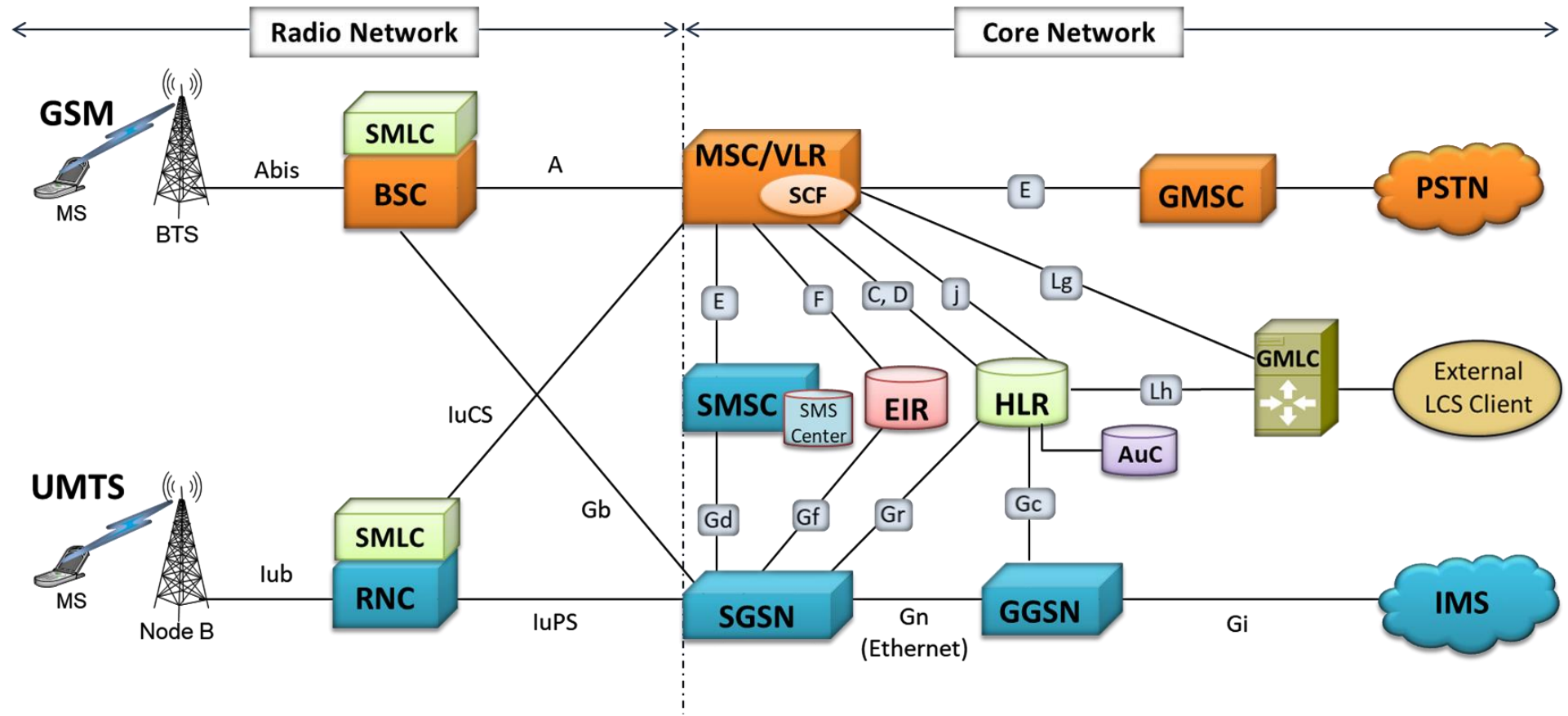

MAPS™ MAP Emulator

Mobile Application Part Emulation over IP, TDM & ATM



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MAPS™ MAP (Mobile Application Part) over IP, TDM and ATM



MAPS™ MAP over IP/TDM/ATM Emulator
MAP (Mobile Application Part)

Supported Interfaces and Nodes

Interface	Elements	Purpose
B	MSC-VLR	Generally, an internal interface within the MSC. Used whenever the MSC needs access to data regarding a MS located in its area.
C	MSC-HLR	MSC server interrogates the HLR for routing information of a subscriber for a call or SMS directed to that subscriber
D	VLR-HLR	Used to exchange data related to the current location of a mobile station and to the management of that subscriber
E	MSC-GMSC MSC-SMSC	Exchange of handover data between two adjacent MSCs for the purpose of seamless call and message flow
F	MSC-EIR	Used by the EIR to verify the status of the IMEI retrieved from the Mobile Station
G	VLR-VLR	Used to update a new VLR with IMSI and authentication info from old VLR, when a mobile subscriber moves from one VLR area to another (not shown in the diagram)
H	HLR-AuC	HLR requests for authentication and ciphering data from the AuC for a Mobile Subscriber.
Gc	GGSN-HLR	Used by the GGSN to retrieve information about the location and supported services for a mobile subscriber for packet data services (GPRS, etc.)
Gr	SGSN-HLR	Used to exchange data related to the current location and management of a Mobile Subscriber (MS) and Mobile Equipment (ME)
Gf	SGSN-EIR	Used by the EIR to verify the status of the IMEI retrieved from the Mobile Station.
Gd	SGSN-SMSC	Used to transfer SMS over GPRS.
Lg	MSC-GMLC	Used in Location Services between MSC and GMLC to provide subscriber location and related report
Lh	GMLC-HLR	Used in Location Services between the GMLC and the HLR to retrieve the routing information needed for routing a location service request to the servicing VMSC, SGSN, MME or 3GPP AAA server

Supported Protocol Standards

MAP
TCAP
SCCP
MTP3
T D M

MAP
TCAP
SCCP
MTP3b
SSCOP
AAL5
ATM
Physical Layer
MAP over ATM

Supported Protocols	Standard / Specification Used
TDM	
MAPR4	3GPP TS 29.002 V4.18.0 (2007-09)
TCAP	ANSI T1.114-1996
SCCP	Q.713, CCITT (ITU-T) Blue Book
MTP3	Q.703, ITU-T Blue Book
ATM	
MAPR4	3GPP TS 29.002 V4.18.0 (2007-09)
TCAP	ANSI T1.114-1996
SCCP	Q.713, CCITT (ITU-T) Blue Book
MTP3	Q.703, ITU-T Blue Book
SSCOP	ITU-T Q.2110
MTP3b	ITU-T Recommendation Q.2210
AAL5	Class C & D (ITU-T I.363.5)

Supported Protocol Standards (Contd.)

MAP			
TCAP			
SCCP			SUA
MTP3		M3UA	
M2PA	M2UA		
SCTP			
IP			
MAP			

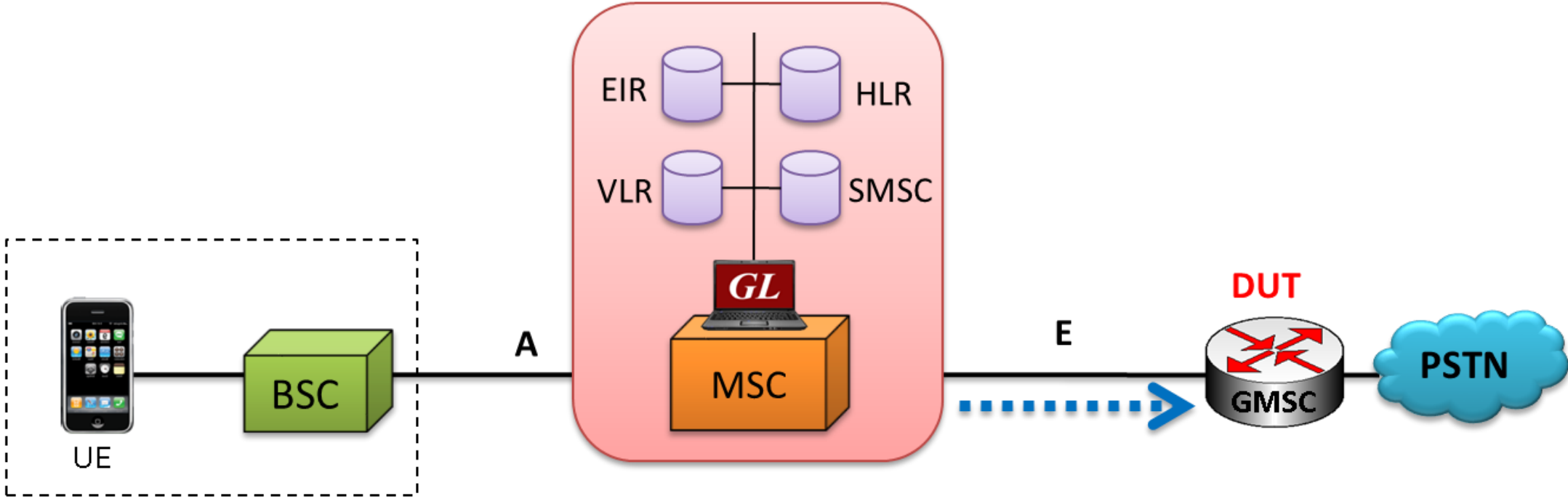
Supported Protocols	Standard / Specification Used
MAPR4	3GPP TS 29.002 V4.18.0 (2007-09)
TCAP	ANSI T1.114-1996
SCCP	Q.713, CCITT (ITU-T) Blue Book
MTP3	ITU-T Q.782
M2PA	RFC 4165
M3UA	RFC 3332
SCTP	RFC 4960

Key Features

- Emulator can be configured as MSC/VLR, HLR, EIR, SMSC, SGSN and GGSN entities to emulate C, D, E, F interfaces in the GSM network and Gc, Gd, Gf, and Gr in the UMTS network
- Access to all protocol fields in M2PA, MTP3, M3UA, M2UA, SCCP, SUA, and MAP R4 layers such as TMSI, IMSI, MCC, MNC, MSIN, CCBS and more
- Ready scripts for emulating GPRS Location Update, Mobile Terminating and Mobile Originating SMS, Location Update, Authentication, Retrieval of Routing Information, Remote User Status, and Check IMEI Status (Equipment Identification) MAP signaling procedures
- Provides protocol trace with full message decoding of the GSM/UMTS messages
- Supports Command Line Interface (CLI) through multiple command-line based clients including TCL, Python, VBScript, Java, and .Net
- Option to send reports to database accessible via web interface

