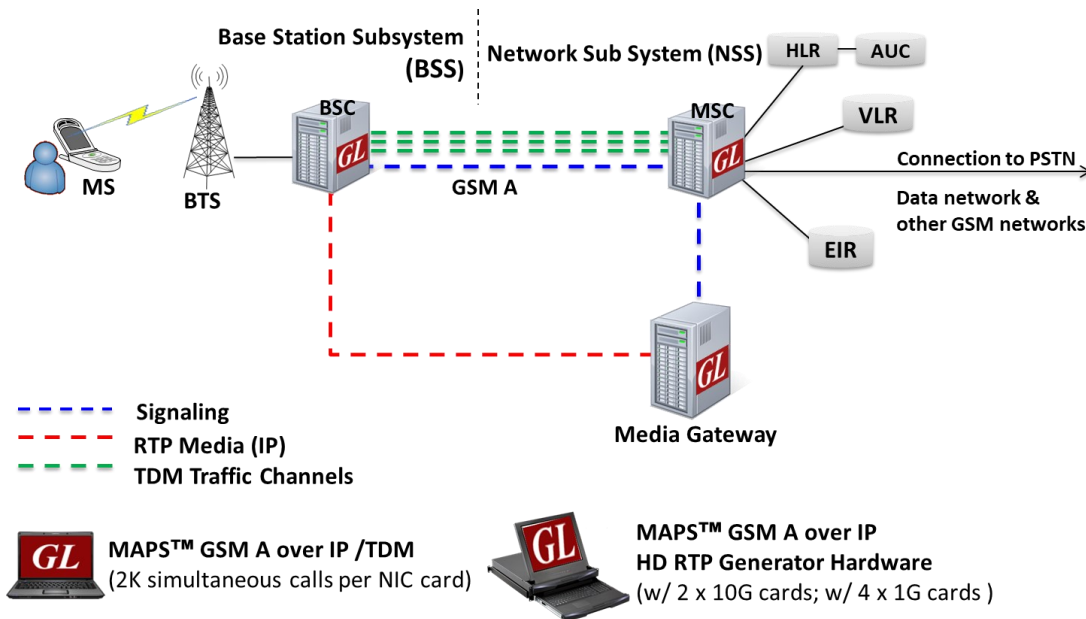


MAPS™ GSM A over IP

(Scripted GSM A Interface Emulation over IP)



Overview

GL's MAPS™ GSM A over IP Emulator is an advanced protocol emulator and a traffic generator designed for GSM A interface over IP, which can emulate BSSMAP and DTAP messages and signaling specification as defined by 3GPP standards. The emulator supports testing network elements MSC and BSC, error tracking, regression testing, conformance testing, and load testing (call generation). MAPS™ GSM A over IP supports send/receive SMS simultaneously using signaling channel with the voice/data/fax service over a GSM network.

With the purchase of RTP Core license (PKS102), MAPS™ GSMAoIP application supports emulation of CS domain RTP traffic such as, digits, voice file, video, tone, fax, and VQT over IP networks.

MAPS™ GSMA over IP also supports high volume of calls with traffic emulation using MAPS™ HD (High Density) network appliance, which has either four 1 Gbps or two 10 Gbps Ethernet ports.

MAPS™ HD (PKS109) is a network appliance is designed to easily achieve up to 20,000 endpoints per appliance (5000 per port). This high density multi-protocol 1U rack mounted Network emulation Appliance is available in the following appliance: 4x1GigE, 2x1/10 GigE, and 2x40/100 GigE.

MAPS™ supports Command Line Interface (CLI) allowing remote controlling of the application through multiple [command-line based clients](#) with additional licensing. clients are TCL, Python, VBScript, Java and .Net.

For more details, visit [MAPS™ GSM A Interface Emulator](#) webpage.



