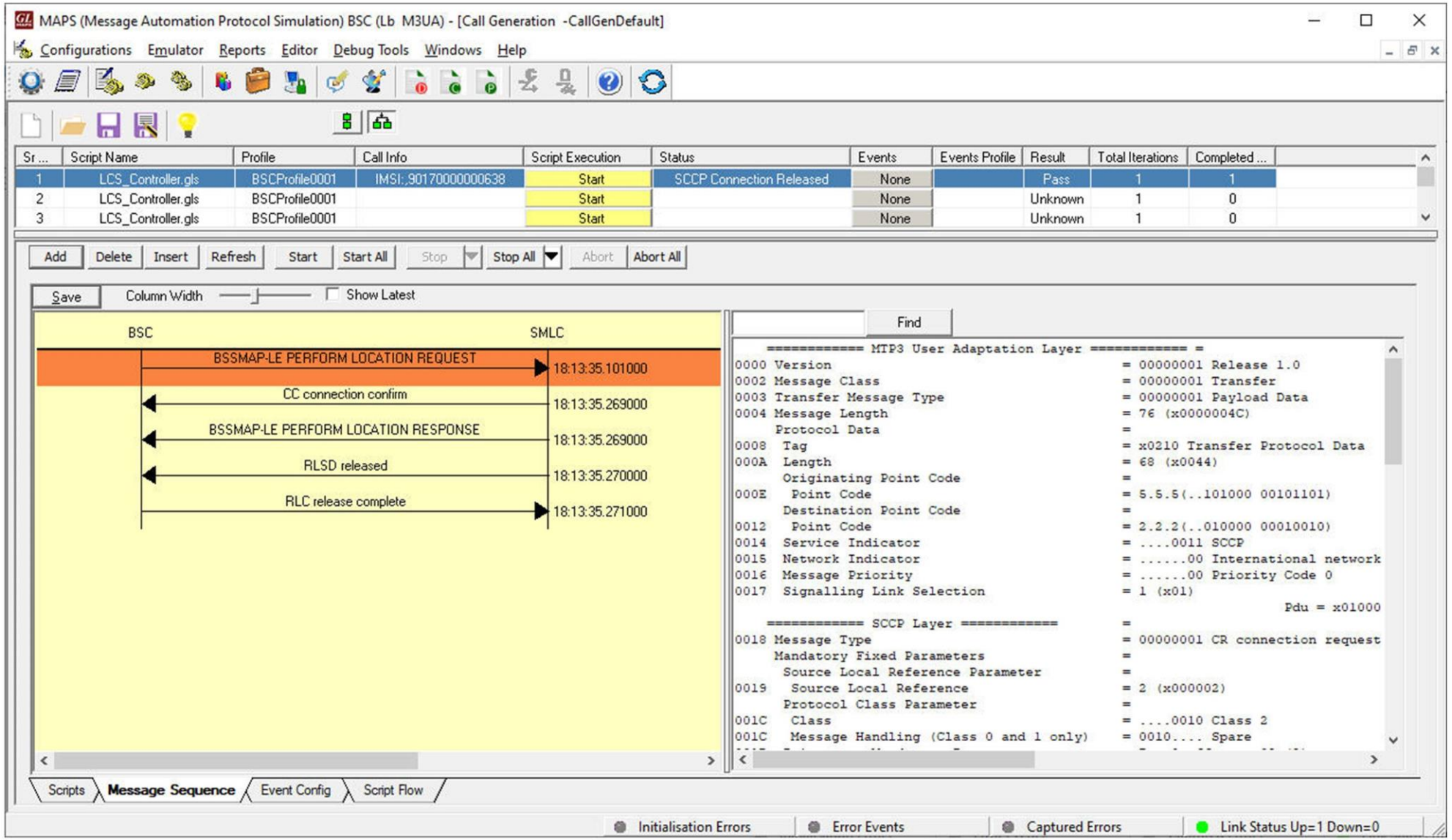
Call Generation