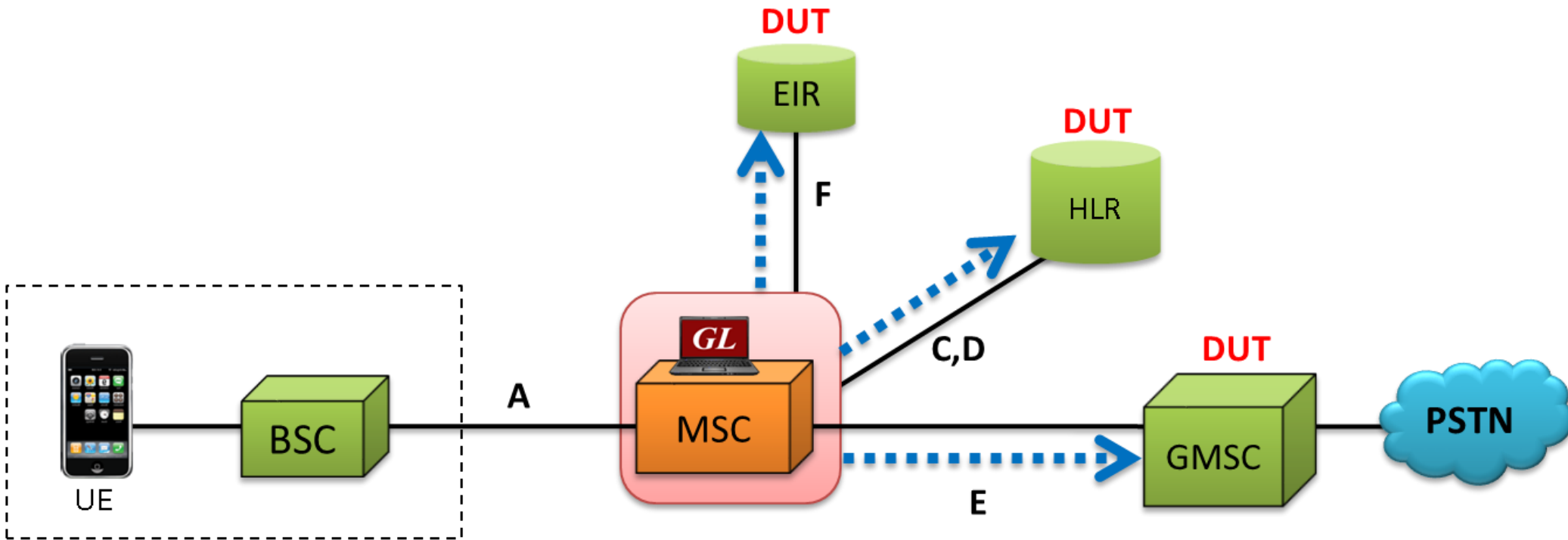
Single Interface Simulation

Testing Scenario



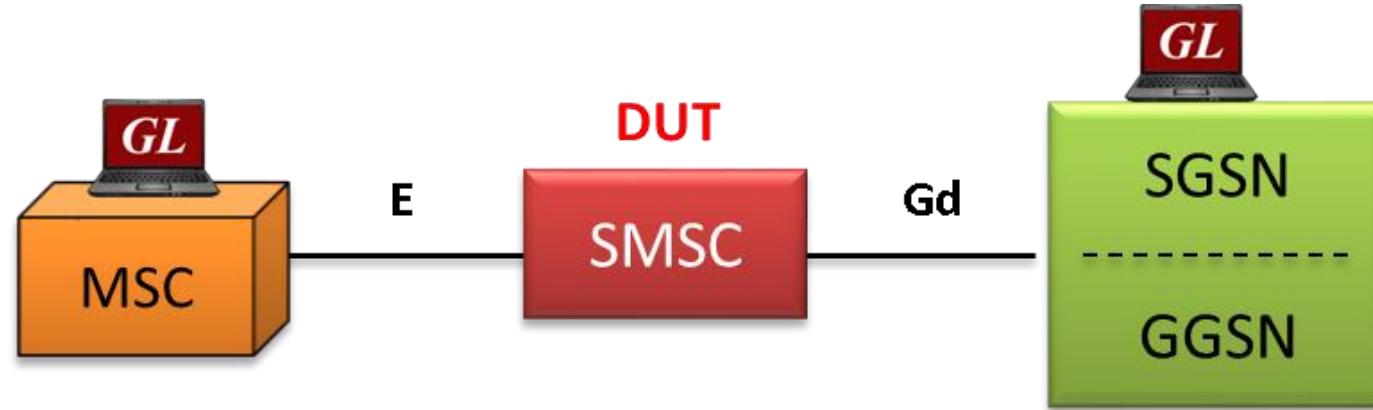
MAPS™ MSC, HLR, VLR, EIR, SMSC

Multi Interface Simulation



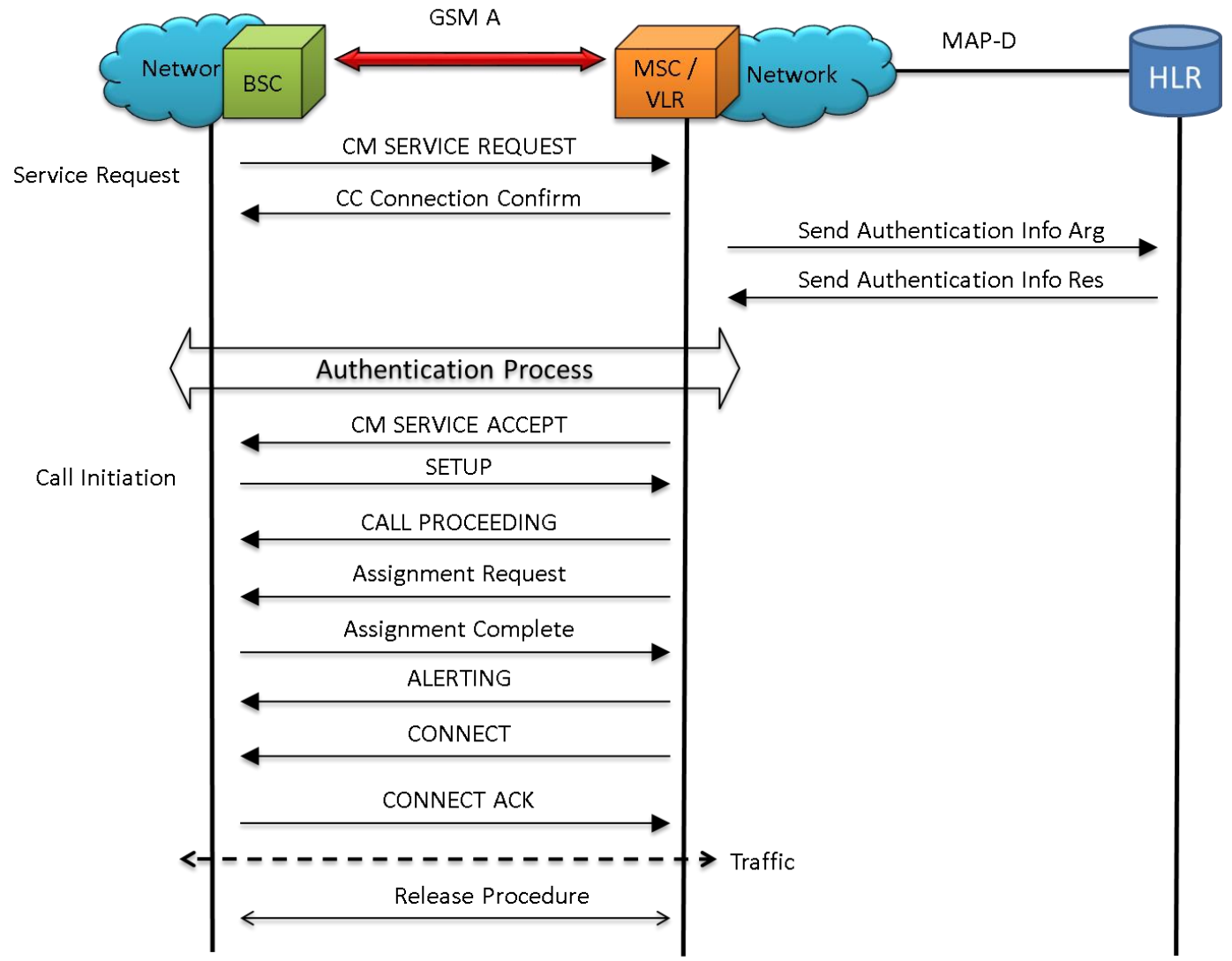
 MAPS™ MAP Emulator in GSM Network

Wrap Around Testing

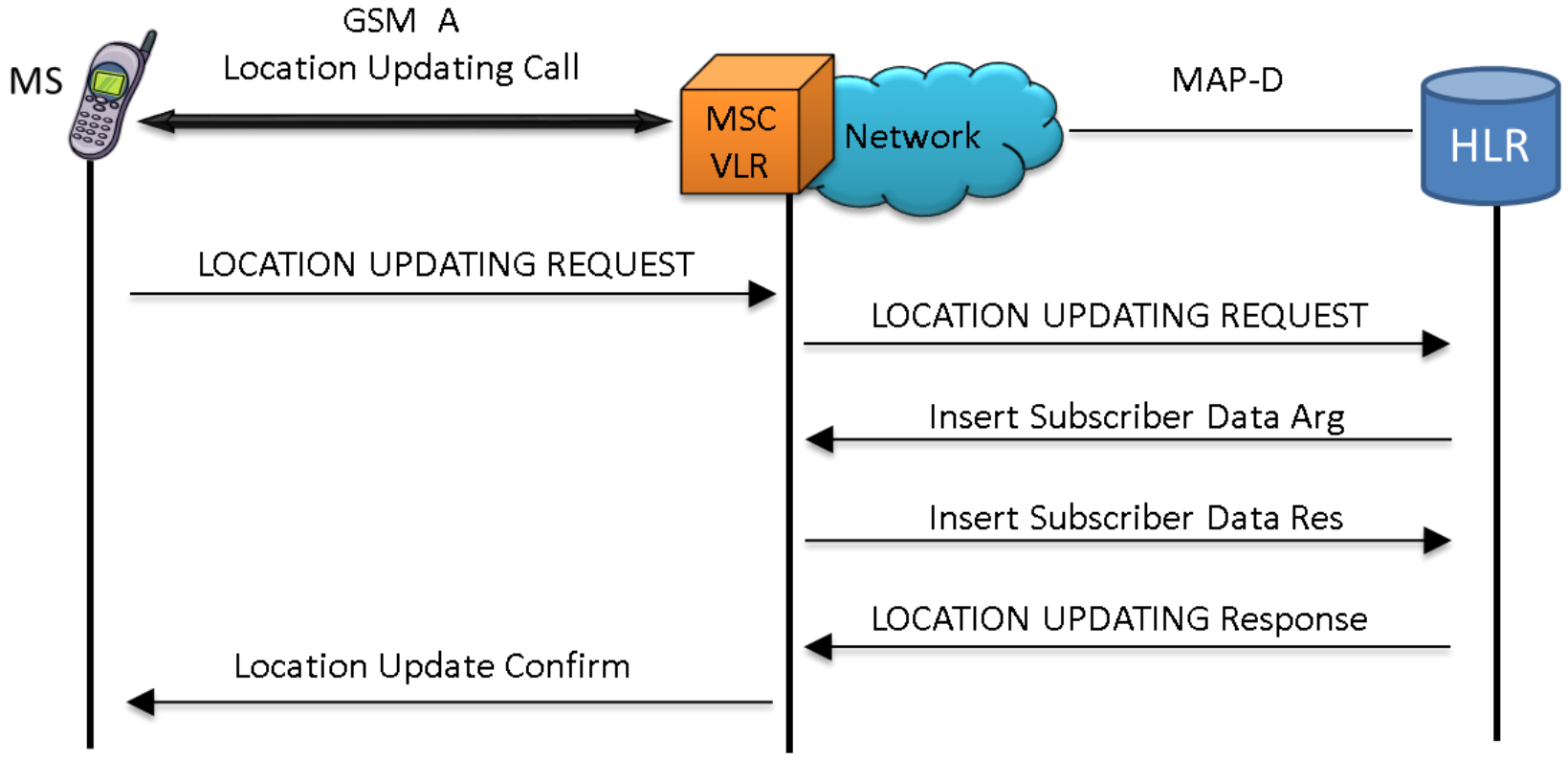


