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# MAPS™ Lb Emulator

Location Services Emulation

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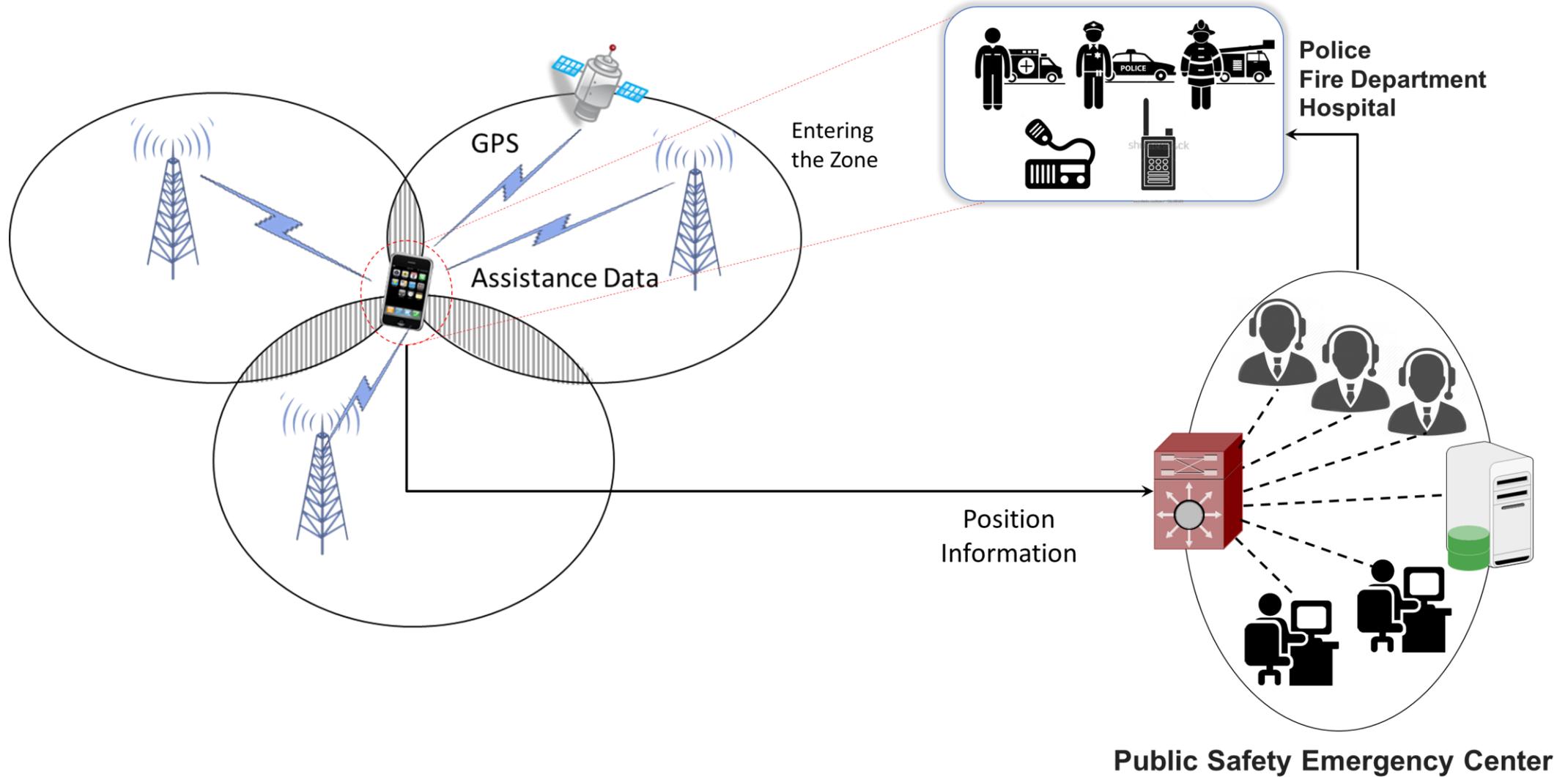
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# What is Location Service (LCS) ?



# 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

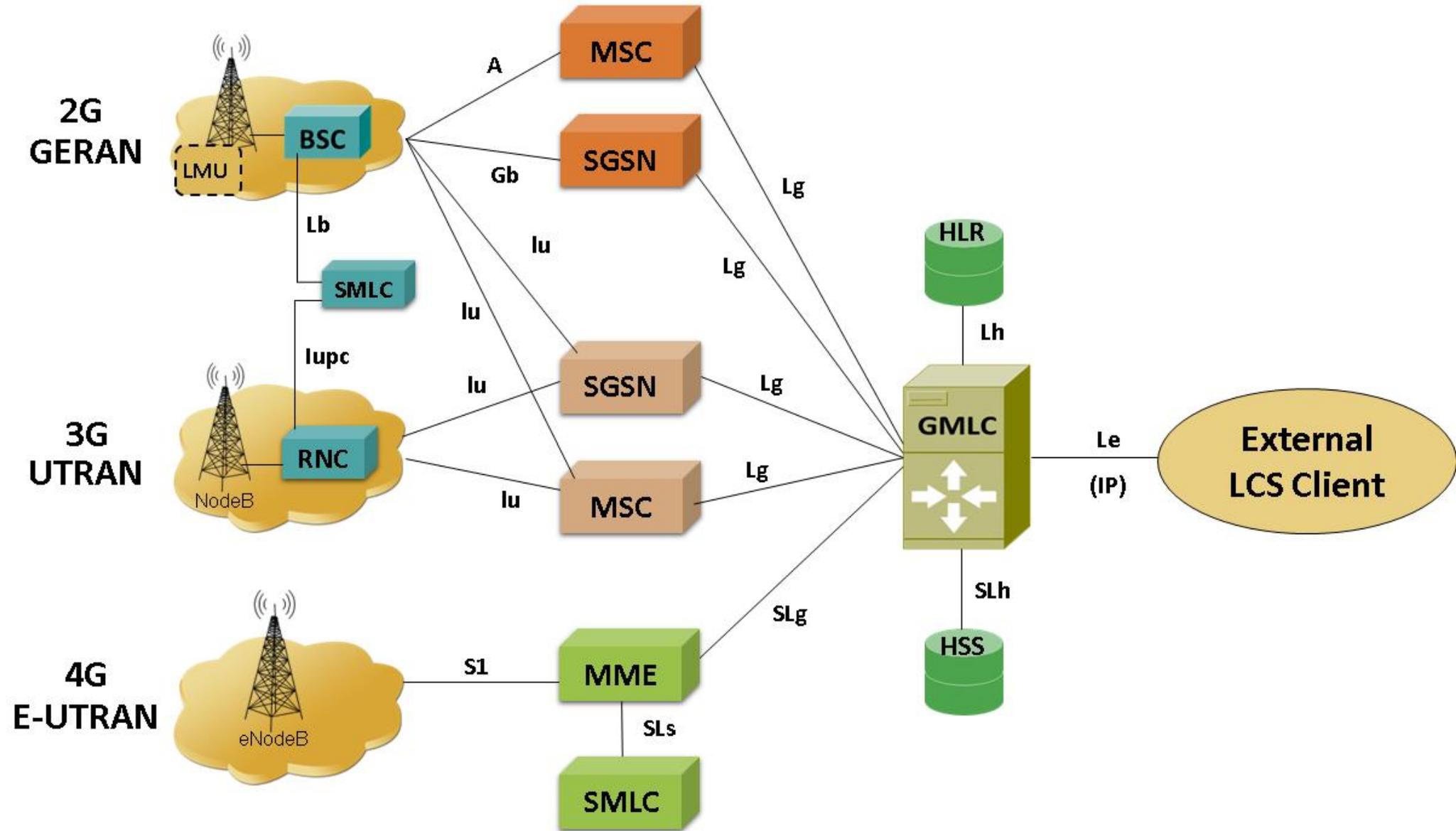
## **Location Based Information Services**