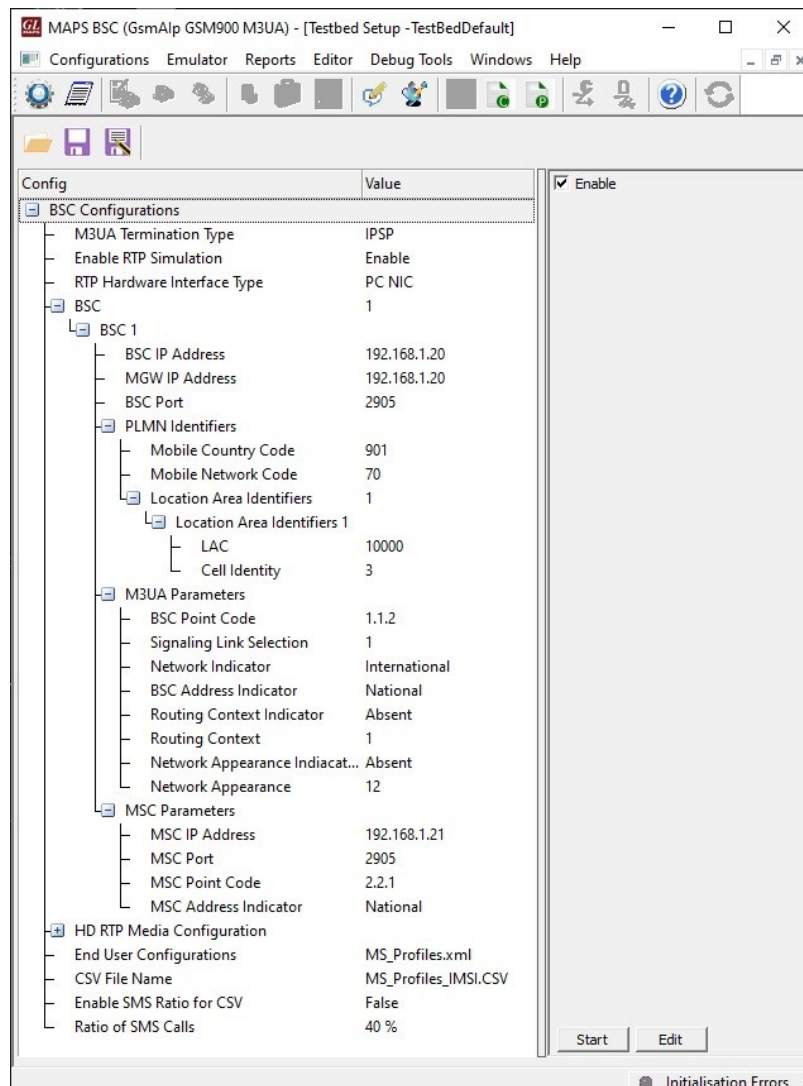
818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A
 (Web) www.gl.com - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) info@gl.com

Main Features

- Setup a virtual real-time GSM network emulating all the network elements using 2G and 2.5G GSM GPRS Communications network Lab Suite
- Supports CS domain RTP traffic emulation Digits, Voice File, Tone, Fax, IVR, and Voice Quality
- Supported codec types includes G.711, G.729, G.726, GSM, AMR, EVRC, SMV, iLBC, SPEEX, G.722, and more. *AMR, EVRC variants requires additional licenses
- High density of up to 20,000 calls with traffic is easily achievable per appliance (5000 calls per port)
- User-friendly GUI for configuring the SCTP/TCP Layer
- Supports all Call Control, Mobility Management, Radio Resource Management messages, and SMS (Short Message Service)
- Access to all BSSMAP and DTAP message parameters like TMSI, IMSI, CIC, MCC, LAC, and more
- Ready scripts for Mobile Originating, Mobile Terminating, Location Updating procedures, Mobile Originating and Terminating SMSes, Handover Management procedure and Supplementary Service Activation Call procedure
- Supports bulk call generation using CSV profiles configured with up to 20,000 subscribers entries. CSV profile includes UE parameters such as IMSI, TMSI, MSISDN

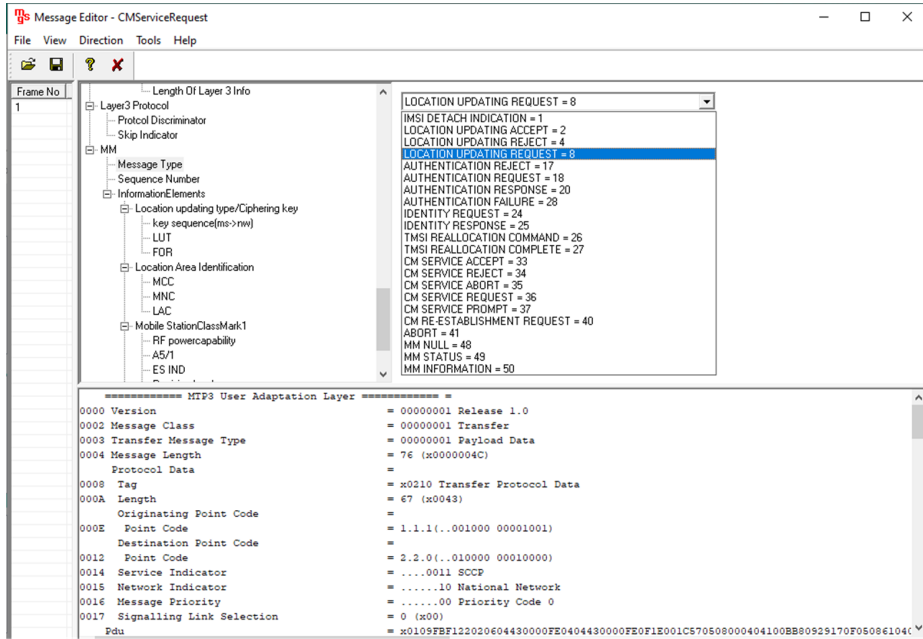
Testbed Setup Configuration

Test Bed setup is provided to establish communication between MAPS™ GSM A over IP and the DUT. It includes parameters for configuring SCTP layer to emulate GSM A messages over SCTP layer. End user configuration profile used to configure MAPS™ GSM A with supported node parameters. Option to configure CSV based UE/Subscriber profiles. For massive UE emulation, it is recommended to use CSV option, with which MAPS™ can access the UE related information directly from CSV files.