 MAPS™ MAPIP Emulator

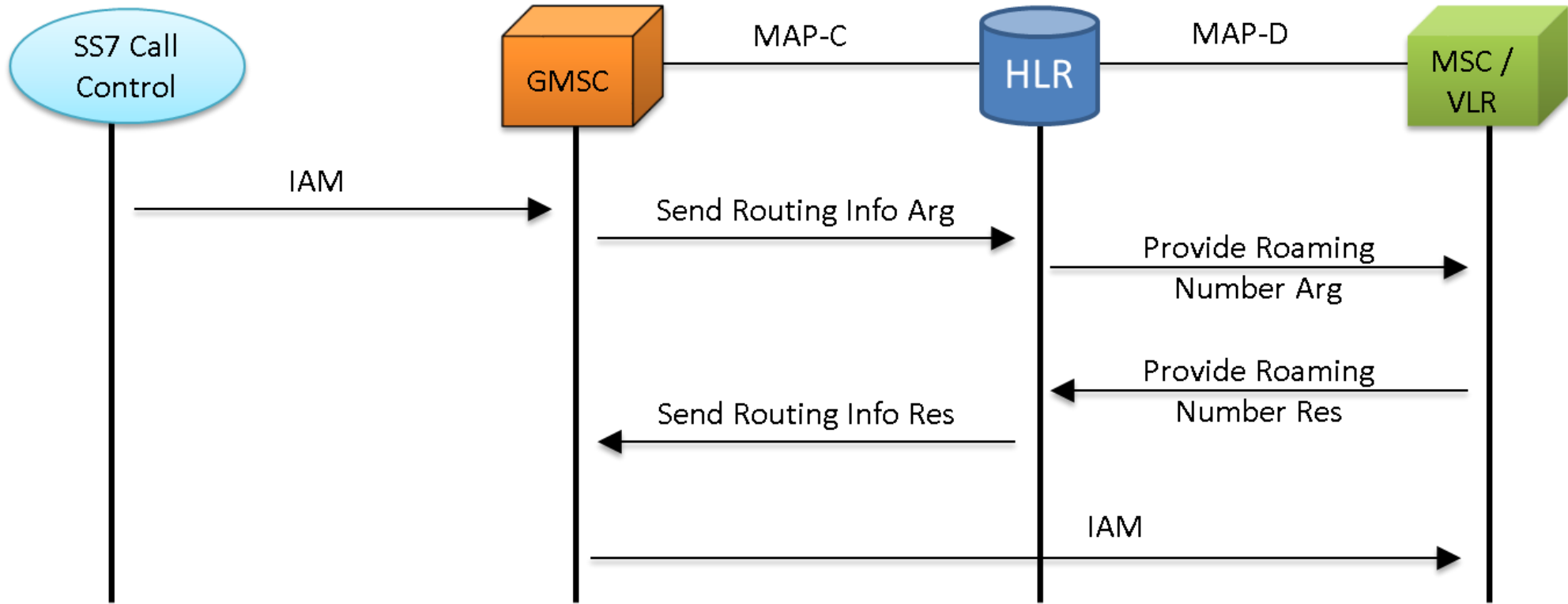
Mobile Originating Call Flow



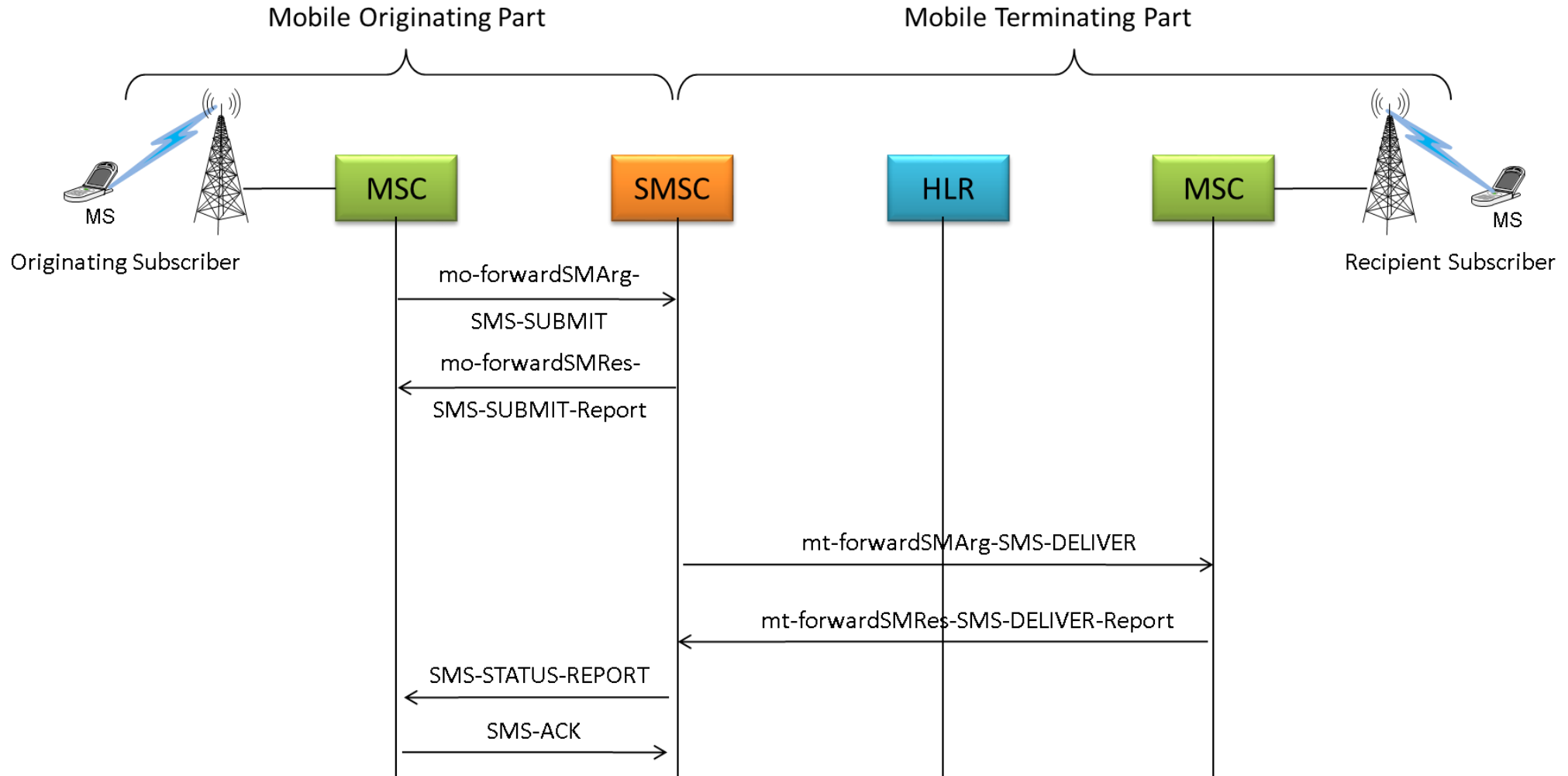
Location Update Call Flow



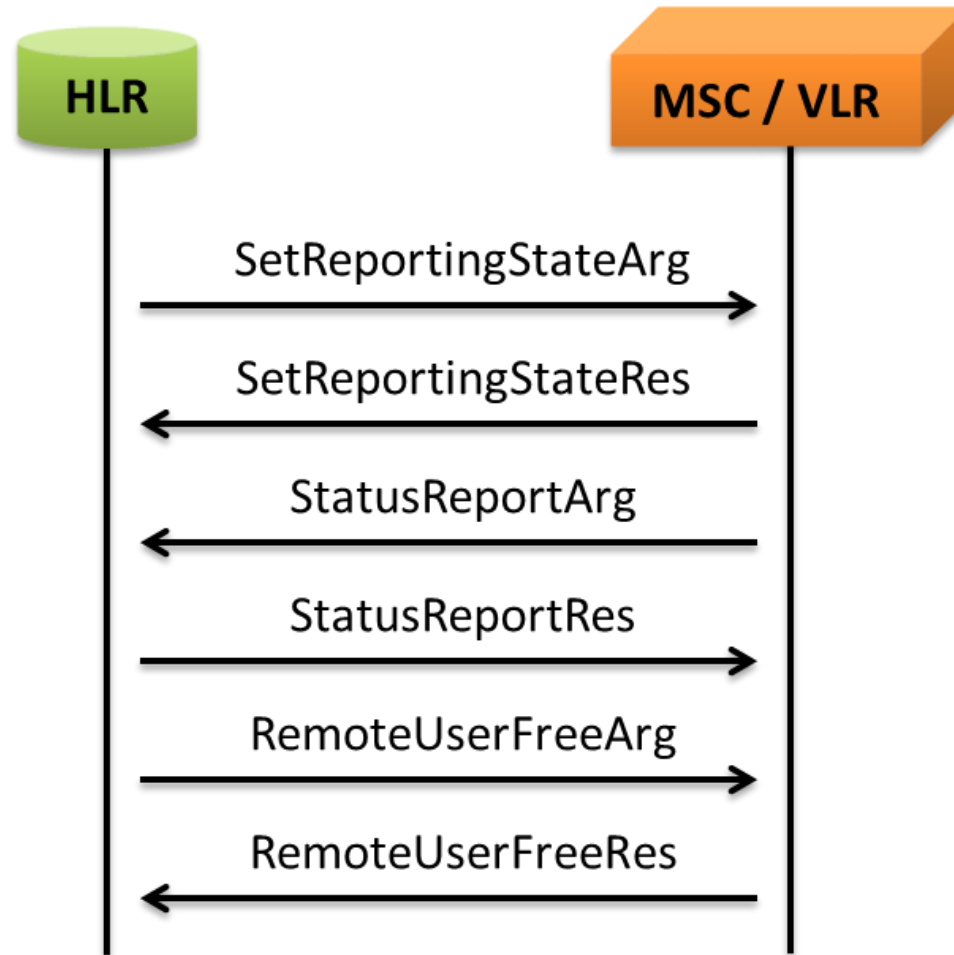
Routing Information Call Flow



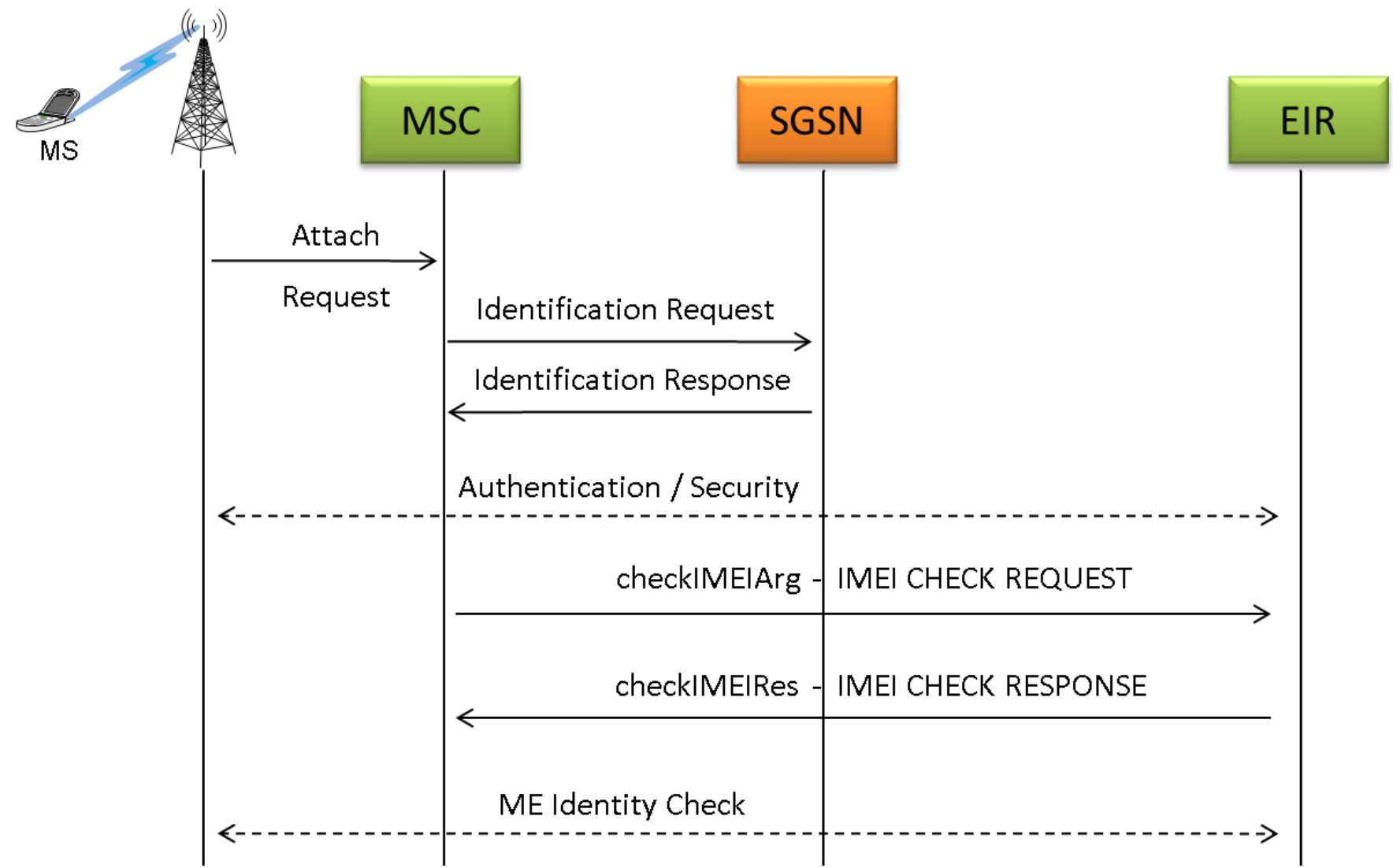
Mobile Terminating (MT) and Mobile Originating (MO) SMS Procedures