- 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.

# LCS Network Overview



# 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).

**MAPS™**

**MA - Message Automation**

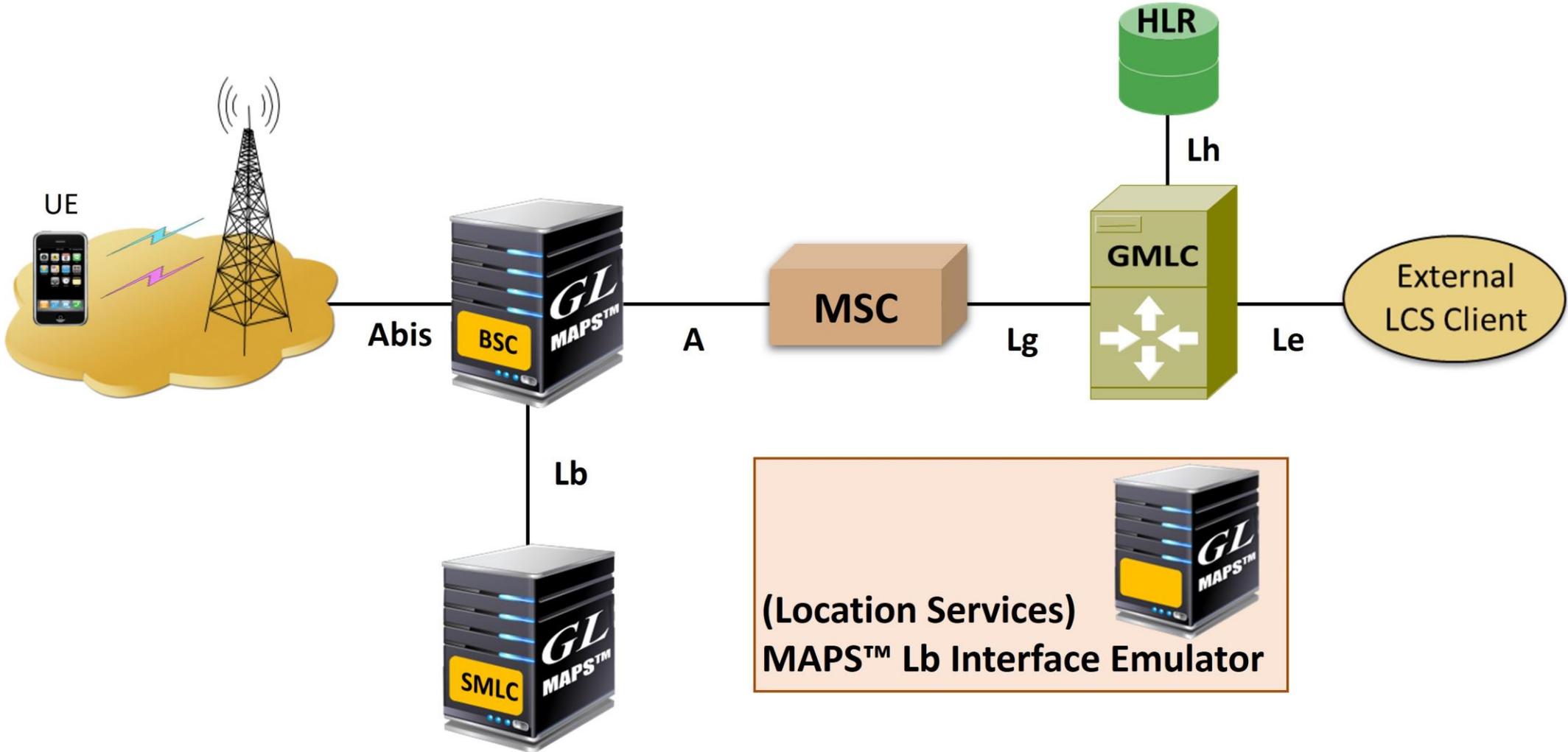
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**PS - Protocol Simulation**

# 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

# MAPS™ Lb Interface



# Supported Protocols

BSSLAP	LLP	SMLCPP
BSSAP-LE (BSSMAP-LE and DTAP-LE)		
SCCP		
M3UA		
SCTP		
IP		
MAC		
<b>Physical Layer</b>		