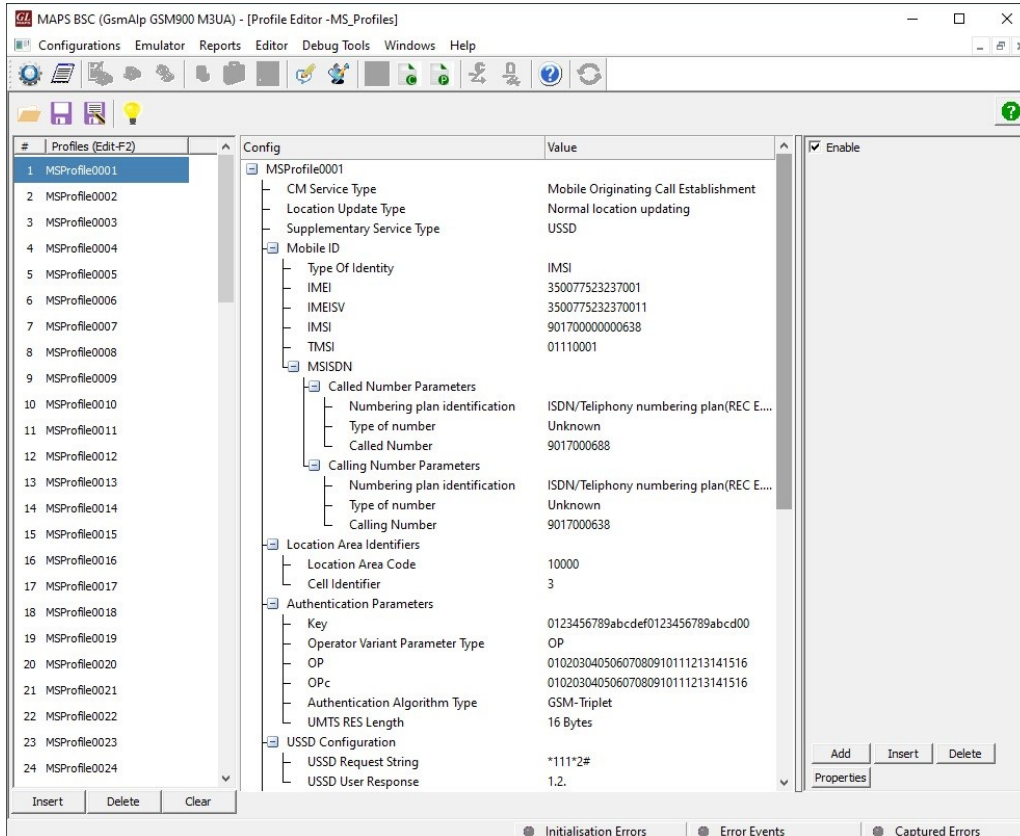


Pre-processing Tools

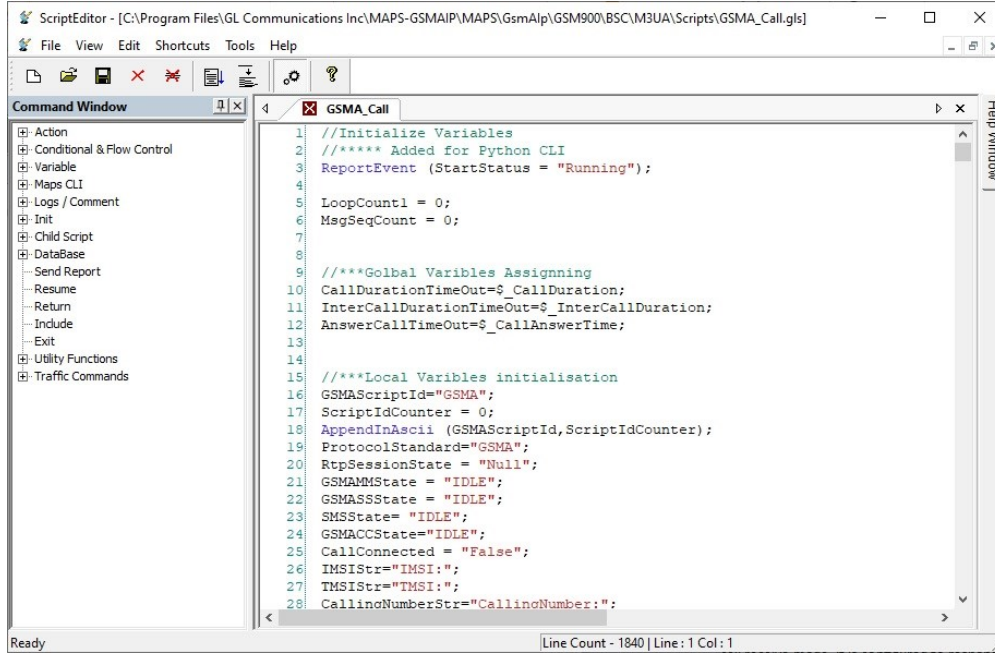
MESSAGE EDITOR - With message editor, users can build a template for each protocol message type. The value for each field may be changed in the message template prior to testing. The protocol fields comprises of mandatory fixed parameters, mandatory variable parameters, and optional variable parameters.