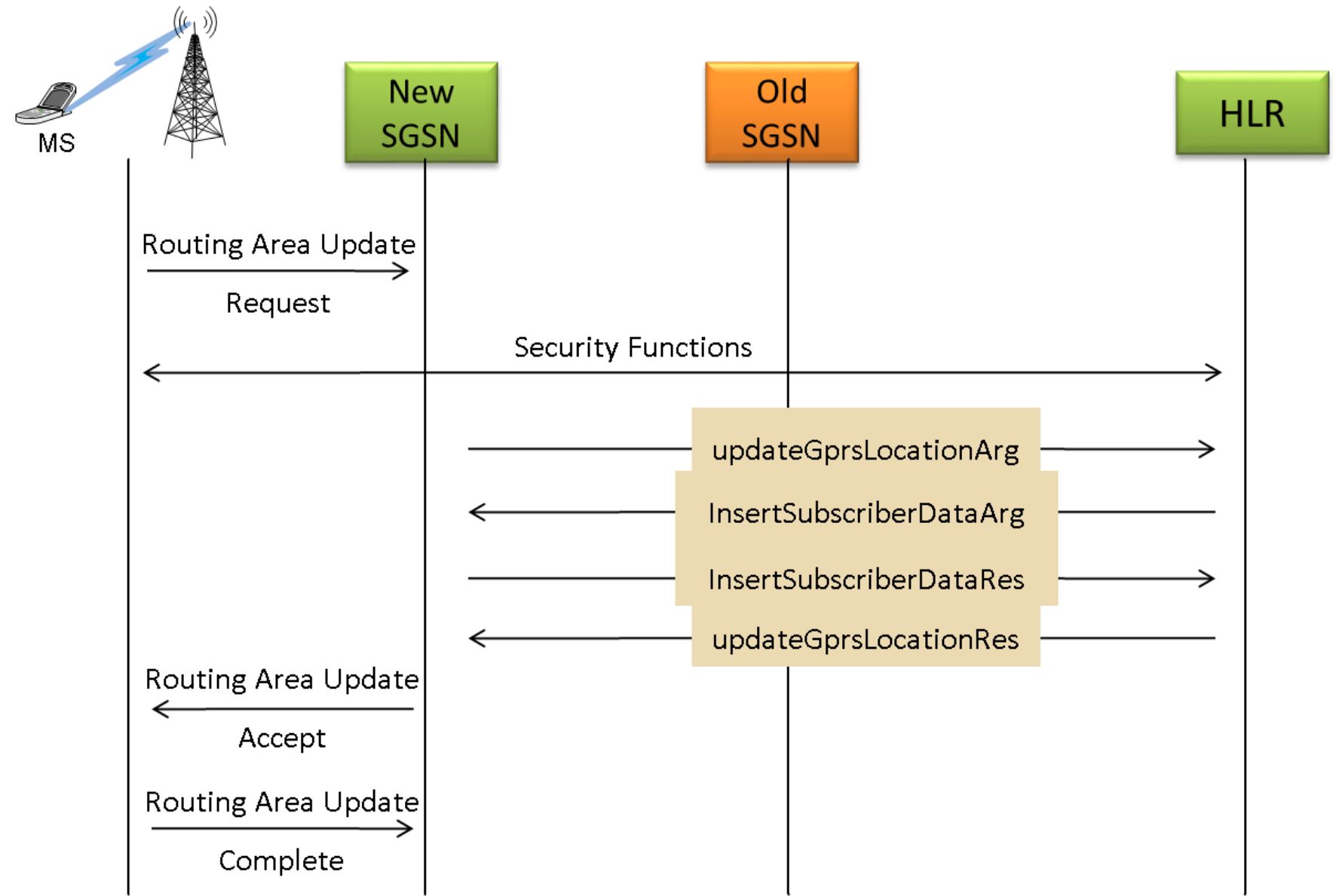
Remote User Status Procedure



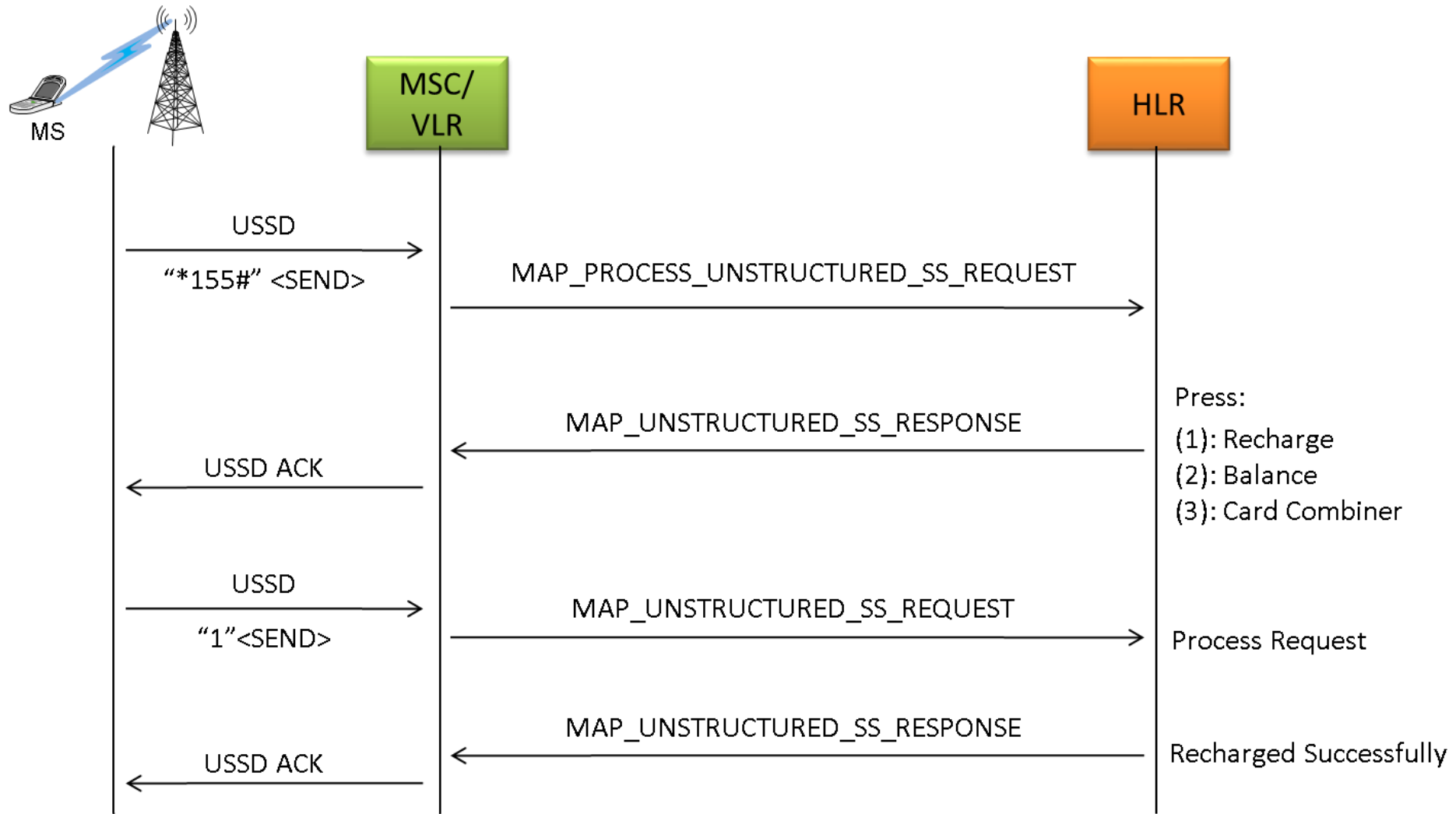
Check IMEI Status Procedure



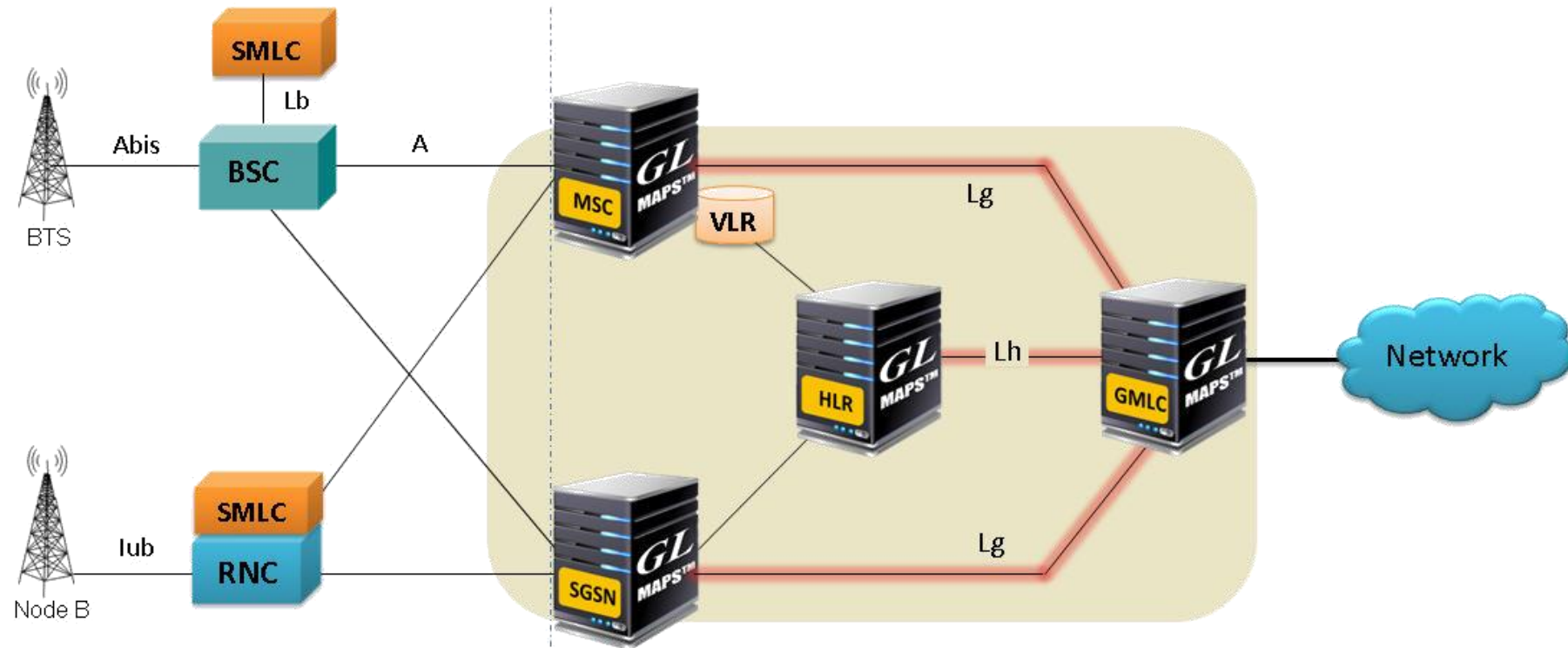
GPRS Location Update Procedure



USSD Call Procedure



Location Services - Lg, Lh Interfaces



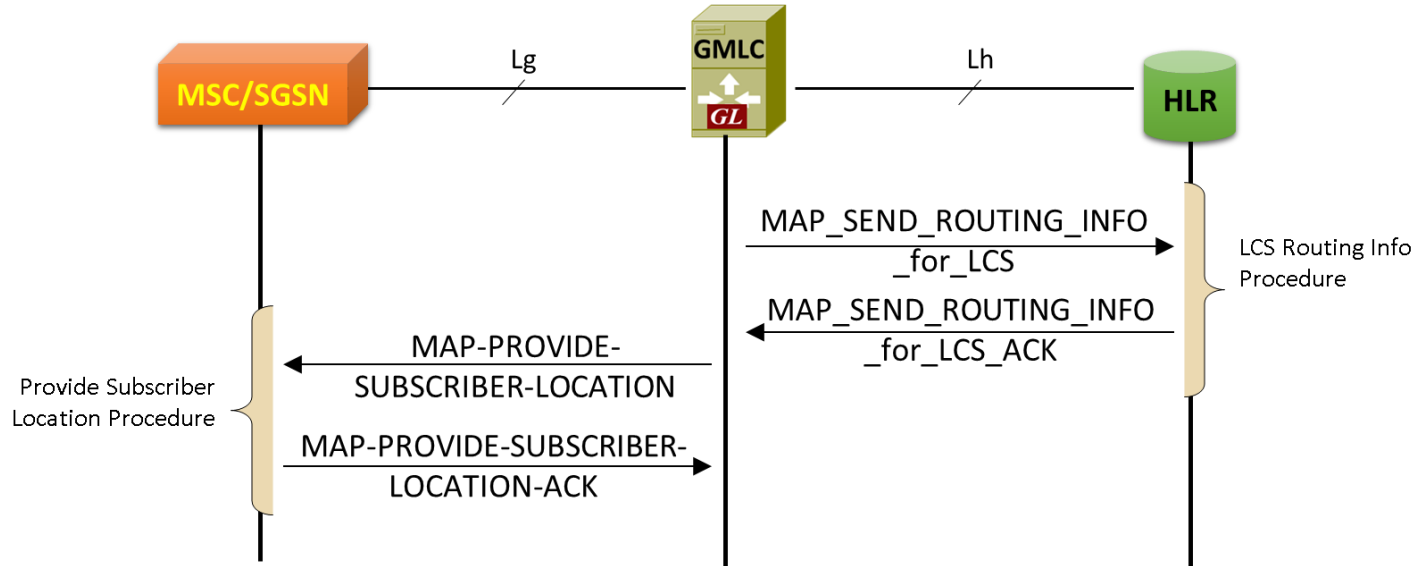
MAPS™ MAP (Mobile Application Part)
Lg and Lh LCS Interfaces Simulation