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

# 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

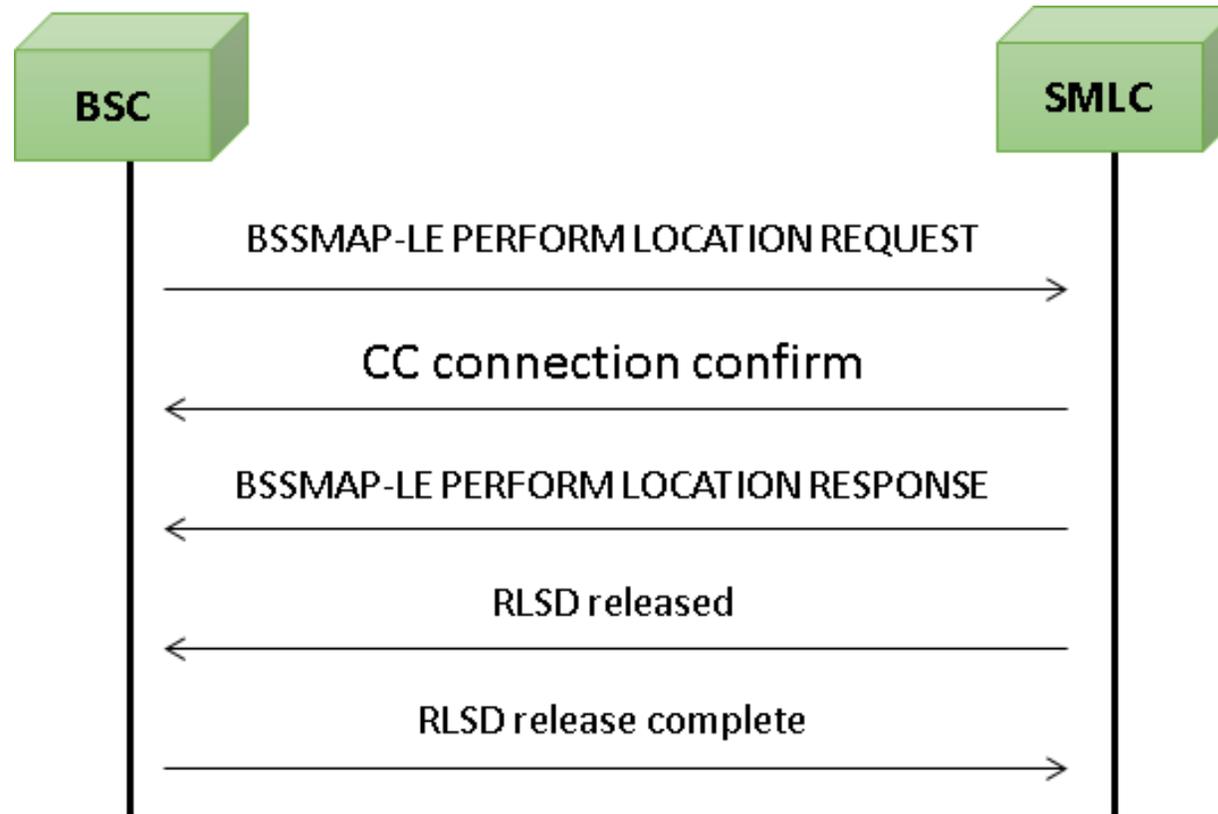
# MAPS™ Lb Procedures

The following are the supported BSSAP-LE procedures:

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

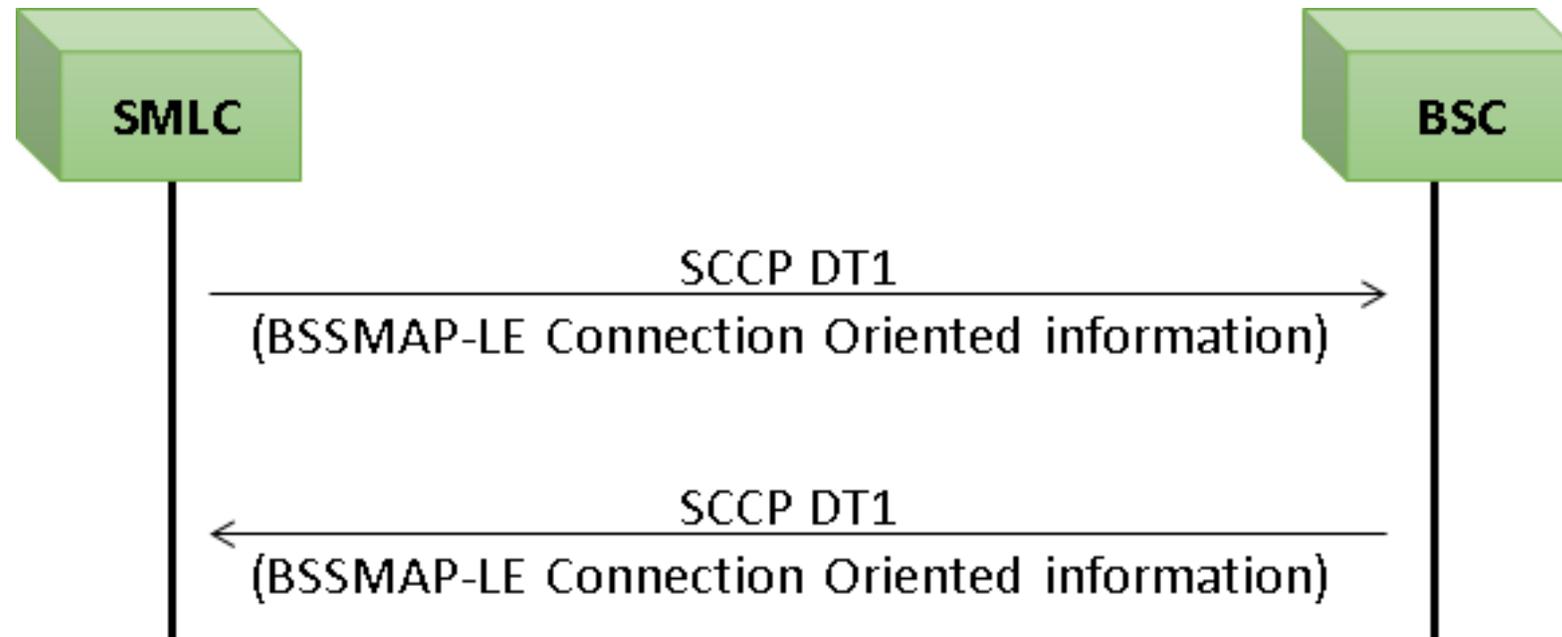
# Location Request Procedure

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



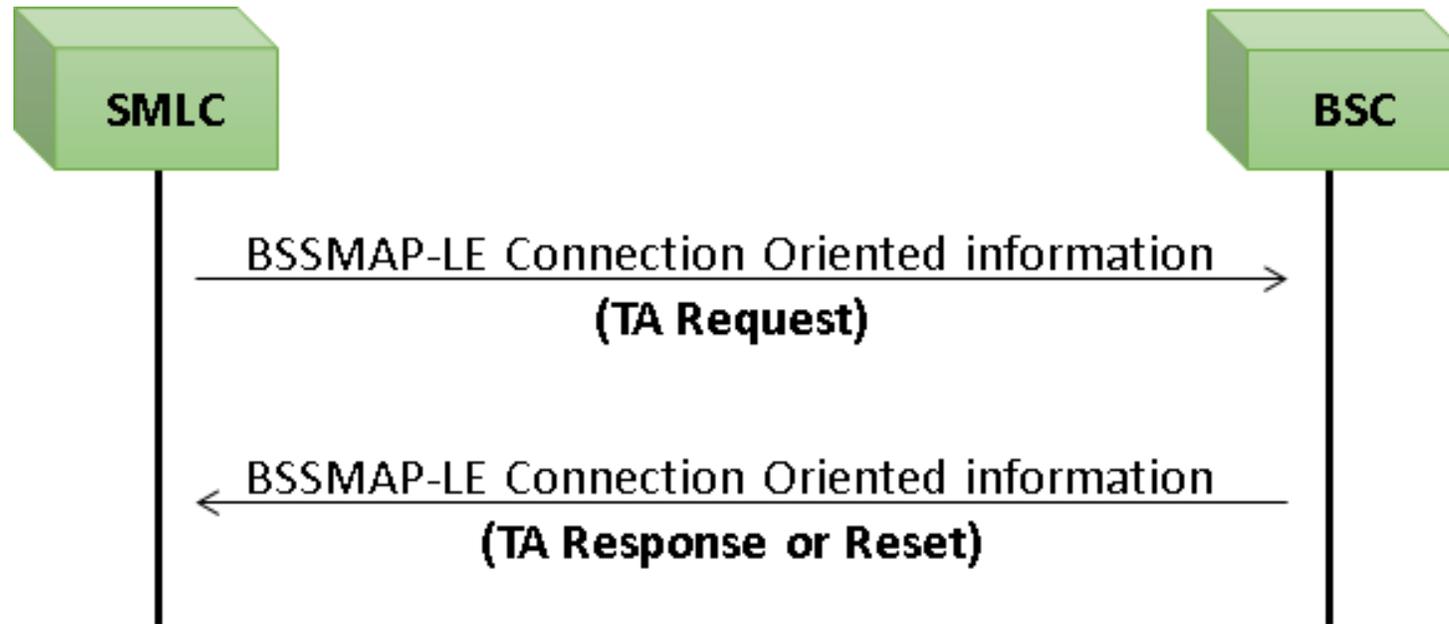
# Connection Oriented Information Transfer