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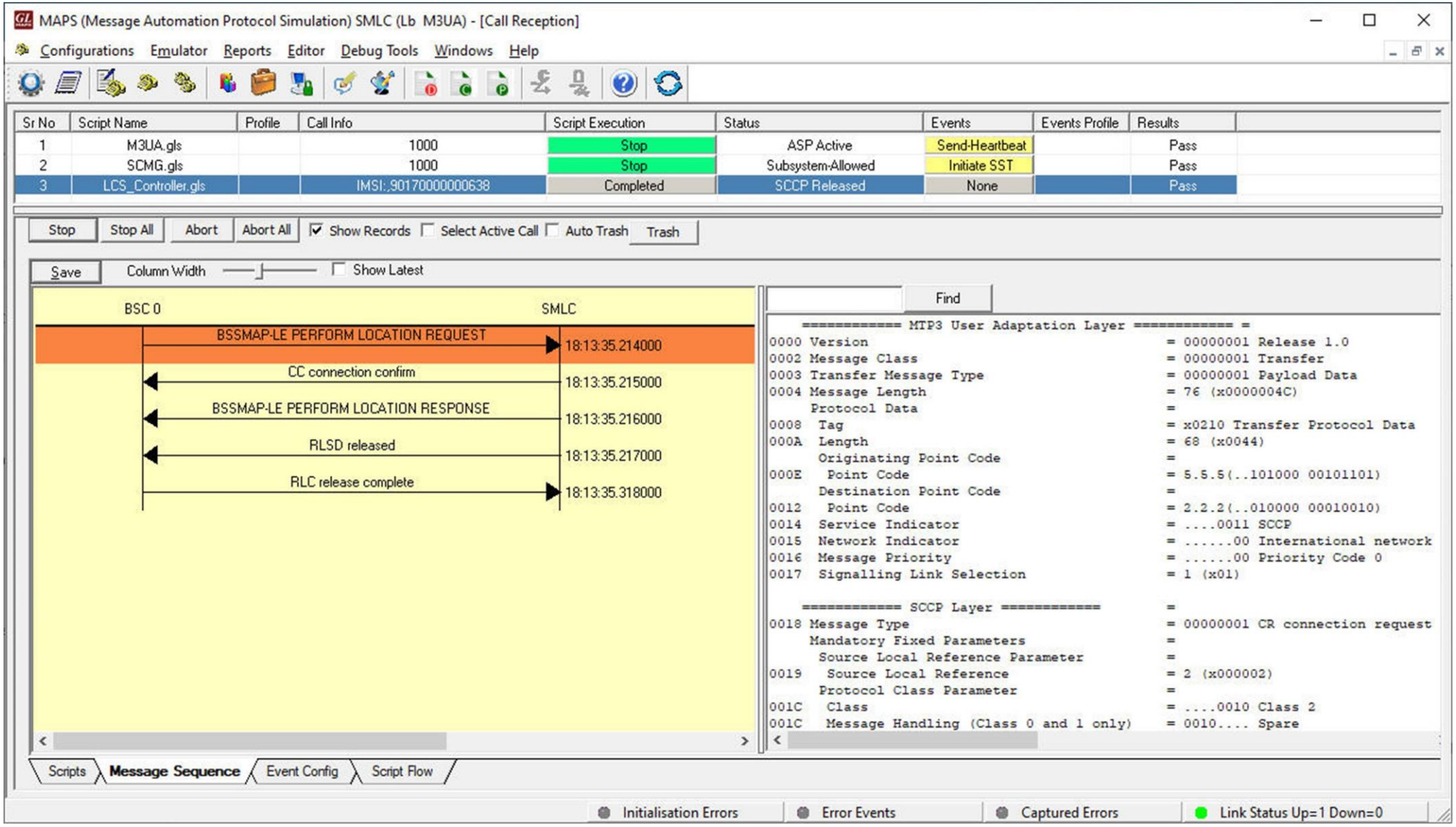
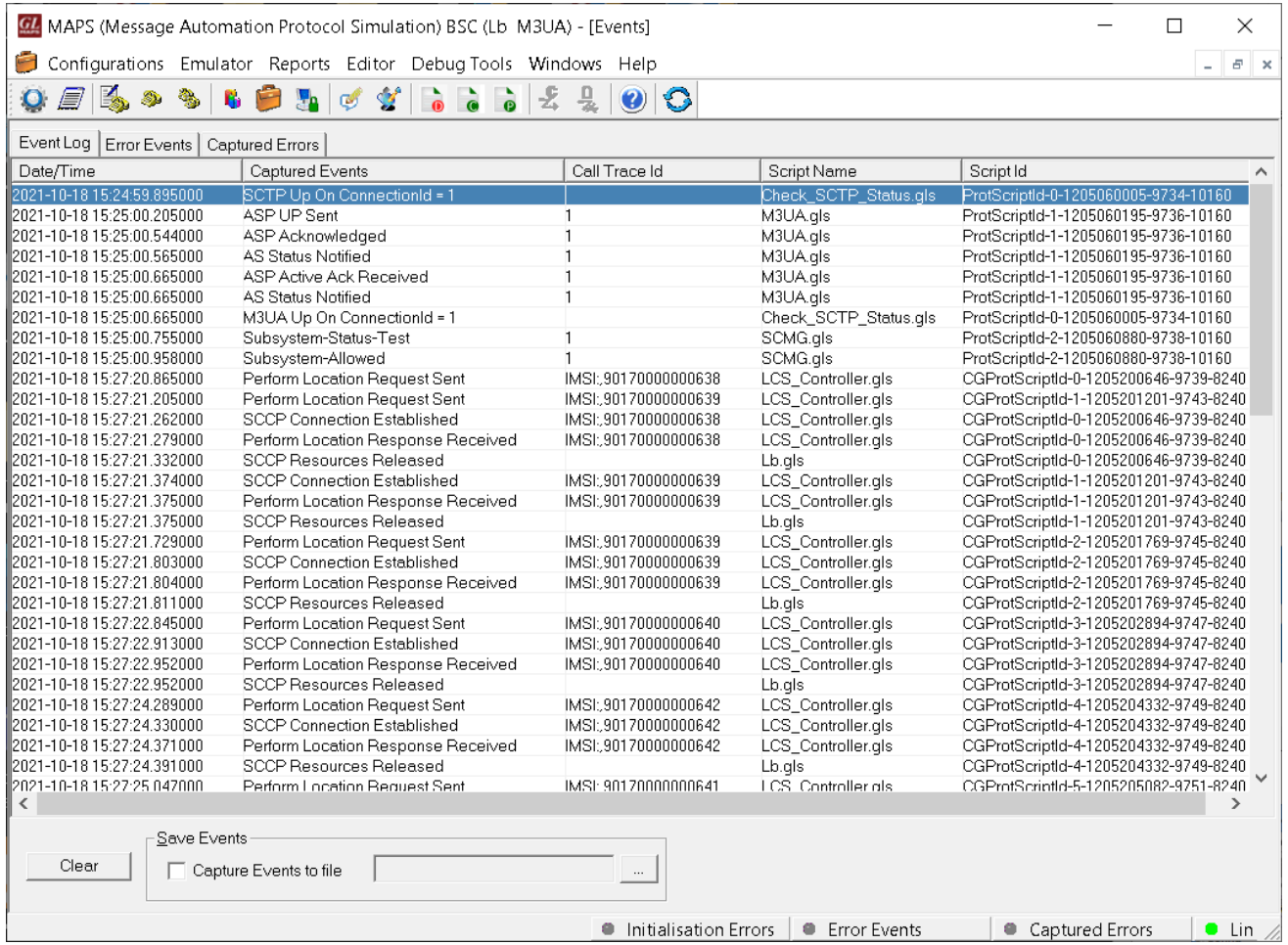