PROFILE EDITOR - The profile editor allows user to edit or create profiles in order to define run-time values to the variables for the message templates. The users can edit the values of the variables thus 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. Users can now enable the traffic option and choose to set either TrafficDigits/ TrafficFile/ TrafficTones/ TrafficFax/ IVR / User-defined traffic types to set and perform over Traffic established call between the nodes.



SCRIPT EDITOR - The script editor allows the user to create / edit scripts and also import/export files that define variables for the message template parameters. The script uses pre-defined message templates to perform send and receive actions. The editor allows to run the added scripts sequentially (in-order) or randomly (any script from the list of added scripts as per the call flow requirements).



Call Generation and 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 may be started manually or they can be automatically triggered by incoming messages.

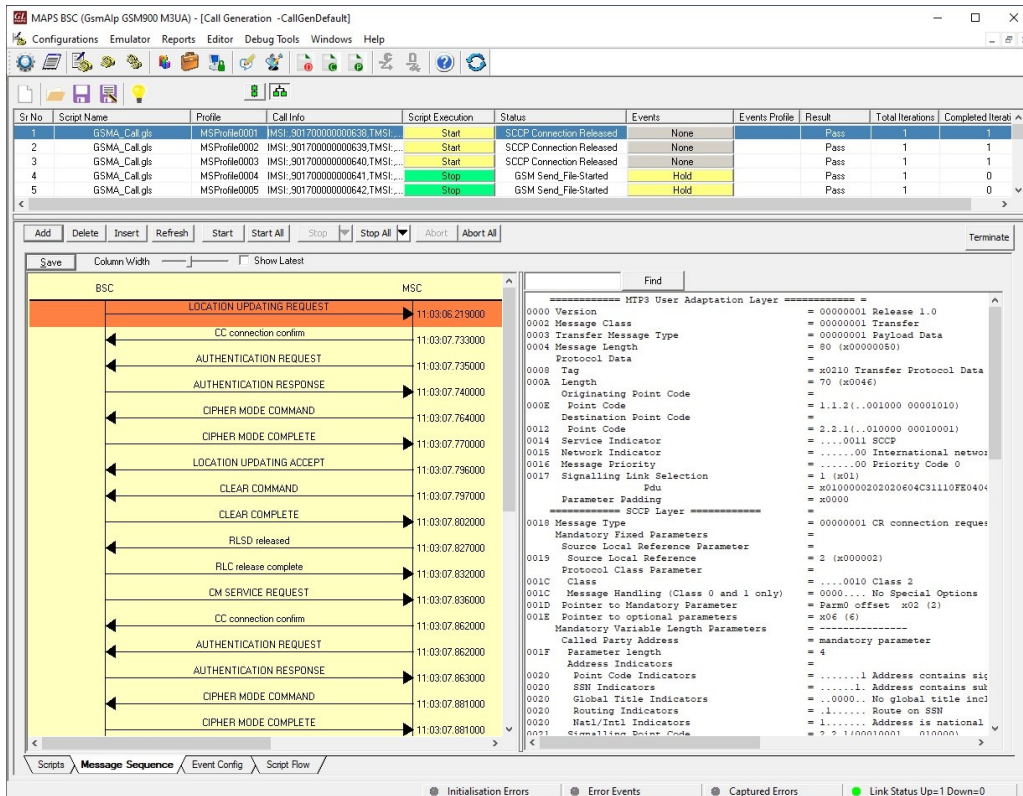


Figure: Call Generation

Call Generation and Reception (Contd.)