- 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



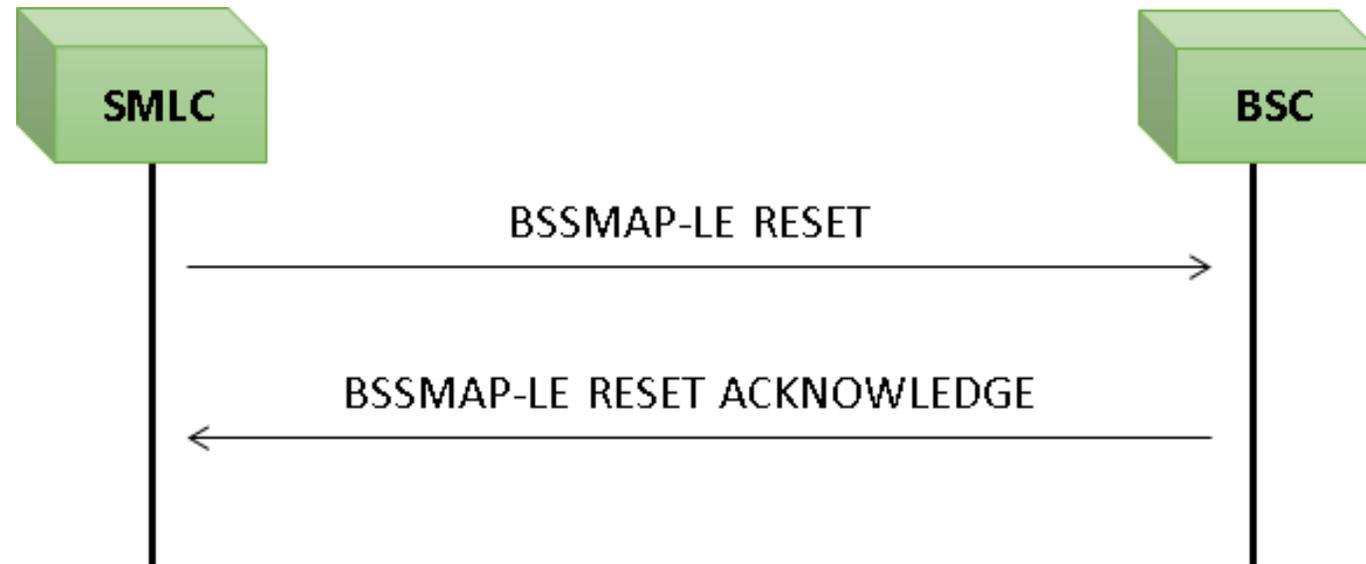
# TA Positioning Procedure

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



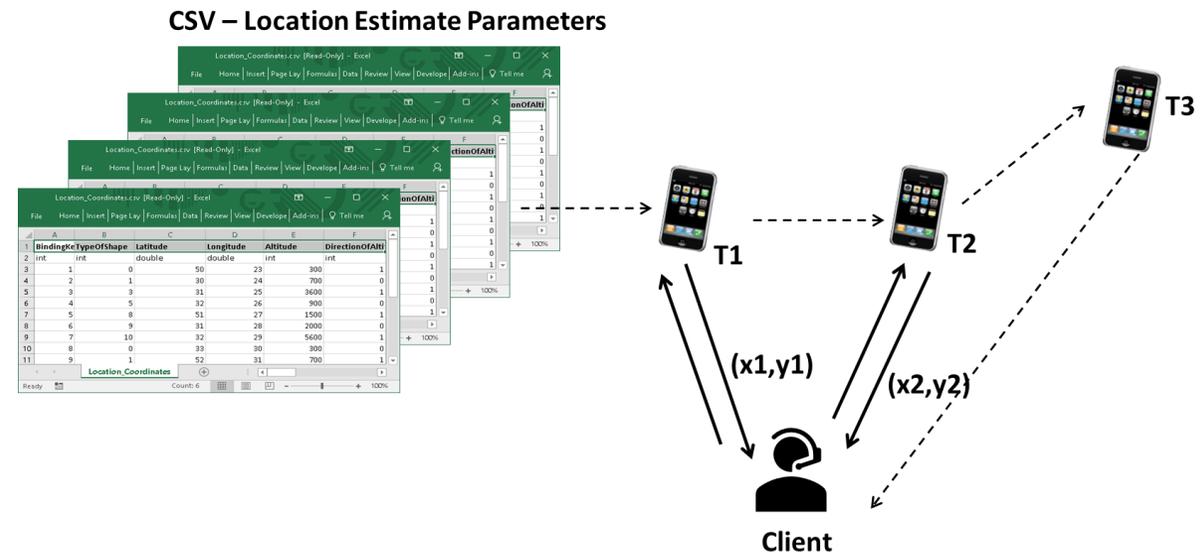
# Reset Procedure

- 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



# 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.



# Testbed Setup

MAPS (Message Automation Protocol Simulation) SMLC (Lb M3UA)

Configurations Emulator Reports Editor Debug Tools Windows Help

Testbed Setup - TestBedDefault

Config	Value	Enable
SMLC Configurations		<input checked="" type="checkbox"/>
SMLC	1	
SMLC 1		
SMLC IP Address	192.168.1.31	
PLMN Identifiers		
Mobile Country Code	901	
Mobile Network Code	70	
MTP Parameters		
SMLC Point Code	2.2.2	
Signaling Link Selection	1	
Network Indicator	International	
SMLC Address Indicator	National	
BSC Parameters		
Supported BSCs	1	
Supported BSCs 1		
BSC IP Address	192.168.1.31	
BSC Port	2905	
BSC Point Code	5.5.5	
BSC Address Indicator	National	
SMLC Port	2906	
M3UA Termination Type	IPSP	
Location Area Identifier		
Location Area Code	10000	
Cell Identity	1	
End User Configuration	SMLC_Profiles.xml	