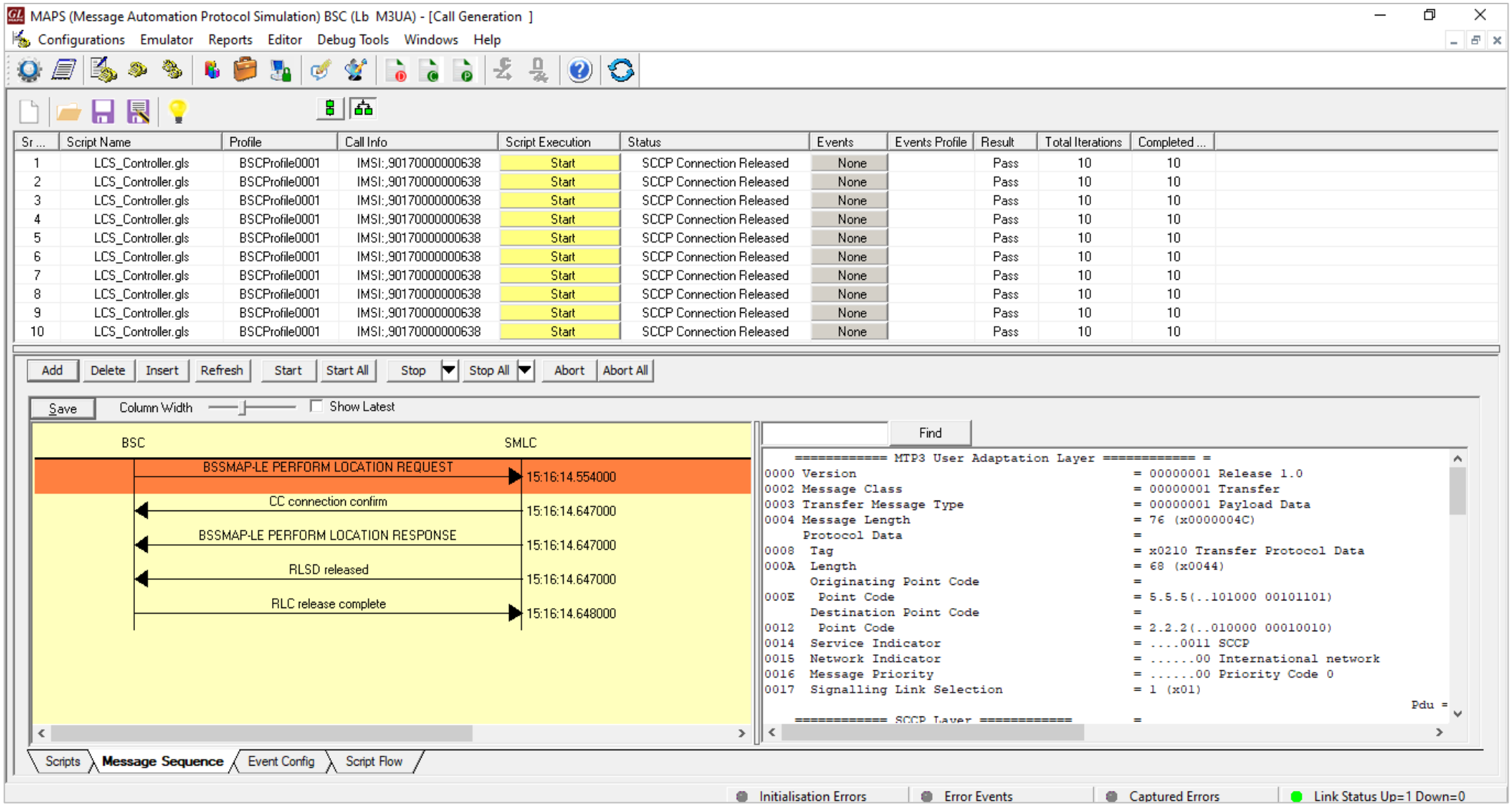
Call Reception