The screenshot displays the MAPS MSC (GsmAlp GSM900 M3UA) - [Call Reception] interface. At the top, a table lists script execution details:

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Results
1	M3UA.gls		1000	Stop	ASP Active	Send-ASPDown	Pass
2	SCMG.gls		1000	Stop	Subsystem-Allowed	Initiate SST	Pass
3	GSMA_Call.gls	MSPProfile0001	IMSI: .901700000000638, CalledNumber: .9017000688	Stop	Record File-Completed	Terminate	Pass
4	GSMA_Call.gls	MSPProfile0002	IMSI: .901700000000639, CalledNumber: .9017000689	Stop	GSM Send_File-Started	Terminate	Pass
5	GSMA_Call.gls	MSPProfile0003	IMSI: .901700000000640, CalledNumber: .9017000690	Stop	GSM Send_File-Started	Terminate	Pass
6	GSMA_Call.gls	MSPProfile0004	IMSI: .901700000000641, CalledNumber: .9017000691	Stop	GSM Send_File-Started	Terminate	Pass
7	GSMA_Call.gls	MSPProfile0005	IMSI: .901700000000642, CalledNumber: .9017000692	Stop	GSM Send_File-Started	Terminate	Pass
8	GSMA_Call.gls	MSPProfile0006	IMSI: .901700000000643, CalledNumber: .9017000693	Stop	SMS Submit Report Sent	Terminate	Pass

Below the table, a message sequence diagram shows the interaction between BSC 0 and MSC. The sequence includes:

- CM SERVICE REQUEST (11:10:55.453000)
- CC connection confirm (11:10:55.460000)
- AUTHENTICATION REQUEST (11:10:55.468000)
- AUTHENTICATION RESPONSE (11:10:55.488000)
- CIPHER MODE COMMAND (11:10:55.493000)
- CIPHER MODE COMPLETE (11:10:55.512000)
- SETUP (11:10:55.513000)
- CALL PROCEEDING (11:10:55.516000)
- ASSIGNMENT REQUEST (11:10:55.517000)
- ASSIGNMENT COMPLETE (11:10:55.542000)
- ALERTING (11:10:55.546000)
- CONNECT (11:10:56.565000)
- CONNECT ACKNOWLEDGE (11:10:56.587000)
- File Recorded :: C:\Program Files\GL Communications Inc\MAPS-GSMAIP (11:11:21.595000)

On the right, a detailed protocol stack is shown, including:

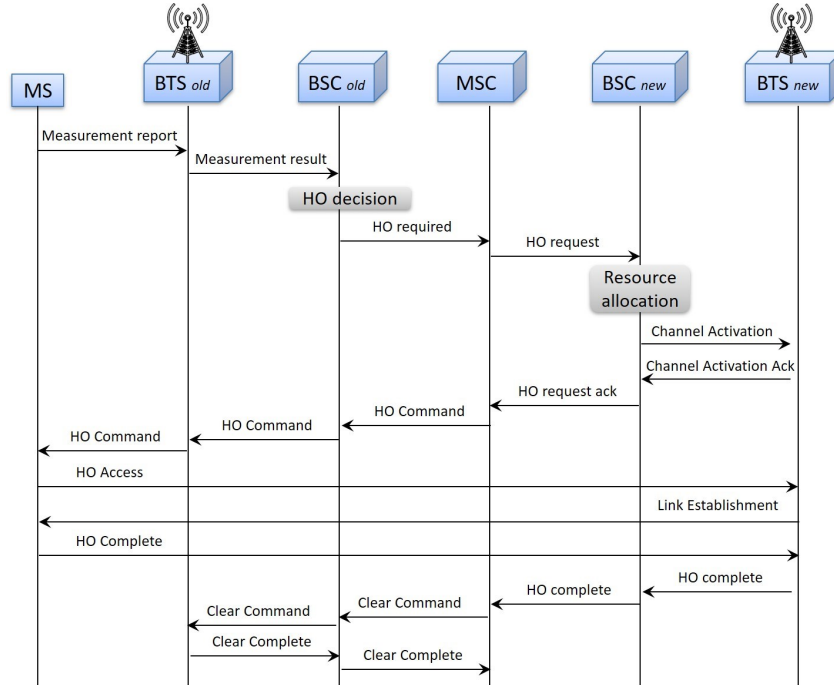
- MTP3 User Adaptation Layer:**
 - 0000 Version = 00000001 Release 1.0
 - 0002 Message Class = 00000001 Transfer
 - 0003 Transfer Message Type = 00000001 Payload Data
 - 0004 Message Length = 76 (x0000004C)
 - 0008 Tag = x0210 Transfer Protocol Data
 - 000A Length = 68 (x0044)
 - 000E Originating Point Code = 1.1.2(...001000 00001010)
 - 0012 Destination Point Code = 2.2.1(...010000 00010001)
 - 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
 - 0019 Source Local Reference = 13 (x00000D)
 - 001C Class =0010 Class 2
 - 001E Pointer to optional parameters = x06 (6)
 - 001F Parameter length = 4
 - 0020 Address Indicators = 1 Address contains signal

The interface also includes a status bar at the bottom showing: Initialisation Errors, Error Events, Captured Errors, and Link Status Up=1 Down=0.