Start Edit

# Profile Configuration

MAPS (Message Automation Protocol Simulation) SMLC (Lb M3UA)

Configurations Emulator Reports Editor Debug Tools Windows Help

Profile Editor - SMLC\_Profiles

#	Profiles (Edit-F2)	Config	Value	Enable
1	SMLCProfile0001	SMLCProfile0001		<input checked="" type="checkbox"/>
2	SMLCProfile0002	Mobile ID		
3	SMLCProfile0003	IMSI	9017000000638	
4	SMLCProfile0004	Enable TA Request	Disable	
5	SMLCProfile0005	Location Estimate Parameters		
6	SMLCProfile0006	LCS Coordinates Input Method	Profile	
7	SMLCProfile0007	LCS Coordinates CSV File Name	Location_Coordinat...	
8	SMLCProfile0008	Number Of Reports for CSV	1	
9	SMLCProfile0009	Type of Shape	Ellipsoid Point	
10	SMLCProfile0010	Degrees of Latitude	52.00	
11	SMLCProfile0011	Degrees of Longitude	70.00	
12	SMLCProfile0012	Uncertainty Code in meters	2.20	
13	SMLCProfile0013	Uncertainty Semi Major in met...	5.30	
14	SMLCProfile0014	Uncertainty Semi Minor in met...	10.90	
15	SMLCProfile0015	Orientation of Major Axis	80	
16	SMLCProfile0016	Confidence	4	
17	SMLCProfile0017	Altitude in meters	3600	
18	SMLCProfile0018	Direction Of Altitude	Altitude Expresses ...	
19	SMLCProfile0019	Uncertainty Altitude in meters	8.40	
20	SMLCProfile0020	Inner Radius	64	
		Uncertainty Radius	15	
		Offset Angle	12	
		Included Angle	8	
		Polygon Shape Parameters		
		Positioning Data Usage	Attempted Unsucce...	
		Positioning Data Method	Timing Advance	

Insert Delete Clear

Add Insert Delete Properties

Initialisation Errors Error Events Captured Errors

# Incoming Call Handler Configuration

The screenshot shows the MAPS (Message Automation Protocol Simulation) SMLC (Lb M3UA) - [Incoming Call Handlers Configura... window. The window has a menu bar with 'Configurations', 'Emulator', 'Reports', 'Editor', 'Debug Tools', 'Windows', and 'Help'. Below the menu bar is a toolbar with various icons. The main area is divided into two panes. The left pane contains a table with 'Message Name' and 'Script Name' columns. The right pane contains a 'Scripts' list and radio buttons for 'Sequence' and 'Random'. At the bottom, there are three status indicators: 'Initialisation Errors', 'Error Events', and a third one with a diagonal line.

Message Name	Script Name
ASP Up	M3UA.gls
ASP Down	M3UA.gls
ASP Active	M3UA.gls
ASP Inactive	M3UA.gls
SSA subsystem-allowed	SCMG.gls
SSP subsystem-prohibited	SCMG.gls
SDR subsystem-out-of-service-request	
SST subsystem-status-test	SCMG.gls
BSSMAP-LE PERFORM LOCATION RE...	LCS_Controller.gls
BSSMAP-LE RESET	Rx_BSSMAP-LEReset.gls

Scripts

- Sequence
- Random

Up

Down

Initialisation Errors

Error Events

# Script Editor

The screenshot displays the Script Editor application window. The title bar reads "ScriptEditor - [C:\Program Files\GL Communications Inc\MAPS-Lb\MAPS\Lb\SMMLC\M3UA\Scripts\LCS\_Controller.gls]". The menu bar includes "File", "View", "Edit", "Shortcuts", "Tools", and "Help". The toolbar contains icons for file operations and editing. The Command Window on the left shows a tree view with categories like Action, Conditional & Flow Control, Variable, Maps CLI, Logs / Comment, Init, Child Script, DataBase, Send Report, Resume, Return, Include, Exit, Utility Functions, and Traffic Commands. The main editor area shows the following script code:

```
1 //Initialize Variables
2 IMSIStr="IMSI:";
3 KeyIdentifier: IMSIStr,IMSI;
4 ProtocolStandard="Lb";
5 CallControlEnabled = "False";
6 SCCPEstablished = "False";
7 StartTime = 0;
8 ScriptIdCounter = 0;
9 LocationReportTime = 0;
10 Result = "Unknown";
11
12 if (MsgReceived)
13     if (MessageType == "BSSMAP-LE PERFORM LOCATION REQUEST")
14         LbScriptId="Location_Service";
15         CallLeg[1].ScriptId = $LbScriptId;
16         IsReception = 1;
17         StartChildScript (LbScriptId,"Lb","Lb.gls",LoadedProfileName);
18     else
19         ErrorLog ("Unexpected Message Received : ", MessageType);
20     endif
21 else
22     IsGeneration = 1;
23 endif
24
25 wait;
26
27 "OnBSSMAP-LEPerformLocationRequest"(ConnectionID,IMSI) :
28     EventLog ("Perform Location Request Received");
29     GlobalProcedures = "True";
30     goto "IdentifySMLC";
31     if (IdentifyStatus != "True")
32         ErrorLog ("Connection Not Identified");
33         exit;
34     endif
35     Loadprofile(IMSI);
36     SetScriptVariable (LbScriptId,MCC=MCC,MNC=MNC,opc=opc,dpc=dpc,NetInd=N
```

The status bar at the bottom indicates "Ready", "Line Count - 171 | Line: 1 Col: 1", and "NUM".