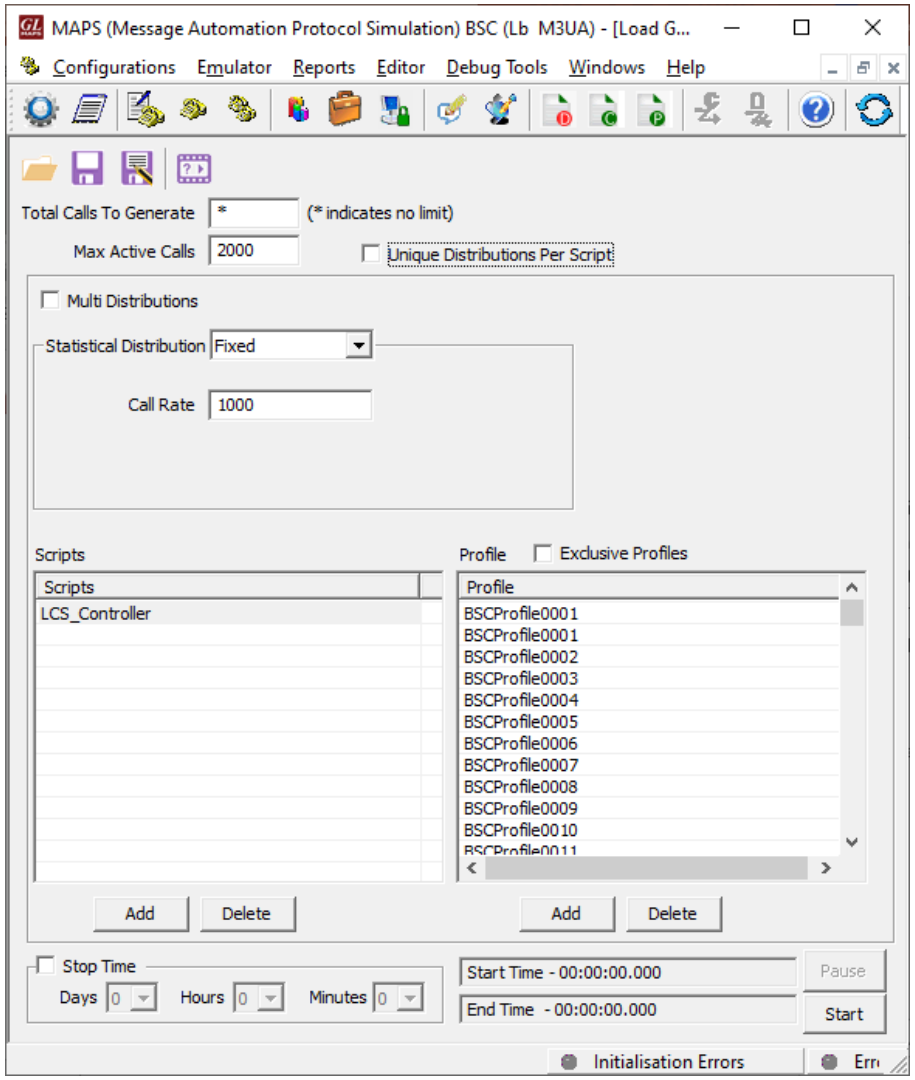
Events Log


MAPS (Message Automation Protocol Simulation) BSC (Lb M3UA) - [Events]
Configurations Emulator Reports Editor Debug Tools Windows Help
Event Log
Error Events
Captured Errors
Date/Time | Captured Events | Call Trace Id | Script Name | Script Id
2021-10-18 15:24:59.895000 | SCTP Up On ConnectionId = 1 | | Check_SCTP_Status.gls | ProtScriptId-0-1205060005-9734-10160
2021-10-18 15:25:00.205000 | ASP UP Sent | 1 | M3UA.gls | ProtScriptId-1-1205060195-9736-10160
2021-10-18 15:25:00.544000 | ASP Acknowledged | 1 | M3UA.gls | ProtScriptId-1-1205060195-9736-10160
2021-10-18 15:25:00.565000 | AS Status Notified | 1 | M3UA.gls | ProtScriptId-1-1205060195-9736-10160
2021-10-18 15:25:00.665000 | ASP Active Ack Received | 1 | M3UA.gls | ProtScriptId-1-1205060195-9736-10160
2021-10-18 15:25:00.665000 | AS Status Notified | 1 | M3UA.gls | ProtScriptId-1-1205060195-9736-10160
2021-10-18 15:25:00.665000 | M3UA Up On ConnectionId = 1 | | Check_SCTP_Status.gls | ProtScriptId-0-1205060005-9734-10160
2021-10-18 15:25:00.755000 | Subsystem-Status-Test | 1 | SCMG.gls | ProtScriptId-2-1205060880-9738-10160
2021-10-18 15:25:00.958000 | Subsystem-Allowed | 1 | SCMG.gls | ProtScriptId-2-1205060880-9738-10160
2021-10-18 15:27:20.865000 | Perform Location Request Sent | IMSI:,90170000000638 | LCS_Controller.gls | CGProtScriptId-0-1205200646-9739-8240
2021-10-18 15:27:21.205000 | Perform Location Request Sent | IMSI:,90170000000639 | LCS_Controller.gls | CGProtScriptId-1-1205201201-9743-8240
2021-10-18 15:27:21.262000 | SCCP Connection Established | IMSI:,90170000000638 | LCS_Controller.gls | CGProtScriptId-0-1205200646-9739-8240
2021-10-18 15:27:21.279000 | Perform Location Response Received | IMSI:,90170000000638 | LCS_Controller.gls | CGProtScriptId-0-1205200646-9739-8240
2021-10-18 15:27:21.332000 | SCCP Resources Released | | Lb.gls | CGProtScriptId-0-1205200646-9739-8240
2021-10-18 15:27:21.374000 | SCCP Connection Established | IMSI:,90170000000639 | LCS_Controller.gls | CGProtScriptId-1-1205201201-9743-8240