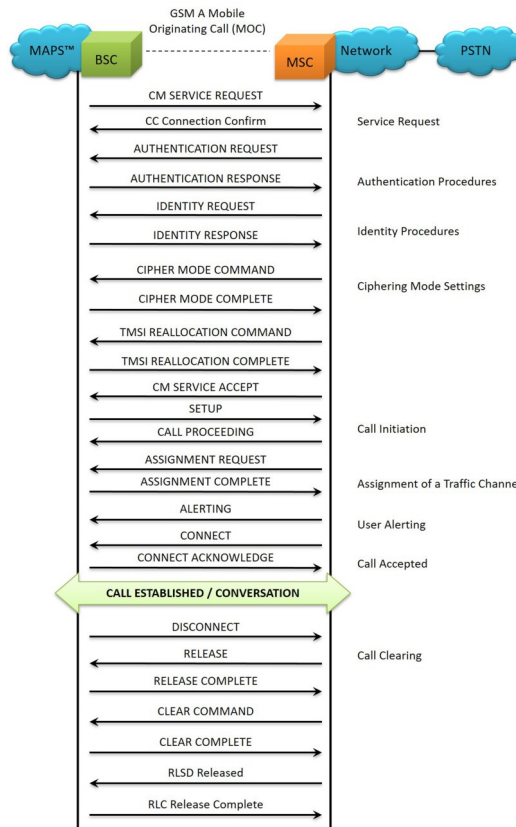
Figure: Call Reception

Typical Call Scenario

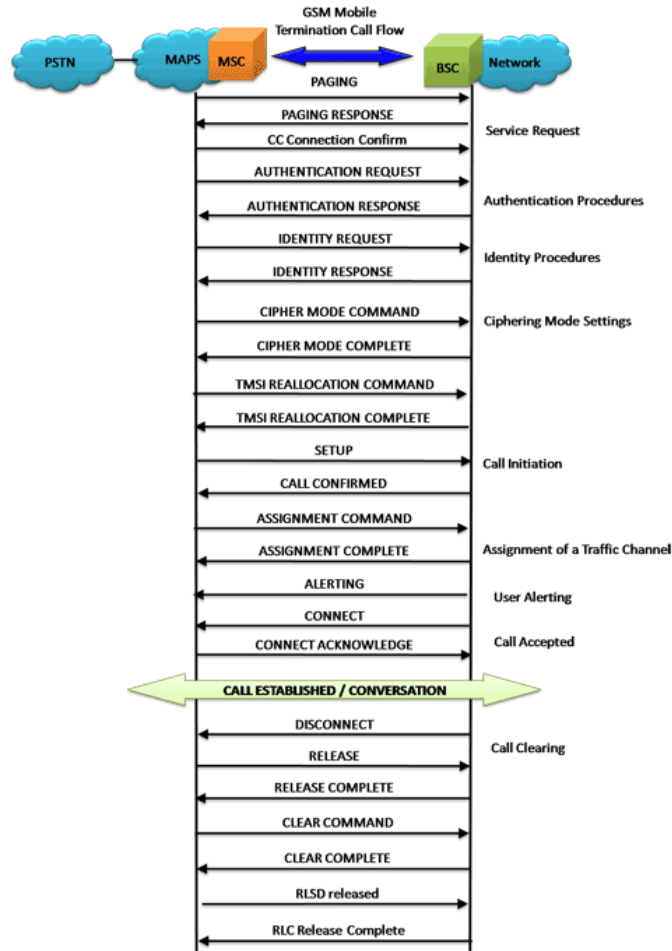
MAPS™ GSM A over IP can be considered to emulate Call Control, Mobility Management, & Radio Resource Messages. The supported mobility management procedures over GSM A interface includes Location Management Procedure, Mobile Originating and Terminating Procedures, and Handover Management Procedures. The following call flow depicts the typical Handover Management procedure between old and new BSC via MSC nodes, when a mobile user travels between two area coverage Below scenario depicts .Handover Management Procedure between old and new BSC.