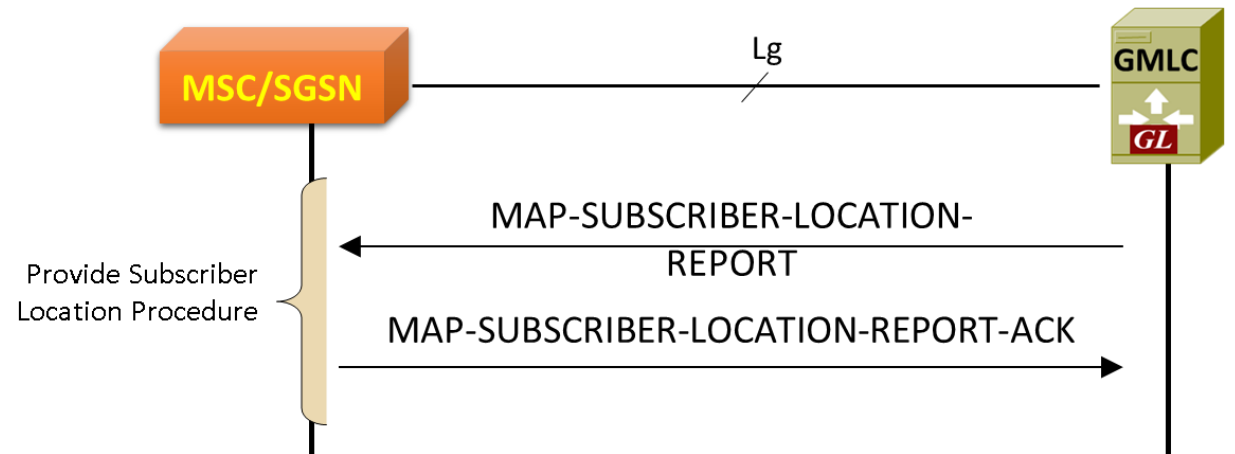
SMLC – Serving Mobile Location Center
GMLC – Gateway Mobile Location Center

Supported Lh, Lg Interface Procedures

Location Retrieval Procedure



Subscriber-Location-Report



Testbed Configuration IP

MAPS (Message Automation Protocol Simulation) SGSN (MAPIP ITU M3UA) - [Testbed Setu...
Configurations Emulator Reports Editor Debug Tools Windows Help

Config	Value
SGSN Interfaces	
SGSN	1
SGSN 1	
SGSN IP Address	192.168.12.219
SGSN Port	2905
SGSN Point Code	0.0.6
SCCP Routing Indicator	Route on GT
Include Calling GT with Route On SSN	False
SCCP Point Code Indicator	Absent
SGSN E164 Global Title Address	234674368
SGSN E214 Global Title Address	234674368
SGSN Address Indicator	National
Nature Of SGSN Address Indicator	Unknown
SGSN Global Title TranslationType	0
Connected Destination Nodes	1
Connected Destination Nodes 1	
Node or Interface Type	HLR
Source SCTP Mode	Client
Destination IP Address	192.168.12.195
Destination Port	2905
Source M3UA Termination T...	IPSP
Destination Point Code	0.0.1
Network Indicator	National
Signaling Link Selection	1
M3UA Routing Context Indi...	Absent
M3UA Routing Context	1
HLR PLMN	90701
Destination SCCP Routing In...	Route on GT
Include Called GT with Rout...	False

Enable
Enter Char
_Interface
Count 1 App
Stop Edit
Initialisation Errors Error Events

Profile Configuration (IP)

MAPS (Message Automation Protocol Simulation) SGSN (MAPIP ITU M3UA) - [Profile Editor - MS_Profiles]

Configurations Emulator Reports Editor Debug Tools Windows Help

Profiles (Edit-F2)

#	Profiles (Edit-F2)	Config	Value
1	MSProfile0001	MSProfile0001	
2	MSProfile0002	MAP Version	3
3	MSProfile0003	Mobile Identity	
4	MSProfile0004	MCC	901
5	MSProfile0005	MNC	70
6	MSProfile0006	IMSI	90170000000638
7	MSProfile0007	IMEI	350077523237111
8	MSProfile0008	MSISDN	9017000638
9	MSProfile0009	Destination MSISDN	9017000639
10	MSProfile0010	MGT Configuration	
11	MSProfile0011	Number Of Digits to Remove from IMSI	5
12	MSProfile0012	Digits to Add	31653
13	MSProfile0013	Authentication Parameters	
14	MSProfile0014	Number Of Requested vectors	1
15	MSProfile0015	Authentication Verification Parameters	
16	MSProfile0016	Verify Authentication	False
17	MSProfile0017	Subscriber Type	GSM
18	MSProfile0018	UMTS Authentication Algorithm Type	Xor
19	MSProfile0019	RES Length	16 Bytes
20	MSProfile0020	KEY or Ki	0123456789abcdef01234567...
21	MSProfile0021	Operator Variant Parameter Type	OPc
		OP	010203040506070809101112...
		OPc	010203040506070809101112...
		AMF	8000
		SQN	000000000079
		SMS Parameters	
		Error Simulation	

version

Select Option

3

Add Insert Delete

Properties

Insert Delete Clear

Initialisation Errors Error Events Captured Errors

MAP Call Generation at MSC/VLR Node

Active Calls Call Status Call Events

Loading Scripts and Profiles

The screenshot displays the MAPS GMLC interface. At the top, there are three tabs: 'Active Calls', 'Call Status', and 'Call Events'. Below these is a table with the following data:

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Ev...	Result	Total I...	Compl...
1	ProvideSubscriberLocationArg_GMLC.gls	MSPProfile0001	901700000000638	Start	Subscriber Location Received	None		Pass	1	1
2	ProvideSubscriberLocationArg_GMLC.gls	MSPProfile0001	901700000000638	Start	Subscriber Location Received	None		Pass	1	1

Below the table is a 'Message Sequence' diagram showing a sequence of messages between GMLC and MSC. The messages are:

- provideSubscriberLocationArg (from GMLC to MSC) at 14:49:05.350000
- provideSubscriberLocationRes (from MSC to GMLC) at 14:49:05.461000

To the right of the message sequence is a 'Decode Message' window showing the following details:

```

===== 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 = 188 (x000000BC)
Protocol Data =
0008 Tag = x0210 Transfer Protocol Data
000A Length = 179 (x00B3)
Originating Point Code =
000E Point Code = 0.0.6(..000000 00000110)
Destination Point Code =
0012 Point Code = 0.0.1(..000000 00000001)
0014 Service Indicator = ....0011 SCCP
0015 Network Indicator = .....10 National Network
0016 Message Priority = .....00 Priority Code 0
0017 Signalling Link Selection = 1 (x01)

Parameter Padding = x00
===== SCCP Layer =====
0018 Message Type = 00001001 UDT unidata
Mandatory Fixed Parameters =
    
```

Message Sequence

Decode Message

MAP Call Reception at HLR Node

Sr No	Script Name	Call Info	Script Execution	Status	Events	Events...	Results
1	M3UA.gls	1000	Stop	ASP Active	Send-ASPDo...		Pass
2	SCMG.gls	1000	Stop	Subsystem-Status-Test	Initiate SST		Unknown
3	SCMG.gls	1000	Completed		None		Unknown
4	SendRoutingInfoForLCSRes_HLR.gls	901700000000638	Completed	SendRouting Info For LCS sent	None		Pass

Message Sequence

```

===== 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 = 140 (x0000008C)
Protocol Data =
0008 Tag = x0210 Transfer Protocol Data
000A Length = 132 (x0084)
000E Originating Point Code =
000E Point Code = 0.0.2(..000000 00000010)
0012 Destination Point Code =
0012 Point Code = 0.0.6(..000000 00000110)
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 = x0900030D170A920700110032644763080A9206
===== SCCP Layer =====
0018 Message Type = 00001001 UDT unidata
Mandatory Fixed Parameters =
Protocol Class Parameter =
0019 Class = ....0000 Class 0
0019 Message Handling (Class 0 and 1 only) = 0000.... No Special Options
001A Pointer to Mandatory Parameter = Parm0 offset x03 (3)
001B Pointer to Mandatory Parameter = Parm1 offset x0D (13)
001C Pointer to Mandatory Parameter = Parm2 offset x17 (23)
Mandatory Variable Length Parameters =
Called Party Address = mandatory parameter
    
```

Decode Message

Call Results

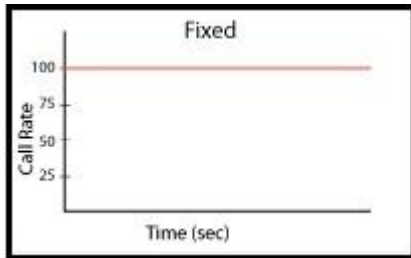
Message Sequence

Decode Message

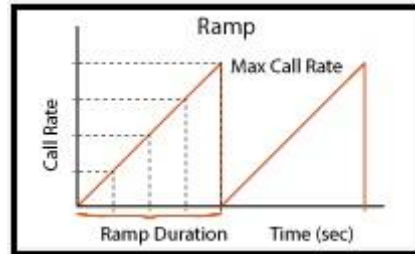
Load Generation

- 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

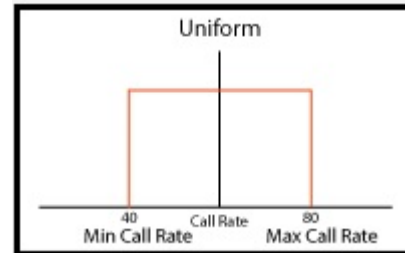
Fixed



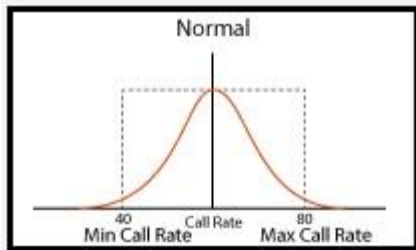
Ramp



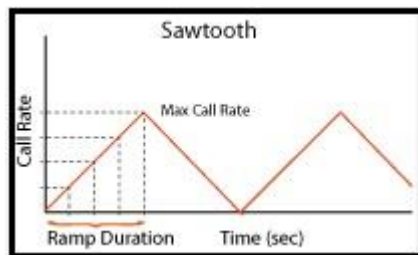
Uniform



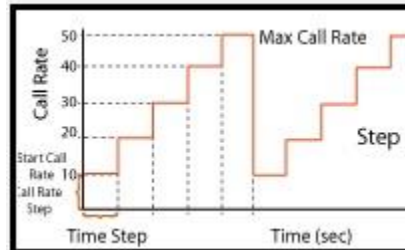
Normal



Saw-tooth

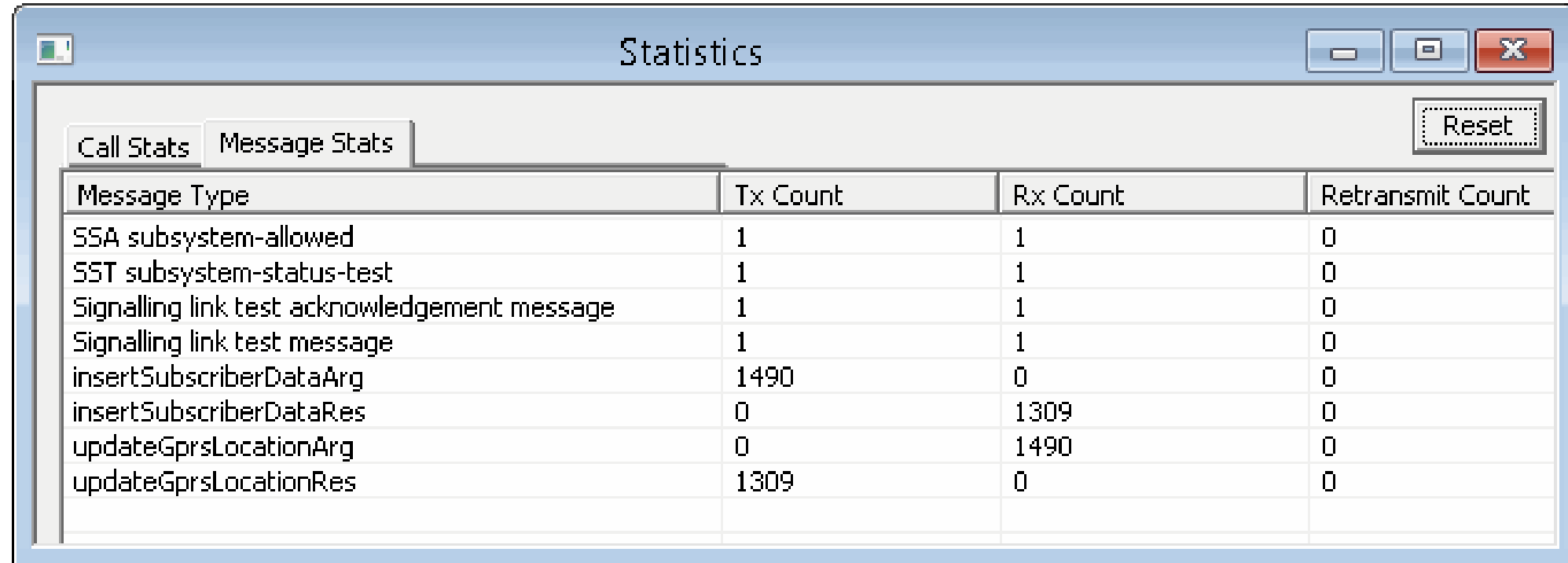


Step



The screenshot shows the 'Load Generation - LoadGendefault' window. It includes fields for 'Total Calls To Generate' (set to '*'), 'Max Active Calls' (set to 2000), and 'Unique Distributions Per Script' (checked). There are also options for 'Multi Distributions' (unchecked), 'Statistical Distribution' (set to 'Fixed'), and 'Call Rate' (set to 200). Below these are two tables: 'Scripts' and 'Profile'. The 'Scripts' table contains one entry: 'MoForwardSMArg_SGSN'. The 'Profile' table contains ten entries: 'MSProfile0001' through 'MSProfile0010'. At the bottom, there are 'Add' and 'Delete' buttons for both tables, and a 'Stop Time' section with 'Days', 'Hours', and 'Minutes' dropdowns, and 'Start Time' and 'End Time' fields.