2021-10-18 15:27:21.375000 | Perform Location Response Received | IMSI:,90170000000639 | LCS_Controller.gls | CGProtScriptId-1-1205201201-9743-8240
2021-10-18 15:27:21.375000 | SCCP Resources Released | | Lb.gls | CGProtScriptId-1-1205201201-9743-8240
2021-10-18 15:27:21.729000 | Perform Location Request Sent | IMSI:,90170000000639 | LCS_Controller.gls | CGProtScriptId-2-1205201769-9745-8240
2021-10-18 15:27:21.803000 | SCCP Connection Established | IMSI:,90170000000639 | LCS_Controller.gls | CGProtScriptId-2-1205201769-9745-8240
2021-10-18 15:27:21.804000 | Perform Location Response Received | IMSI:,90170000000639 | LCS_Controller.gls | CGProtScriptId-2-1205201769-9745-8240
2021-10-18 15:27:21.811000 | SCCP Resources Released | | Lb.gls | CGProtScriptId-2-1205201769-9745-8240
2021-10-18 15:27:22.845000 | Perform Location Request Sent | IMSI:,90170000000640 | LCS_Controller.gls | CGProtScriptId-3-1205202894-9747-8240
2021-10-18 15:27:22.913000 | SCCP Connection Established | IMSI:,90170000000640 | LCS_Controller.gls | CGProtScriptId-3-1205202894-9747-8240
2021-10-18 15:27:22.952000 | Perform Location Response Received | IMSI:,90170000000640 | LCS_Controller.gls | CGProtScriptId-3-1205202894-9747-8240
2021-10-18 15:27:22.952000 | SCCP Resources Released | | Lb.gls | CGProtScriptId-3-1205202894-9747-8240
2021-10-18 15:27:24.289000 | Perform Location Request Sent | IMSI:,90170000000642 | LCS_Controller.gls | CGProtScriptId-4-1205204332-9749-8240
2021-10-18 15:27:24.330000 | SCCP Connection Established | IMSI:,90170000000642 | LCS_Controller.gls | CGProtScriptId-4-1205204332-9749-8240
2021-10-18 15:27:24.371000 | Perform Location Response Received | IMSI:,90170000000642 | LCS_Controller.gls | CGProtScriptId-4-1205204332-9749-8240
2021-10-18 15:27:24.391000 | SCCP Resources Released | | Lb.gls | CGProtScriptId-4-1205204332-9749-8240
Clear
Save Events
Capture Events to file
Initialisation Errors
Error Events
Captured Errors
Lin