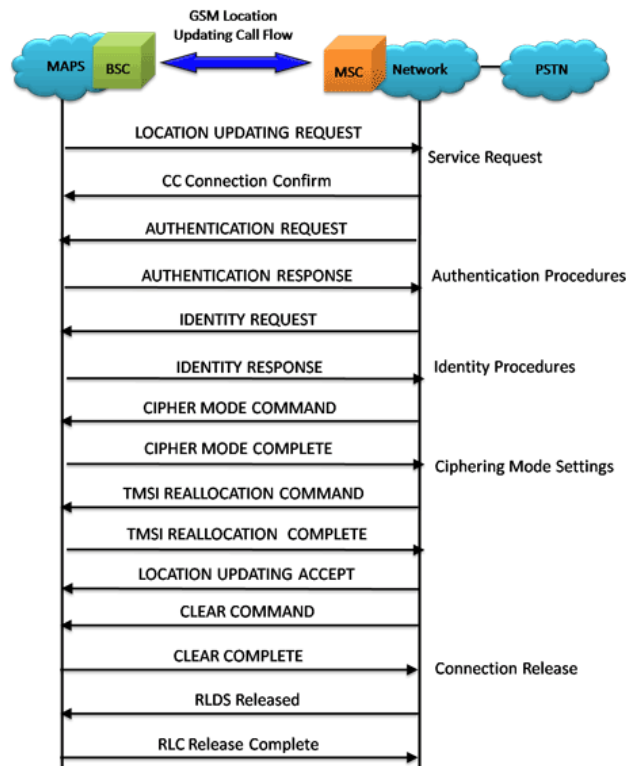
The following call flow depicts the typical Mobile Originating procedure between BSC and MSC nodes in GSM A interface.



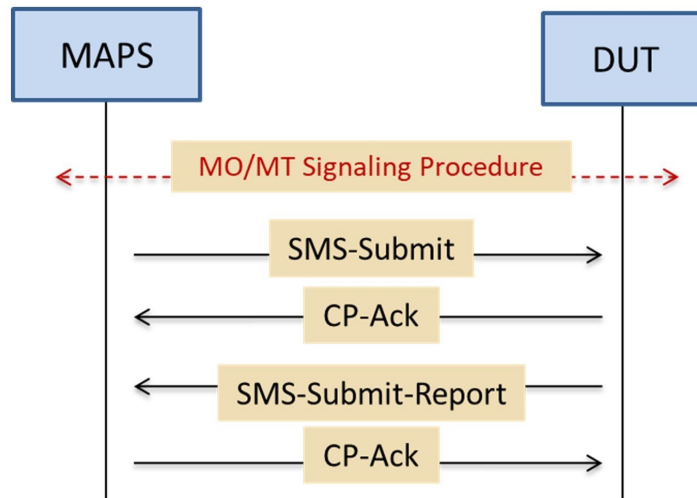
The following call flow depicts the typical Mobile Terminating procedure between MSC and BSC nodes in GSM A interface.



The following call flow depicts the Location Updating Call procedure between MSC and BSC nodes in GSM A interface.



Short Message Service (SMS) is a mechanism of short messages delivery over the mobile networks. It is a store and forward way of transmitting messages to and from mobile phones. The messages (text only) from the sending mobile is stored in a central short message center (SMC) which then is forwarded to the destination mobile. The following call flow depicts the typical SMS call procedure between MSC and BSC nodes in GSM A interface.



Command Line Interface (CLI)

MAPS™ can be configured as server-side application, to enable remote controlling of the application through multiple command-line based clients. Supported clients include TCL, Python, VBScript, Java, and .Net.

Clients can remotely perform all functions such as start testbed setup, load scripts, and profiles, apply user events such as send digits/file/tones, detect digits/file/tones, dial, originate call, terminate call, start and stop traffic . User can also generate and receive calls through commands. This client application is distributed along with MAPS™ Server application.