Message Statistics



Message Type	Tx Count	Rx Count	Retransmit Count
SSA subsystem-allowed	1	1	0
SST subsystem-status-test	1	1	0
Signalling link test acknowledgement message	1	1	0
Signalling link test message	1	1	0
insertSubscriberDataArg	1490	0	0
insertSubscriberDataRes	0	1309	0
updateGprsLocationArg	0	1490	0
updateGprsLocationRes	1309	0	0

Call Event Log

Events				
Event Log Error Events Captured Errors				
Date/Time	Captured Events	Call Trace Id	Script Name	Script Id
2014-10-29 15:32:41.170000	Subsystem-Allowed	1	SCMG.gls	ProtScriptId_2834237-1535-43
2014-10-29 15:35:06.105000	Loaded Profile :: MSPProfile04	901700000000626	UpdateLocationRes_HLR.gls	ProtScriptId_2979779-1537-43
2014-10-29 15:35:06.105000	Location Update Message is received	901700000000626	UpdateLocationRes_HLR.gls	ProtScriptId_2979779-1537-43
2014-10-29 15:35:06.795000	Subscriber Data Insertion is successful	901700000000626	UpdateLocationRes_HLR.gls	ProtScriptId_2979779-1537-43
2014-10-29 15:35:06.837000	Location Update Successful	901700000000626	UpdateLocationRes_HLR.gls	ProtScriptId_2979779-1537-43
2014-10-29 15:38:09.235000	Loaded Profile :: MSPProfile05	901700000000627	SendAuthenticationInfoRes_HLR.gls	ProtScriptId_3162907-1539-43
2014-10-29 15:38:09.235000	SendAuthenticationInfo Recieved	901700000000627	SendAuthenticationInfoRes_HLR.gls	ProtScriptId_3162907-1539-43
2014-10-29 15:38:09.235000	RAND 1 = 0x2923BE84E16CD6AE529049F1F1BB...	901700000000627	SendAuthenticationInfoRes_HLR.gls	ProtScriptId_3162907-1539-43
2014-10-29 15:38:09.235000	SRES 1 = 0x5426D228	901700000000627	SendAuthenticationInfoRes_HLR.gls	ProtScriptId_3162907-1539-43
2014-10-29 15:38:09.235000	KC 1 = 0x1C4163D73F7BC800	901700000000627	SendAuthenticationInfoRes_HLR.gls	ProtScriptId_3162907-1539-43
2014-10-29 15:38:09.235000	End	901700000000627	SendAuthenticationInfoRes_HLR.gls	ProtScriptId_3162907-1539-43
2014-10-29 15:38:09.235000	Authentication Successful	901700000000627	SendAuthenticationInfoRes_HLR.gls	ProtScriptId_3162907-1539-43
2014-10-29 15:38:14.401000	Loaded Profile :: MSPProfile06	901700000000628	AuthenticationFailureReportRes_HLR.gls	ProtScriptId_3168071-1541-43
2014-10-29 15:38:14.401000	Authentication Failure Report Requested	901700000000628	AuthenticationFailureReportRes_HLR.gls	ProtScriptId_3168071-1541-43
2014-10-29 15:38:14.422000	Authentication Failure Report Response Sent	901700000000628	AuthenticationFailureReportRes_HLR.gls	ProtScriptId_3168071-1541-43
2014-10-29 15:38:20.899000	Requested USSD String =		processUnstructuredSS-RequestRes_HLR.gls	ProtScriptId_3174573-1543-43
2014-10-29 15:38:20.899000	Requested USSD String = *#101#	ProtScriptId_3174573-1543-4384	processUnstructuredSS-RequestRes_HLR.gls	ProtScriptId_3174573-1543-43
2014-10-29 15:38:21.553000	Requested USSD String = *#101#	ProtScriptId_3174573-1543-4384	processUnstructuredSS-RequestRes_HLR.gls	ProtScriptId_3174573-1543-43
2014-10-29 15:38:21.554000	Requested USSD String = 1	ProtScriptId_3174573-1543-4384	processUnstructuredSS-RequestRes_HLR.gls	ProtScriptId_3174573-1543-43

Save Events

Capture Events to file ...

MAPS™ MAP (Mobile Application Protocol) Call Generation over TDM & ATM

MAPS™ MAP TDM and ATM Testbed Setup

MAPS (Message Automation Protocol Simulation) MSC (MAP 3GPP) - [Testbed Setup - MSC_HLR]

Configurations Emulator Reports Editor Debug Tools Windows Help

Config	Value
MSC Interfaces	
MSC	1
MSC 1	
MSC Point Code	0.0.6
SCCP Routing Indicator	Route on GT
MSC E164 Global Title Address	234674369
MSC E214 Global Title Address	234674369
MSC Address Indicator	National
Nature Of MSC Address Indicator	Unknown
MSC Global Title TranslationType	0
Connected Destination Nodes	1
Connected Destination Nodes 1	
Node or Interface Type	HLR
MTP Signalling Configuration	
T1 Port Number	1
Timeslot	23
SignalingSubchannel	1..8
Network Indicator	National
Signaling Link Selection	1
Destination Point Code	0.0.1
Adjacent Point Code	0.0.1
HLR PLMN	90701
Destination SCCP Routing Indicator	Route on GT
Destination E164 Global Title Address	234674368
Destination E214 Global Title Address	234674368
Destination Address Indicator	International
Nature Of Destination Address Indicator	Unknown
Destination Global Title Translation Type	0
End User Configuration	MS_Profiles.xml

DestinationNode

Select Option

HLR

Start Edit

Initialisation Errors Error Events

MAPS (Message Automation Protocol Simulation) MSC (MAP 3GPP ATM)

Configurations Emulator Reports Editor Debug Tools Windows Help

Testbed Setup - MSC_HLR_1-Link_1-DstNode

Config	Value
MSC Interfaces	
MSC	1
MSC 1	
MSC Point Code	0.0.6
SCCP Routing Indicator	Route on GT
Include Calling GT with Route On S...	False
SCCP Point Code Indicator	Absent
MSC E164 Global Title Address	234674369
MSC E214 Global Title Address	234674369
MSC Address Indicator	National
Nature Of MSC Address Indicator	Unknown
MSC Global Title TranslationType	0
Connected Destination Nodes	1
Connected Destination Nodes 1	
Node or Interface Type	HLR
MTP Links	1
MTP Links 1	
T1 E1 Port Number	1
Signaling VPI	105
Signalling VCI	106
Network Indicator	National
Signaling Link Selec...	0
Destination Point Code	0.0.1
Adjacent Point Code	0.0.1
HLR PLMN	90701
Destination SCCP Routing I...	Route on GT
Include Called GT with Rout...	False
Destination SCCP Point Co...	Absent
Destination E164 Global Titl...	234674368
Destination E214 Global Titl...	234674368
Destination Address Indicator	International
Nature Of Destination Addr...	Unknown
Destination Global Title Tran...	0
End User Configuration	MS_Profiles.xml

SourcePointCode

Enter Char

0.0.6

Start Edit

Initialisation Errors Error Events Captured Errors

MAPS™ MAP TDM and ATM Profile Editor

The screenshot shows the MAPS Profile Editor interface. The main window displays a list of profiles on the left and a detailed configuration tree for MSProfile0001 on the right. The configuration tree is expanded to show various parameters such as Mobile Identity, Authentication Parameters, SMS Parameters, Password Parameters, Remote User Status, LCS Parameters, and Error Simulation. The status bar at the bottom indicates 'Link Status Up=0 Down=0'.

#	Profiles (Edit-F2)	Config	Value	Enable
1	MSProfile0001	MSProfile0001		<input checked="" type="checkbox"/>
2	MSProfile0002	MAP Version	3	
3	MSProfile0003	Mobile Identity		
4	MSProfile0004	MCC	901	
5	MSProfile0005	MNC	70	
6	MSProfile0006	IMSI	90170000000638	
7	MSProfile0007	IMEI	350077523237111	
8	MSProfile0008	MSISDN	9017000638	
9	MSProfile0009	Destination MSISDN	9017000639	
10	MSProfile0010	Authentication Parameters		
11	MSProfile0011	Number Of Requested vectors	1	
12	MSProfile0012	Authentication Verification Parameters		
13	MSProfile0013	SMS Parameters		
14	MSProfile0014	SMS Character Set	UCS2(16 bit)	
15	MSProfile0015	SMS Data for Default and 8 Bit Data	Test SMS 0001	
16	MSProfile0016	SMS Data for UCS2	005400650073007400200053004d0053002000...	
17	MSProfile0017	Trigger New Dialog Per Fragment	False	
18	MSProfile0018	Request TP Status Report	Disable	
19	MSProfile0019	TPDA Type Of Number	National	
20	MSProfile0020	TPDA for Alphanumeric Destination address	S_12345	
21	MSProfile0021	Destination SME Address	849749409	
22	MSProfile0022	Network Node Address	121212121212121	
23	MSProfile0023	Password Parameters		
24	MSProfile0024	Current Password	5521	
25	MSProfile0025	New Password	5521	
26	MSProfile0026	Remote User Status		
27	MSProfile0027	CCBS State in SetReportingStateRes	CCBS Not Idle	
28	MSProfile0028	Remote User Free Outcome	Accepted	
29	MSProfile0029	CCBS State in Status Report	CCBS Idle	
30	MSProfile0030	Monitoring Mode in Status Report	A-Side	
31	MSProfile0031	Call Outcome in Status Report	Success	
32	MSProfile0032	LCS Parameters		
33	MSProfile0033	LCS Coordinates Input Method	Profile	
34	MSProfile0034	LCS Coordinates CSV File Name	Location_Coordinates.csv	
35	MSProfile0035	Number Of Reports for CSV	5	
36	MSProfile0036	LCS Event	Emergency Call Origination	
37	MSProfile0037	LCS Client Type	Emergency Services	
38	MSProfile0038	Location Estimate Parameters		
39	MSProfile0039	Error Simulation		
40	MSProfile0040	Error Simulation Type	None	
41	MSProfile0041	P Abort Cause	incorrectTransactionPortion	
42	MSProfile0042	u AbortCause	Application-Context-Name-Not-Supported	
43	MSProfile0043	Reject Reason for General Problem	unrecognizedComponent	
44	MSProfile0044	Reject Reason for Invoke Problem	resourceLimitation	
45	MSProfile0045	Reject Reason for Return Result Problem	mistypedParameter	
46	MSProfile0046	Reject Reason for Return Error Problem	unrecognizedInvokeID	
47	MSProfile0047	Return ErrorCode	busySubscriber	
48	MSProfile0048	Simulate Version 2 Fallback	Disable	

The screenshot shows the MAPS Profile Editor interface, similar to the first screenshot but with a more detailed view of the Mobile Identity section. The configuration tree is expanded to show parameters like IMSI, IMEI, MSISDN, and Destination MSISDN. The status bar at the bottom indicates 'Link Status Up=0 Down=0'.