# Message Editor

The screenshot shows the Message Editor application window titled "Message Editor - BSSMAP-LEPerformLocationRequest". The interface includes a menu bar (File, View, Direction, Tools, Help) and a toolbar with icons for file operations and help. The main area is divided into two panes. The left pane shows a tree view of the message structure under "Frame 1":

- BSSMAP-LE
  - Discrimination bit D
  - Message Length
  - Message Type
  - InformationElements
    - Location Type
      - IE Identifier(LT)
      - Length of Location Type
      - Location Information
    - Cell Identifier
      - IE Identifier(CI)
      - Length Of Cell Identifier

The right pane shows a dropdown menu with the following options:

- BSSMAP-LE PERFORM LOCATION REQUEST = 43 (selected)
- BSSMAP-LE CONNECTION ORIENTED INFORMATION = 42
- BSSMAP-LE PERFORM LOCATION RESPONSE = 45
- BSSMAP-LE PERFORM LOCATION ABORT = 46
- BSSMAP-LE PERFORM LOCATION INFORMATION = 47
- BSSMAP-LE RESET = 48
- BSSMAP-LE RESET ACKNOWLEDGE = 49
- BSSMAP-LE CONNECTIONLESS INFORMATION = 58

The bottom pane displays a hex dump of the message structure:

```
===== MTP3 User Adaptation Layer ===== =
0000 Version = 00000001 Release 1.0
0002 Message Class = 00000001 Transfer
0003 Transfer Message Type = 00000001 Payload Data
0004 Message Length = 76 (x0000004C)
Protocol Data =
0008 Tag = x0210 Transfer Protocol Data
000A Length = 68 (x0044)
Originating Point Code =
000E Point Code = 1.1.1(..001000 00001001)
Destination Point Code =
0012 Point Code = 2.2.0(..010000 00010000)
0014 Service Indicator = ....0011 SCCP
0015 Network Indicator = .....10 National Network
0016 Message Priority = .....00 Priority Code 0
0017 Signalling Link Selection = 1 (x01)
Pdu = x0109FBF122020402C2FE040242FE0F2300

===== SCCP Layer ===== =
0018 Message Type = 00000001 CR connection request
Mandatory Fixed Parameters =
Source Local Reference Parameter =
0019 Source Local Reference = 654321 (x09FBF1)
Protocol Class Parameter =
```

# Global Configuration

The screenshot shows the 'Global Configuration' window in the MAPS software. The window title is 'MAPS (Message Automation Protocol Simulation) SMLC (Lb M3UA) - [Global Confi...'. The menu bar includes 'Configurations', 'Emulator', 'Reports', 'Editor', 'Debug Tools', 'Windows', and 'Help'. The toolbar contains icons for various functions like save, print, and refresh. The main area is divided into a tree view on the left and a table on the right. The tree view shows a hierarchy of configuration categories: Global Configuration, M3UA Parameters, M3UA Specific Timers, SCMG Timers, SCCP Parameters, and Lb Specific Timers. The table on the right lists the values for each parameter, with an 'Enable' checkbox on the far right. At the bottom of the window, there are 'Apply' and 'Edit' buttons, and a status bar with 'Initialisation Errors' and 'Error Even' indicators.

Config	Value	Enable
Global Configuration		<input checked="" type="checkbox"/>
M3UA Parameters		
Dynamic Registration	Not Required	
Destination Audit	Not Required	
M3UA Specific Timers		
TackTimer in msec	2000	
TbeatTimer in msec	30000	
DAUDTimer in msec	5000	
SCMG Timers		
Trbss in msec	10000	
Tstatinfo in msec	60000	
SCCP Parameters		
Tack Timer in msec	20000	
Response Timer in msec	20000	
Status Report Timer in msec	10000	
Tint Timer in msec	60000	
Tias Timer in msec	300000	
Tiar Timer in msec	660000	
Trel Timer in msec	20000	
Trepeat rel Timer in msec	20000	
Lb Specific Timers		
Location Timer in msec	10000	
BSSMAP LE Reset Timer in msec	3000	
TA Response Timer in msec	10000	

# Call Generation

GL MAPS (Message Automation Protocol Simulation) BSC (Lb M3UA) - [Call Generation - CallGenDefault]

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr...	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Profile	Result	Total Iterations	Completed ...
1	LCS_Controller.gls	BSCProfile0001	IMSI:9017000000638	Start	SCCP Connection Released	None		Pass	1	1
2	LCS_Controller.gls	BSCProfile0001		Start		None		Unknown	1	0
3	LCS_Controller.gls	BSCProfile0001		Start		None		Unknown	1	0

Add Delete Insert Refresh Start Start All Stop Stop All Abort Abort All

Save Column Width Show Latest

BSC SMLC

```

BSSMAP-LE PERFORM LOCATION REQUEST 18:13:35.101000
CC connection confirm 18:13:35.269000
BSSMAP-LE PERFORM LOCATION RESPONSE 18:13:35.269000
RLSD released 18:13:35.270000
RLC release complete 18:13:35.271000
        
```

Find

```

===== MTP3 User Adaptation Layer =====
0000 Version = 00000001 Release 1.0
0002 Message Class = 00000001 Transfer
0003 Transfer Message Type = 00000001 Payload Data
0004 Message Length = 76 (x0000004C)
Protocol Data =
0008 Tag = x0210 Transfer Protocol Data
000A Length = 68 (x0044)
Originating Point Code =
000E Point Code = 5.5.5(..101000 00101101)
Destination Point Code =
0012 Point Code = 2.2.2(..010000 00010010)
0014 Service Indicator = ....0011 SCCP
0015 Network Indicator = .....00 International network
0016 Message Priority = .....00 Priority Code 0
0017 Signalling Link Selection = 1 (x01)
Pdu = x01000
===== SCCP Layer =====
0018 Message Type = 00000001 CR connection request
Mandatory Fixed Parameters =
Source Local Reference Parameter =
0019 Source Local Reference = 2 (x000002)
Protocol Class Parameter =
001C Class = ...0010 Class 2
001C Message Handling (Class 0 and 1 only) = 0010.... Spare
        
```

Scripts Message Sequence Event Config Script Flow

● Initialisation Errors ● Error Events ● Captured Errors ● Link Status Up=1 Down=0

# Call Reception

GL MAPS (Message Automation Protocol Simulation) SMLC (Lb M3UA) - [Call Reception]

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Profile	Results
1	M3UA.gls		1000	Stop	ASP Active	Send-Heartbeat		Pass
2	SCMG.gls		1000	Stop	Subsystem-Allowed	Initiate SST		Pass
3	LCS_Controller.gls		IMSI: 90170000000638	Completed	SCCP Released	None		Pass

Stop Stop All Abort Abort All  Show Records  Select Active Call  Auto Trash Trash

Save Column Width  Show Latest

BSC 0 SMLC

```

      BSSMAP-LE PERFORM LOCATION REQUEST 18:13:35.214000
      CC connection confirm 18:13:35.215000
      BSSMAP-LE PERFORM LOCATION RESPONSE 18:13:35.216000
      RLSD released 18:13:35.217000
      RLC release complete 18:13:35.318000
          
```

Find

```

===== MTP3 User Adaptation Layer =====
0000 Version = 00000001 Release 1.0
0002 Message Class = 00000001 Transfer
0003 Transfer Message Type = 00000001 Payload Data
0004 Message Length = 76 (x0000004C)
Protocol Data =
0008 Tag = x0210 Transfer Protocol Data
000A Length = 68 (x0044)
Originating Point Code =
000E Point Code = 5.5.5(..101000 00101101)
Destination Point Code =
0012 Point Code = 2.2.2(..010000 00010010)
0014 Service Indicator = ....0011 SCCP
0015 Network Indicator = .....00 International network
0016 Message Priority = .....00 Priority Code 0
0017 Signalling Link Selection = 1 (x01)

===== SCCP Layer =====
0018 Message Type = 00000001 CR connection request
Mandatory Fixed Parameters =
Source Local Reference Parameter =
0019 Source Local Reference = 2 (x0000002)
Protocol Class Parameter =
001C Class = ....0010 Class 2
001C Message Handling (Class 0 and 1 only) = 0010.... Spare
          
```