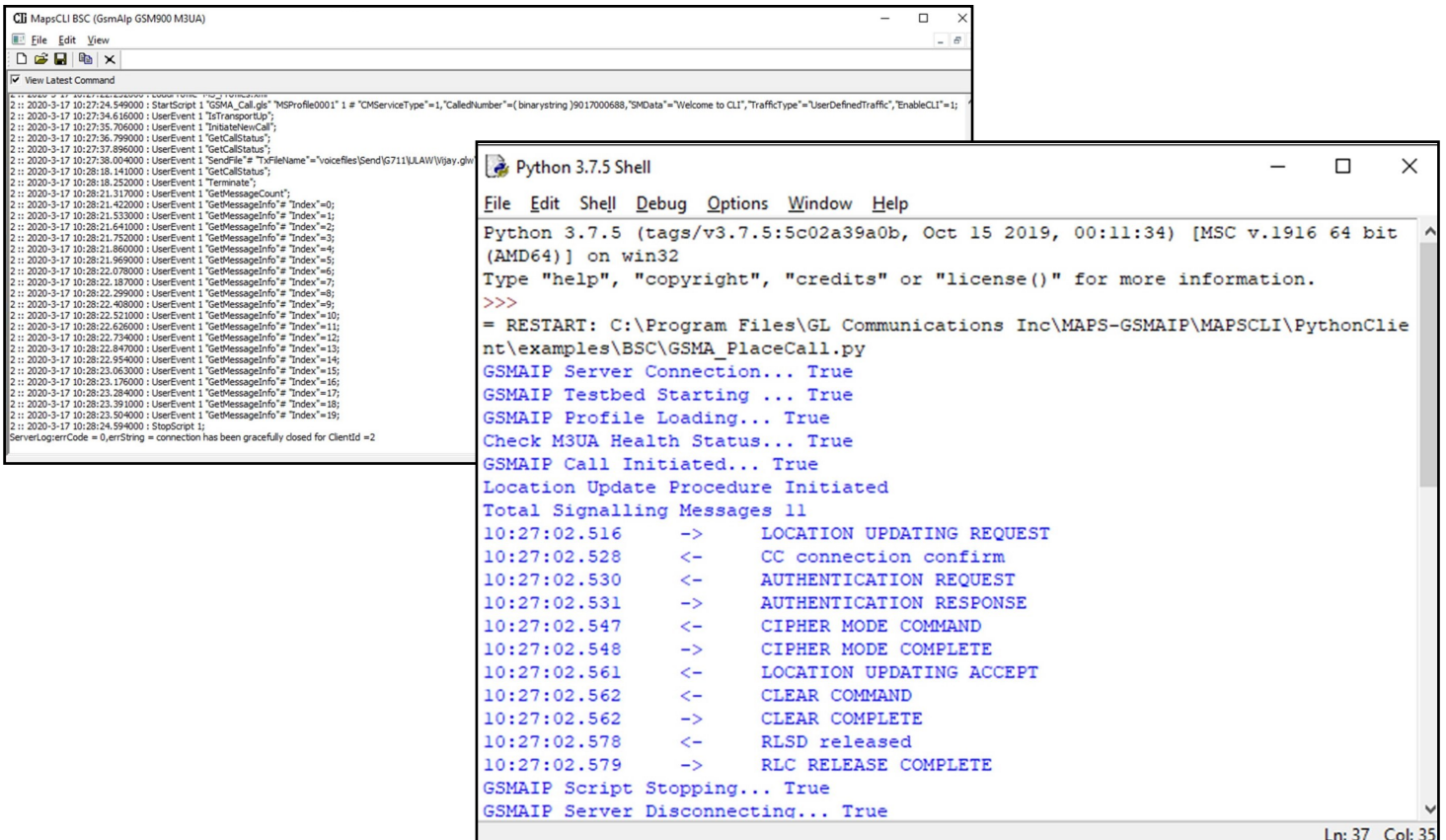
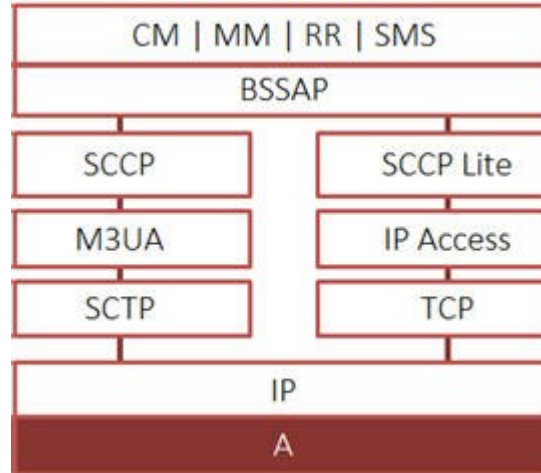


Figure: MAPS CLI Server and Python Client Script

Supported Protocol Standards



Supported Protocols	Standard / Specification Used
SCCP	Q.713, CCITT (ITU-T) Blue Book
SCTP	RFC 4960
TCP	RFC 793
M3UA	RFC 3332
BSSMAP/DTAP	3GPP TS 08.08 V8.9.0, 3GPP TS 48.008 V10.0.0 (2011-01)
MM / CC	3GPP TS 04.08 V7.17.0
RR	3GPP TS 04.18 V8.13.0
SMS	3GPP TS 03.40 V7.5.0 & 3GPP TS 04.11 V7.1.0 GSM 03.38 version 7.2.0 Release 1998

Buyer's Guide

Item No	Product Description
PKS137	MAPS™ GSM A over IP (GSM A Emulation over IP)

Item No	Related Software
PKS109	MAPS™ RTP HD Traffic Option
PKS170	CLI Support for MAPS™
PKS102	RTP Soft Core for RTP Traffic Generation
XX692	MAPS™ GSM A Interface Emulator

For more details, visit [MAPS™ GSM A Interface Emulator](#) webpage.

For complete list of MAPS™ products, visit [Message Automation and Protocol Simulation \(MAPS™\)](#) webpage.



GL Communications Inc.

818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A
(Web) www.gl.com - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) info@gl.com