#	Profiles (Edit-F2)	Config	Value	Enable
1	MSProfile0001	MSProfile0001		<input checked="" type="checkbox"/>
2	MSProfile0002	MAP Version	3	
3	MSProfile0003	ATM Link Selection		
4	MSProfile0004	Originating Global Title Address	234674369	
5	MSProfile0005	Destination Global Title Address	234674368	
6	MSProfile0006	Mobile Identity		
7	MSProfile0007	MCC	901	
8	MSProfile0008	MNC	70	
9	MSProfile0009	IMSI	90170000000638	
10	MSProfile0010	IMEI	350077523237111	
11	MSProfile0011	MSISDN	9017000638	
12	MSProfile0012	Destination MSISDN	9017000639	
13	MSProfile0013	Destination IMSI	90170000000639	
14	MSProfile0014	TMSI	12345678	
15	MSProfile0015	Type Of Identity	IMSI	
16	MSProfile0016	MGT Configuration		
17	MSProfile0017	Number Of Digits to Remove from IMSI	5	
18	MSProfile0018	Digits to Add	31653	
19	MSProfile0019	Authentication Parameters		
20	MSProfile0020	Number Of Requested vectors	3	
21	MSProfile0021	Authentication Verification Parameters		
22	MSProfile0022	Verify Authentication	False	
23	MSProfile0023	Authentication Algorithm Type	GSM Comp128 V1	
24	MSProfile0024	RES Length	16 Bytes	
25	MSProfile0025	KEY or Ki	0123456789abcdef0123456...	
26	MSProfile0026	Operator Variant Parameter Type	OPc	
27	MSProfile0027	OP	0102030405060708091011...	
28	MSProfile0028	OPc	0102030405060708091011...	
29	MSProfile0029	AMF	8000	
30	MSProfile0030	SQN	000000000079	
31	MSProfile0031	Invoke Update Location After Authenticat...	False	
32	MSProfile0032	USSD Configuration		
33	MSProfile0033	SMS Parameters		
34	MSProfile0034	SMS Character Set	UCS2(16 bit)	
35	MSProfile0035	SMS Data for Default and 8 Bit Data	Test MO SMS 0001	
36	MSProfile0036	SMS Data for UCS2	005400650073007400200053004d0053002000...	
37	MSProfile0037	Trigger New Dialog Per Fragment	False	
38	MSProfile0038	Request TP Status Report	Disable	
39	MSProfile0039	TPDA Type Of Number	National	
40	MSProfile0040	TPDA for Alphanumeric Destination address	S_12345	
41	MSProfile0041	Destination SME Address	849749409	
42	MSProfile0042	Network Node Address	121212121212121	
43	MSProfile0043	Password Parameters		
44	MSProfile0044	PSI Response Parameters		
45	MSProfile0045	Subscriber State	NetDetNotReachable	
46	MSProfile0046	Include VLR Number	False	
47	MSProfile0047	Age Of Location	50	
48	MSProfile0048	Include CellGlobal Id or LAI	CellId	
49	MSProfile0049	Cell ID	11	
50	MSProfile0050	LAC	1	
51	MSProfile0051	Remote User Status		
52	MSProfile0052	LCS Parameters		
53	MSProfile0053	Error Simulation		

MAPS™ MAP TDM Incoming Call Handler Configuration

Incoming Call Handlers Configuration - default

Message Name Script Name

updateLocationArg	UpdateLocationRes_HLR.gls
updateGprsLocationArg	UpdateGPRSLocationRes_HLR.gls
sendAuthenticationInfoArg	SendAuthenticationInfoRes_HLR.gls
sendRoutingInfoForLCSArg	SendRoutingInfoforLCSRes_HLR.gls
sendRoutingInfoForSMArg	SendRoutingInfoforSMRes_HLR.gls
provideSubscriberLocationArg	
purgeMSArg	PurgeMSRes_HLR.gls
readyForSMArg	readyForSMRes_HLR.gls
processUnstructuredSS-RequestArg	processUnstructuredSS-RequestRes_HLR.gls
Signalling link test message	
SSA subsystem-allowed	SCMG.gls
SSP subsystem-prohibited	SCMG.gls
SST subsystem-status-test	SCMG.gls
SOG subsystem-out-of-service-grant	SCMG.gls
SOR subsystem-out-of-service-request	SCMG.gls
SCC SCCP/subsystem-congested	SCMG.gls
sendRoutingInfoForGprsArg	SendRoutingInfoforGPRSRes_HLR.gls
failureReportArg	FailureReportRes_HLR.gls
authenticationFailureReportArg	AuthenticationFailureReportRes_HLR.gls

Scripts

UpdateLocationRes_HLR.gls

Sequence
 Random

Up
Down

Add Delete

Add Delete Clear

MAPS™ MAP TDM Call Generation

Active Calls Call Status Call Events

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Profile	Result	Total Iterations	Completed Iterations
1	UpdateLocationArg_MSCVLR.gls	MSProfile04	901700000000626	Start	Location Update Completed	None		Pass	1	1
2	SendAuthenticationInfoArg_VLR.gls	MSProfile05		Start		None		Unknown	1	0
3	AuthenticationFailureArg_MSC.gls	MSProfile06		Start		None		Unknown	1	0
4	processUnstructuredSS-RequestArg_MSC.gls	MSProfile07		Start		None		Unknown	1	0
5	ReadyForSMArg_VLR.gls	MSProfile08		Start		None		Unknown	1	0
6	PurgeMSArg_MSC.gls	MSProfile09		Start		None		Unknown	1	0

Message Sequence

```

sequenceDiagram
    participant MAPS
    participant DUT
    MAPS->>DUT: updateLocationArg 11:35:28.771000
    DUT-->>MAPS: insertSubscriberDataArg 11:35:29.358000
    MAPS->>DUT: insertSubscriberDataRes 11:35:29.359000
    DUT-->>MAPS: updateLocationRes 11:35:29.959000
        
```

Decode Message

```

===== MTP3 Layer =====
0000 Service Indicator = ....0011 SCCP
0000 Priority Code = ..00.... Priority Code 0
0000 Sub-service field = 10..... National Network
0001 DPC = 0.0.1(00000001 ..000000)
0002 OPC = 0.0.6(10..... 00000001 ....0000)
0004 Signalling Link Code = 0001.... (1)
Higher Layer Data = x0981030C16099206007200545784870A92070011001364476308546252480400000
===== SCCP Layer =====
0005 Message Type = 00001001 UDT unidata
Mandatory Fixed Parameters =
Protocol Class Parameter =
0006 Class = ....0001 Class 1
0006 Message Handling (Class 0 and 1 only) = 1000.... return message on error
0007 Pointer to Mandatory Parameter = Parm0 offset x03 (3)
0008 Pointer to Mandatory Parameter = Parm1 offset x0C (12)
0009 Pointer to Mandatory Parameter = Parm2 offset x16 (22)
Mandatory Variable Length Parameters =
Called Party Address = mandatory parameter
000A Parameter length = 9
Address Indicators =
000E Point Code Indicators = .....0 Address does not contain signalling point code
000E SSN Indicators = .....1. Address contains subsystem number
000E Global Title Indicators = ..0100.. Global title includes translation type, numbering plan, enc...
        
```

Loading Scripts and Profiles

Message Sequence

Decode Message

MAPS™ MAP TDM Call Reception

MAPS (Message Automation Protocol Simulation) HLR (MAP 3GPP) - [Call Reception]

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Call Info	Script Execution	Status	Events	Events Profile	Results
1	SLTM.gls	0.0.1.0.0.6.1	Stop	MTP3 Active	Initiate SLTM		Pass
2	SCMG.gls	1	Stop	Subsystem-Allowed	Initiate SST		Pass
3	UpdateLocationRes_HLR.gls	901700000000626	Completed	Location Update successful	None		Pass
4	UpdateLocationRes_HLR.gls	901700000000626	Completed	Location Update successful	None		Pass

Call Results

Message Sequence

Decode Message

```

===== MTP3 Layer =====
0000 Service Indicator          = ...0011 SCCP
0000 Priority Code              = ..00.... Priority Code 0
0000 Sub-service field         = 10..... National Network
0001 DPC                       = 0.0.1(00000001 ..000000)
0002 OPC                       = 0.0.6(10..... 00000001 ....0000)
0004 Signalling Link Code      = 0001.... (1)
Higher Layer Data              = x0981030C16099206007200545784870A9207001100136447630854625248040000
===== SCCP Layer =====
0005 Message Type              = 00001001 UDI unidata
Mandatory Fixed Parameters
Protocol Class Parameter       =
Class                          = ...0001 Class 1
Message Handling (Class 0 and 1 only) = 1000.... return message on error
0007 Pointer to Mandatory Parameter = Parm0 offset x03 (3)
0008 Pointer to Mandatory Parameter = Parm1 offset x0C (12)
0009 Pointer to Mandatory Parameter = Parm2 offset x16 (22)
Mandatory Variable Length Parameters
Called Party Address           = mandatory parameter
000A Parameter length          = 9
Address Indicators             =
000B Point Code Indicators     = .....0 Address does not contain signalling point code
000B SSN Indicators            = .....1. Address contains subsystem number
000B Global Title Indicators   = ..0100.. Global title includes translation type, numbering plan, enc
000B Routing Indicators        = ..0..... Route on GT.
000B Nat1/Int1 Indicators      = 1..... Address is national
000C Subsystem number          = 00000110 HLR
Translation Type                = 00000000 unknown
    
```

Scripts Message Sequence Event Config Script Flow

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

MAPS™ MAP TDM Events Log

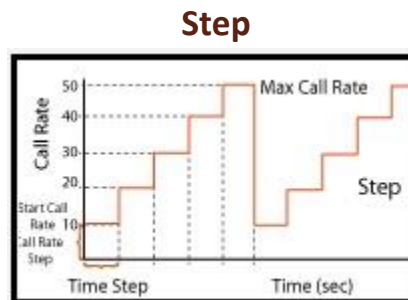
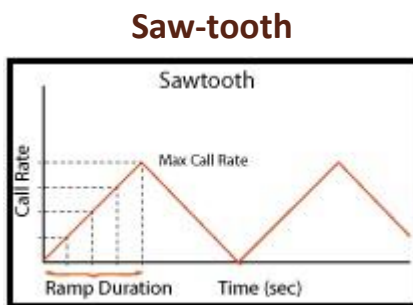
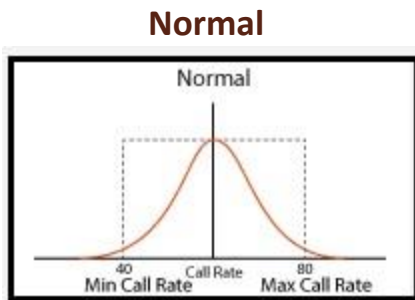
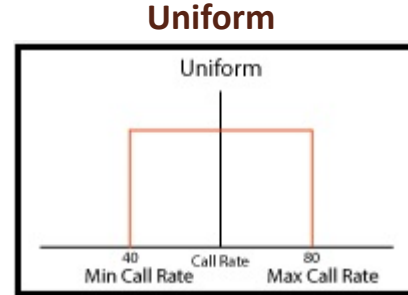
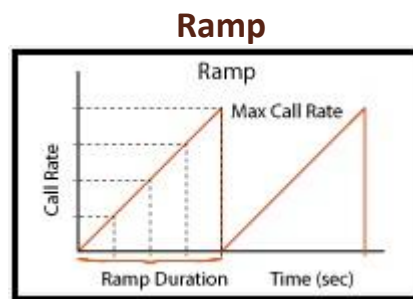
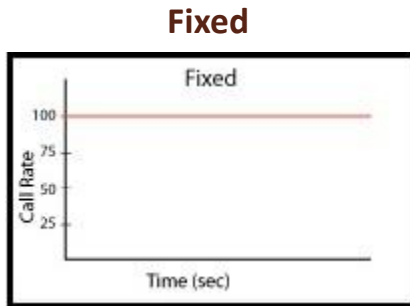
Date/Time	Captured Events	Call Trace Id	Script Name	Script Id
2015-9-21 11:33:00.240000	Mtp2LinkStatus: OutOfService :1. Reason:Link Just Ope...			MTP2
2015-9-21 11:33:00.313000	Mtp2LinkStatus: InitialAlignment :1			MTP2
2015-9-21 11:33:08.943000	Mtp2LinkStatus: AlignedReady :1			MTP2
2015-9-21 11:33:09.575000	Mtp2LinkStatus: InService :1			MTP2
2015-9-21 11:33:09.660000	MTP3 Initiated	0.0.6.0.0.1.1	SLTM.gls	ProtScriptId_0_517192883-3525-3492
2015-9-21 11:33:10.030000	Stream Id = 1	0.0.6.0.0.1.1	SLTM.gls	ProtScriptId_0_517192883-3525-3492
2015-9-21 11:33:10.030000	MTP3 Initiation Requested	0.0.6.0.0.1.1	SLTM.gls	ProtScriptId_0_517192883-3525-3492
2015-9-21 11:33:10.031000	MTP3 Activated	0.0.6.0.0.1.1	SLTM.gls	ProtScriptId_0_517192883-3525-3492
2015-9-21 11:33:10.083000	Subsystem-Status-Test	1	SCMG.gls	ProtScriptId_1_517202743-3527-3492
2015-9-21 11:33:10.234000	MTP3 Activated	0.0.6.0.0.1.1	SLTM.gls	ProtScriptId_0_517192883-3525-3492
2015-9-21 11:33:10.333000	Subsystem-Allowed	1	SCMG.gls	ProtScriptId_1_517202743-3527-3492
2015-9-21 11:33:10.662000	Subsystem-Allowed	1	SCMG.gls	ProtScriptId_1_517202743-3527-3492
2015-9-21 11:34:19.105000	Location Update Message sent	901700000000626	UpdateLocationArg_MSCVLR.gls	CGProtScriptId_0_517271716-3528-4152
2015-9-21 11:34:19.847000	Subscriber Data Inserted in VLR	901700000000626	UpdateLocationArg_MSCVLR.gls	CGProtScriptId_0_517271716-3528-4152
2015-9-21 11:34:20.460000	Location Update Completed	901700000000626	UpdateLocationArg_MSCVLR.gls	CGProtScriptId_0_517271716-3528-4152
2015-9-21 11:35:28.771000	Location Update Message sent	901700000000626	UpdateLocationArg_MSCVLR.gls	CGProtScriptId_1_517341441-3530-4152
2015-9-21 11:35:29.359000	Subscriber Data Inserted in VLR	901700000000626	UpdateLocationArg_MSCVLR.gls	CGProtScriptId_1_517341441-3530-4152
2015-9-21 11:35:29.959000	Location Update Completed	901700000000626	UpdateLocationArg_MSCVLR.gls	CGProtScriptId_1_517341441-3530-4152

Save Events

Capture Events to file ...