Scripts **Message Sequence** Event Config Script Flow

● Initialisation Errors ● Error Events ● Captured Errors ● Link Status Up=1 Down=0

# 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
2021-10-18 15:27:25.047000	Perform Location Request Sent	IMSI:90170000000641	LCS_Controller.gls	CGProtScriptId-5-1205205082-9751-8240

Save Events

Clear  Capture Events to file

Initialisation Errors Error Events Captured Errors Lin

# Bulk Call Generation

GL MAPS (Message Automation Protocol Simulation) BSC (Lb M3UA) - [Call Generation ]

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr ...	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Profile	Result	Total Iterations	Completed ...
1	LCS_Controller.gls	BSCProfile0001	IMSI:;90170000000638	Start	SCCP Connection Released	None		Pass	10	10
2	LCS_Controller.gls	BSCProfile0001	IMSI:;90170000000638	Start	SCCP Connection Released	None		Pass	10	10
3	LCS_Controller.gls	BSCProfile0001	IMSI:;90170000000638	Start	SCCP Connection Released	None		Pass	10	10
4	LCS_Controller.gls	BSCProfile0001	IMSI:;90170000000638	Start	SCCP Connection Released	None		Pass	10	10
5	LCS_Controller.gls	BSCProfile0001	IMSI:;90170000000638	Start	SCCP Connection Released	None		Pass	10	10
6	LCS_Controller.gls	BSCProfile0001	IMSI:;90170000000638	Start	SCCP Connection Released	None		Pass	10	10
7	LCS_Controller.gls	BSCProfile0001	IMSI:;90170000000638	Start	SCCP Connection Released	None		Pass	10	10
8	LCS_Controller.gls	BSCProfile0001	IMSI:;90170000000638	Start	SCCP Connection Released	None		Pass	10	10
9	LCS_Controller.gls	BSCProfile0001	IMSI:;90170000000638	Start	SCCP Connection Released	None		Pass	10	10
10	LCS_Controller.gls	BSCProfile0001	IMSI:;90170000000638	Start	SCCP Connection Released	None		Pass	10	10

Add Delete Insert Refresh Start Start All Stop Stop All Abort Abort All

Save Column Width Show Latest

BSC SMLC

```

BSSMAP-LE PERFORM LOCATION REQUEST → 15:16:14.554000
← CC connection confirm 15:16:14.647000
← BSSMAP-LE PERFORM LOCATION RESPONSE 15:16:14.647000
← RLSd released 15:16:14.647000
← RLC release complete → 15:16:14.648000
                    
```

Find

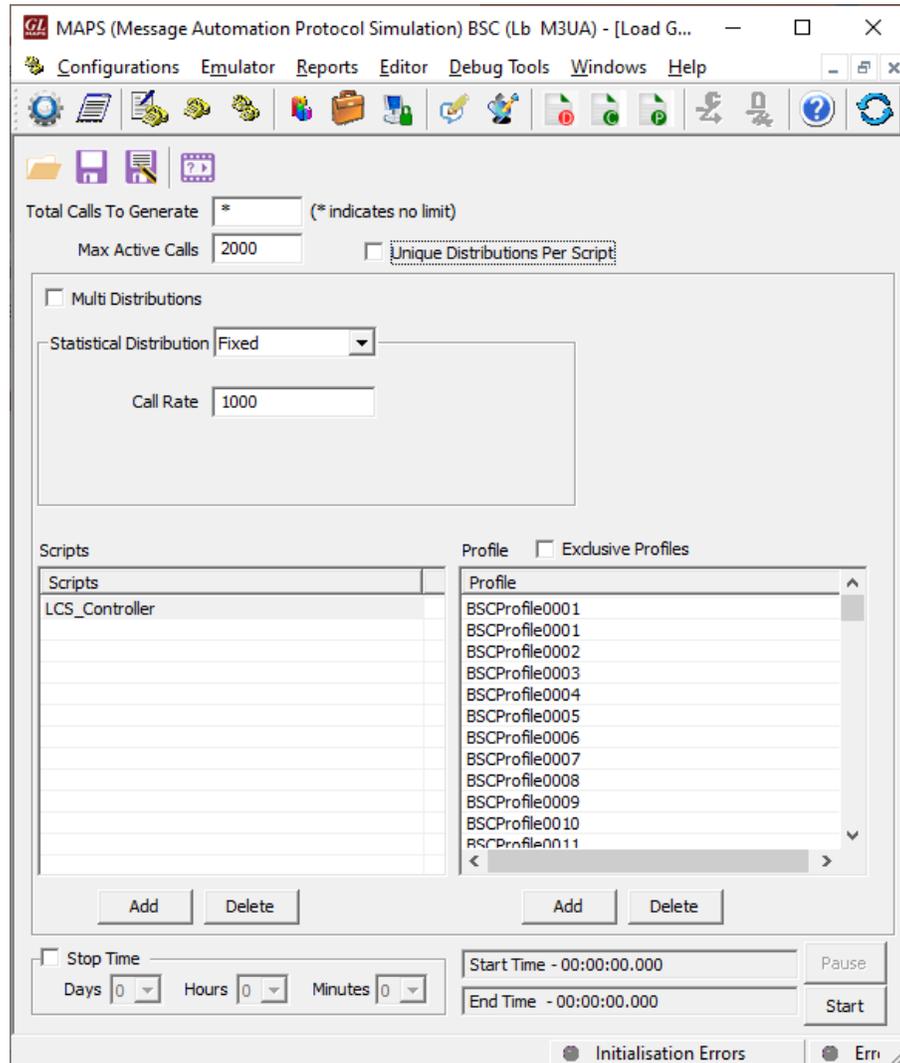
```

===== MTP3 User Adaptation Layer =====
0000 Version = 00000001 Release 1.0
0002 Message Class = 00000001 Transfer
0003 Transfer Message Type = 00000001 Payload Data
0004 Message Length = 76 (x0000004C)
      Protocol Data =
0008 Tag = x0210 Transfer Protocol Data
000A Length = 68 (x0044)
      Originating Point Code =
      Point Code = 5.5.5(..101000 00101101)
      Destination Point Code =
      Point Code = 2.2.2(..010000 00010010)
0014 Service Indicator = ....0011 SCCP
0015 Network Indicator = .....00 International network
0016 Message Priority = .....00 Priority Code 0
0017 Signalling Link Selection = 1 (x01)
Pdu =
===== SCCP Layer =====
                    
```