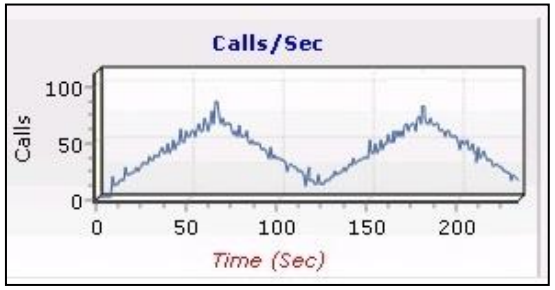
Bulk Call Generation



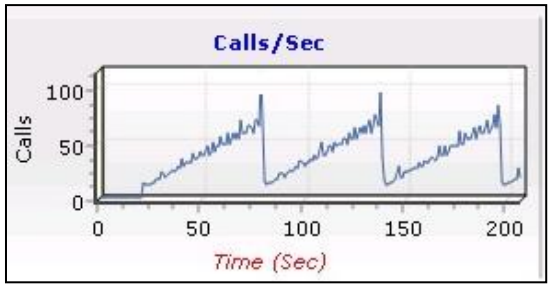
Load Generation



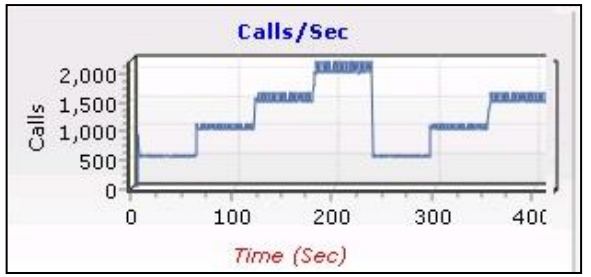
Saw-tooth Statistical Distribution



Ramp Statistical Distribution



Step Statistical Distribution



- Stability/Stress and Performance testing using Load Generation
- Different types of Load patterns to distribute load
- User can load multiple patterns for selected script
- User configurable Test Duration, CPS, Maximum and Minimum Call Rate, etc.

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High Density (HD) Traffic Simulation

- IP variants of MAPS can be run on any modern Windows server.
- A typical i7 platform will be able to handle ~2000 concurrent RTP sessions through a conventional server-grade NIC
- We also offer an HD (High Density) appliance which
- can deliver up to 20,000 concurrent RTP sessions per U of rack space.

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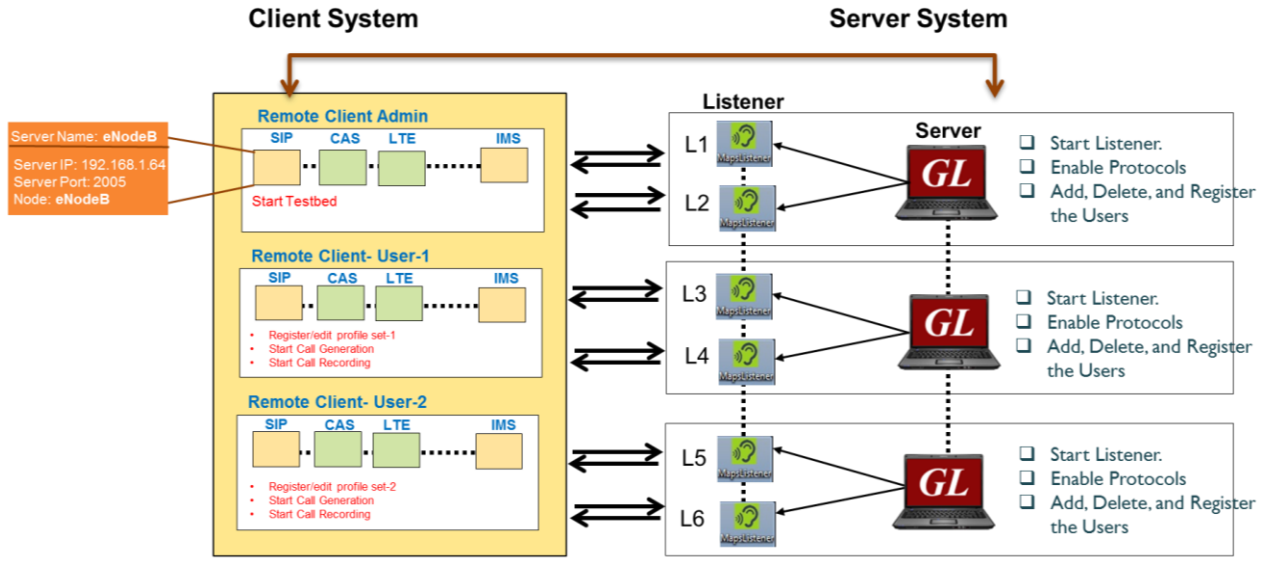
Remote MAPS Controller

- Multi-node and multi-interface simulation from a single GUI
- Suitable for testing any core network, access network, and inter-operability functions
- Single Licensing Server controlling server and client licenses (no. of users)
- Unlimited number of remote client user can be defined at the server
- Admin privileges to control Testbed and access to configuration files for each remote client user
- Remote Client users has privileges to perform all other functions - call simulation, edit scripts/profiles, and view statistics
- Simultaneous traffic generation/reception at 100% on all servers



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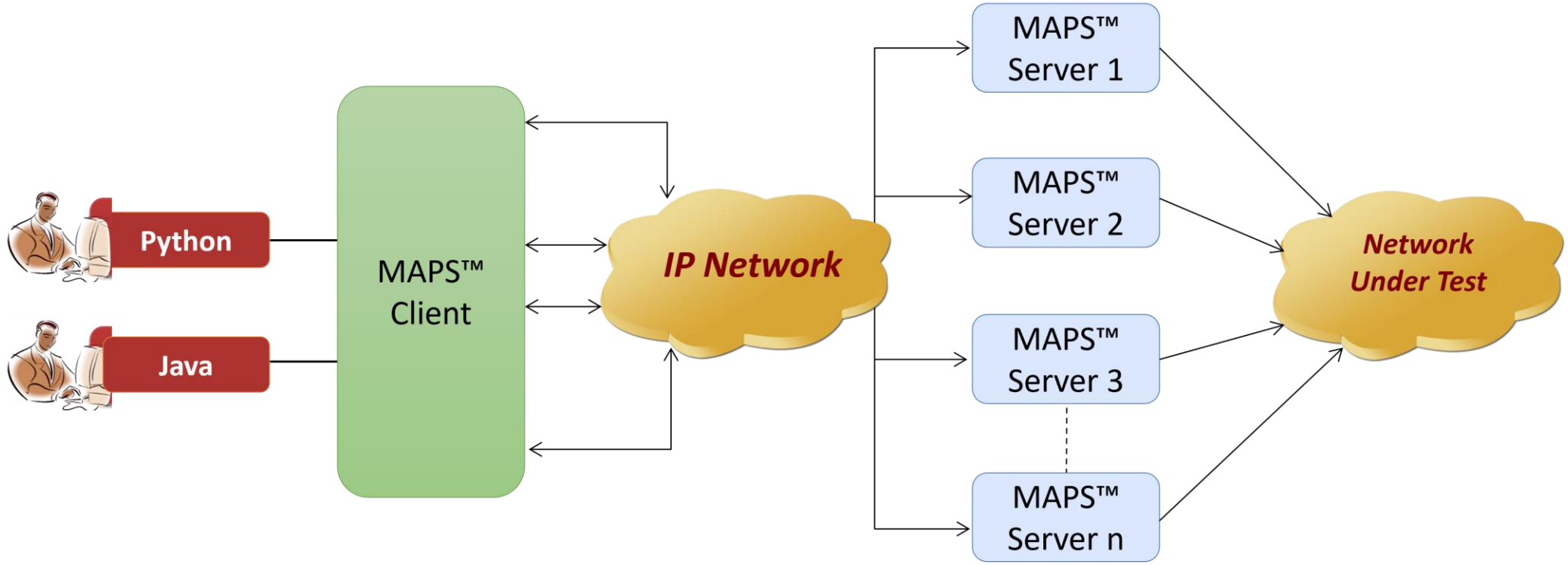
MAPS APIs



- API wraps our proprietary scripting language in standard languages familiar to the user:
  - Python
  - Java
- Clients and Servers support a “Many-to-Many” relationship, making it very easy for users to develop **complex test cases involving multiple signaling protocols**

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Thank you

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