Scripts Message Sequence Event Config Script Flow

● Initialisation Errors ● Error Events ● Captured Errors ● Link Status Up=1 Down=0

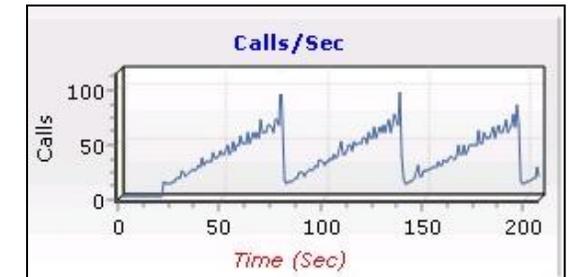
# Load Generation



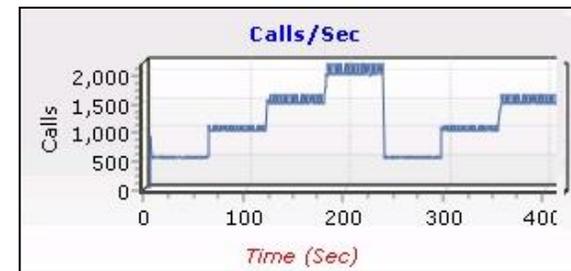
Saw-tooth Statistical Distribution



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.

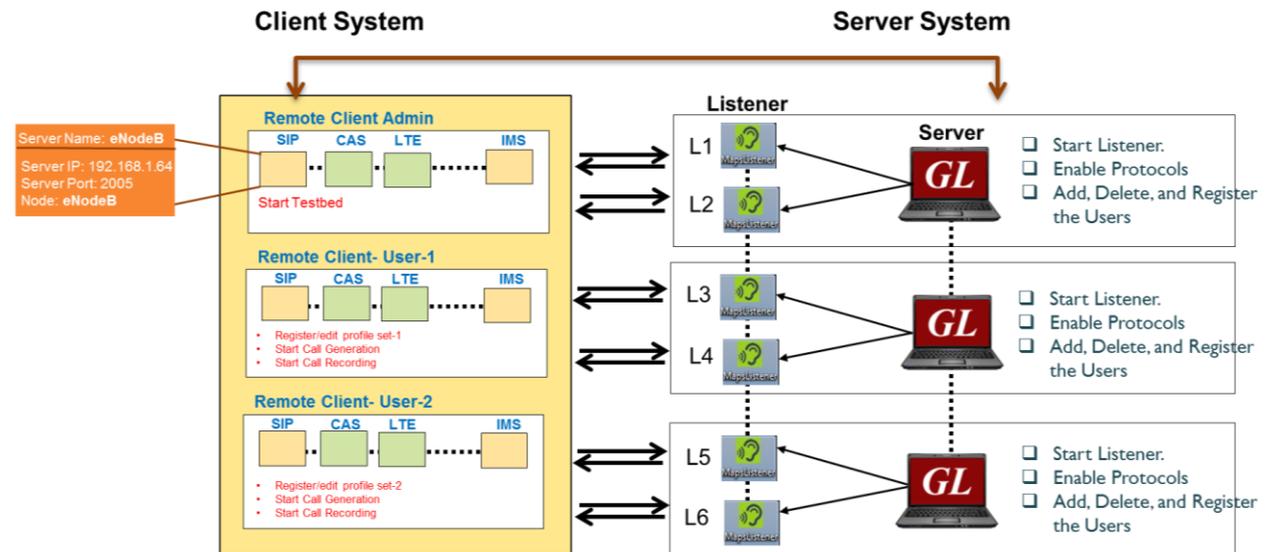
# High Density (HD) Traffic Simulation



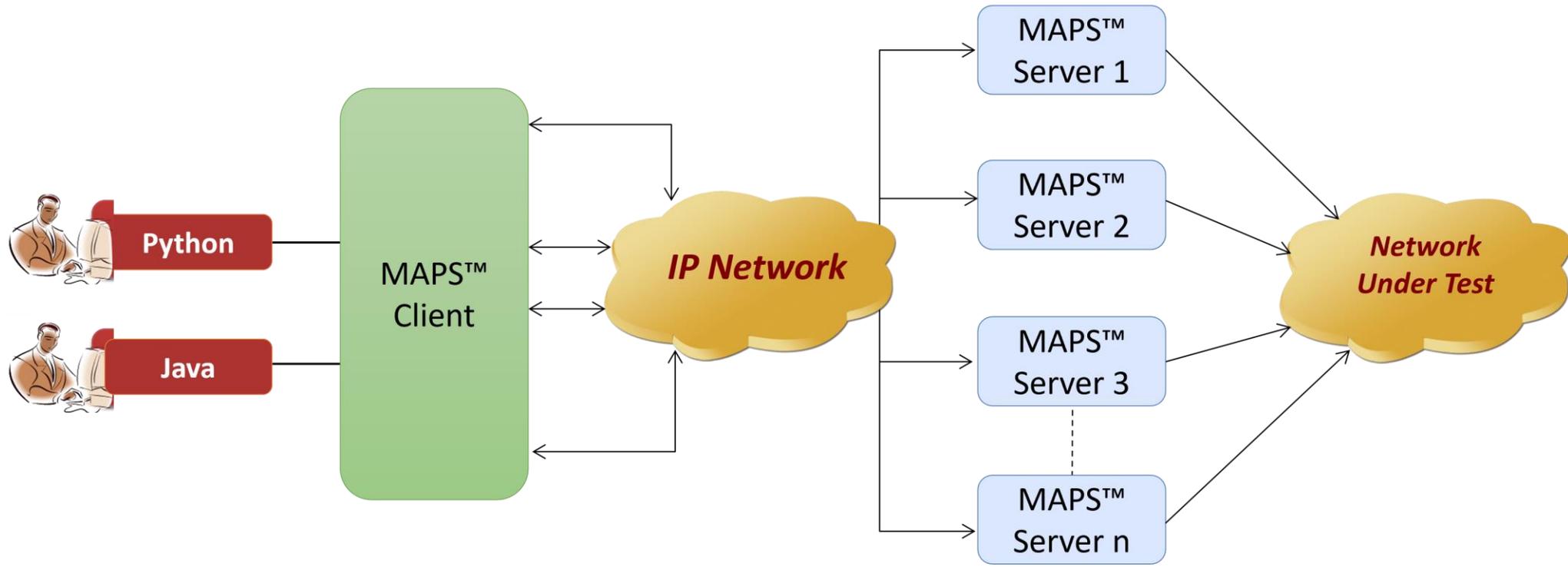
- IP variants of MAPS can be run on any modern Windows server.
- A typical i7 platform will be able to handle ~2000 concurrent RTP sessions through a conventional server-grade NIC
- We also offer an HD (High Density) appliance which
- can deliver up to 20,000 concurrent RTP sessions per U of rack space.

# 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



# 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**

**Thank you**