Load Generation

- 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



MAPS (Message Automation Protocol Simulation) MSC (MAP 3GPP) - [Load Generation - LoadGendefault]

Configurations Emulator Reports Editor Debug Tools Windows Help

Total Calls To Generate * (* indicates no limit)

Max Active Calls 300 Unique Distributions Per Script

Multi Distributions Max Active Calls Per Script 0

Distributions	Description	Add
Uniform	MinCR=40, MaxCR=80, Duration=10	Remove
Fixed	Call Rate=100, Duration=10	Remove
Normal	MinCR=40, MaxCR=80, Duration=10	Remove All

Scripts

Scripts
SendAuthenticationInfoArg_VLR

Profile Exclusive Profiles

Profile
MSProfile0001
MSProfile0002
MSProfile0003
MSProfile0004
MSProfile0005
MSProfile0006
MSProfile0007
MSProfile0008
MSProfile0009
MSProfile0010

Stop Time

Days 0 Hours 0 Minutes 0

Start Time - 00:00:00.000

End Time - 00:00:00.000

Initialisation Errors Error Events Captured Errors

Bulk Call Generation

MAPS (Message Automation Protocol Simulation) MSC (MAP 3GPP) - [Call Generation]

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Profile	Result	Total Iterations	Completed Iterations
1	UpdateLocationArg_MSCVLR.gls	MSPProfile01		Start		None		Unknown	10	0
2	UpdateLocationArg_MSCVLR.gls	MSPProfile02		Start		None		Unknown	10	0
3	UpdateLocationArg_MSCVLR.gls	MSPProfile03		Start		None		Unknown	10	0
4	UpdateLocationArg_MSCVLR.gls	MSPProfile04		Start		None		Unknown	10	0
5	UpdateLocationArg_MSCVLR.gls	MSPProfile05		Start		None		Unknown	10	0
6	UpdateLocationArg_MSCVLR.gls	MSPProfile06		Start		None		Unknown	10	0
7	UpdateLocationArg_MSCVLR.gls	MSPProfile07		Start		None		Unknown	10	0
8	UpdateLocationArg_MSCVLR.gls	MSPProfile08		Start		None		Unknown	10	0
9	UpdateLocationArg_MSCVLR.gls	MSPProfile09		Start		None		Unknown	10	0
10	UpdateLocationArg_MSCVLR.gls	MSPProfile10		Start		None		Unknown	10	0

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

View Executing Line

Script Contents

```
/// This Script Initiates Location Update procedure ///
```

```
///Initialization ///
```

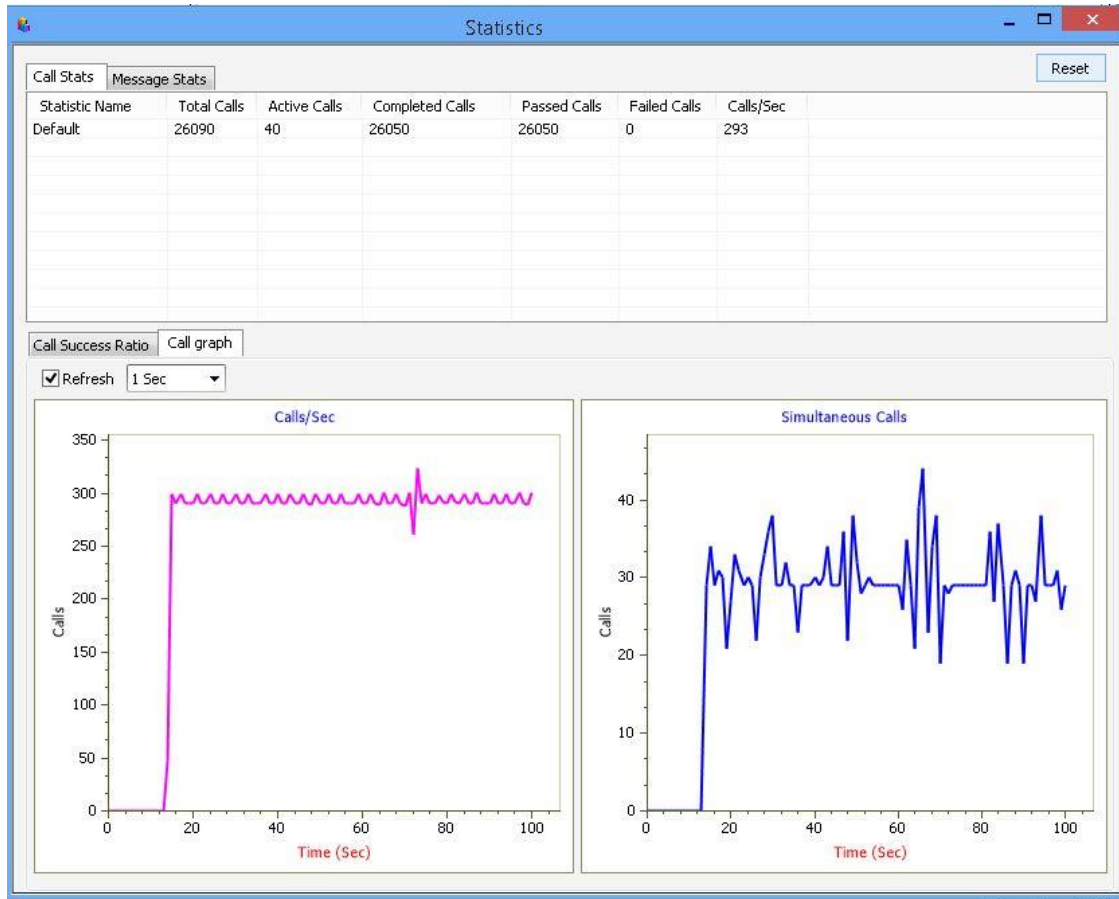
```
CallId=$_CallId++;  
invokeId=$_invokeId++;  
if(_invokeId>127)  
  _invokeId=1;  
endif  
KeyIdentifier:imsi;  
MsgHandler : "MapMsgHandler";  
InterfaceId = (ConnectionIdentifier - 1) ;  
IsGeneration=1;  
goto "Identify Connection";  
CallingSSN=7;  
VLRGTAddress=$_CallingAddress;
```

Scripts Message Sequence Event Config Script Flow

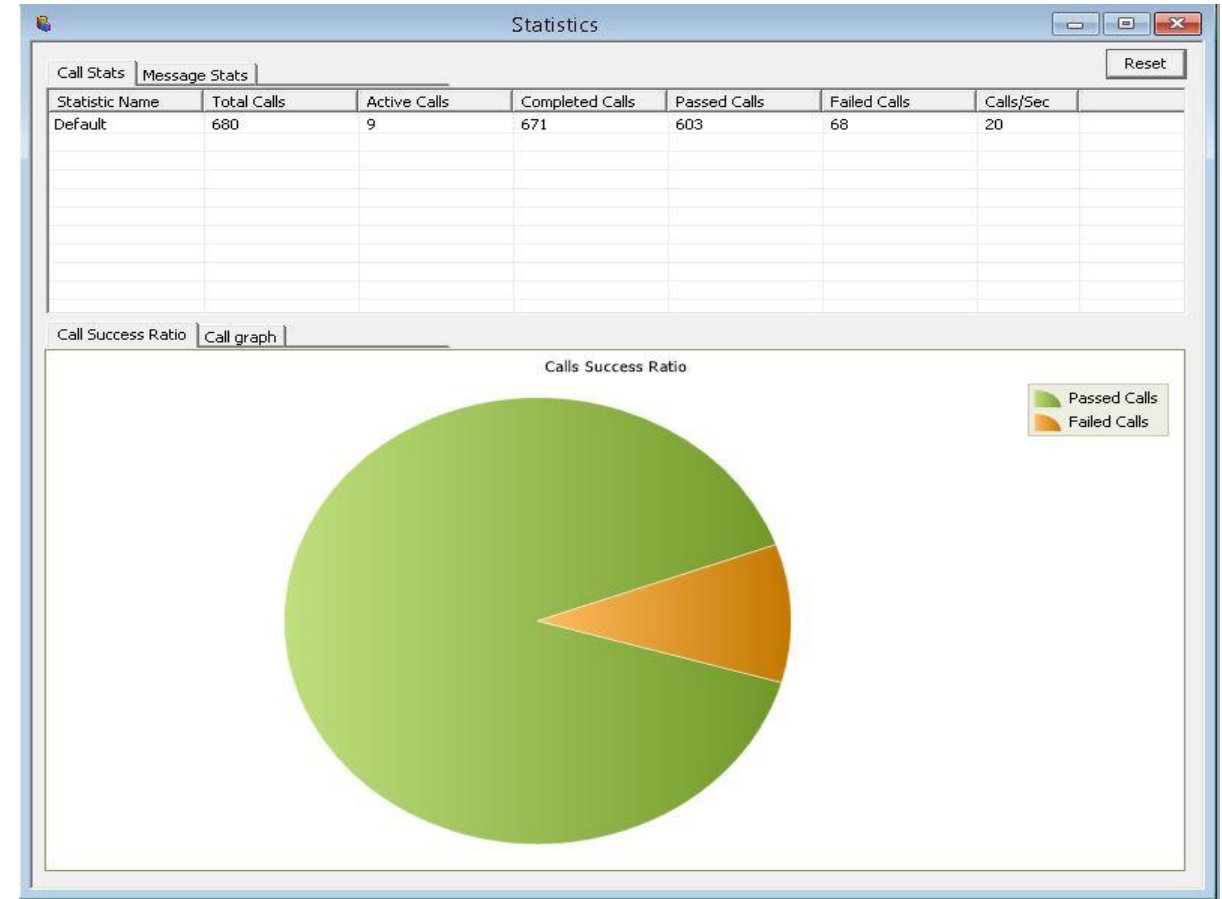
Error Events Captured Errors Link Status Up=1 Down=0

MAP Call Ratio Statistics

Call Graph

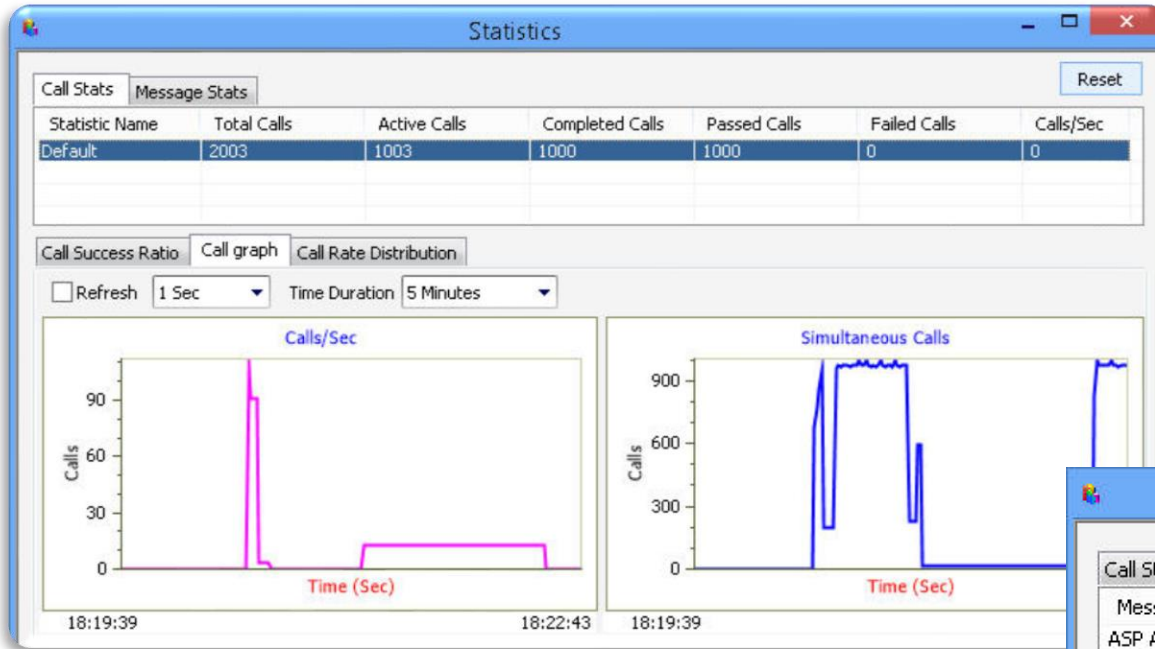


Call Stats



Bulk Call Statistics & Graph

Call Stats and Graph



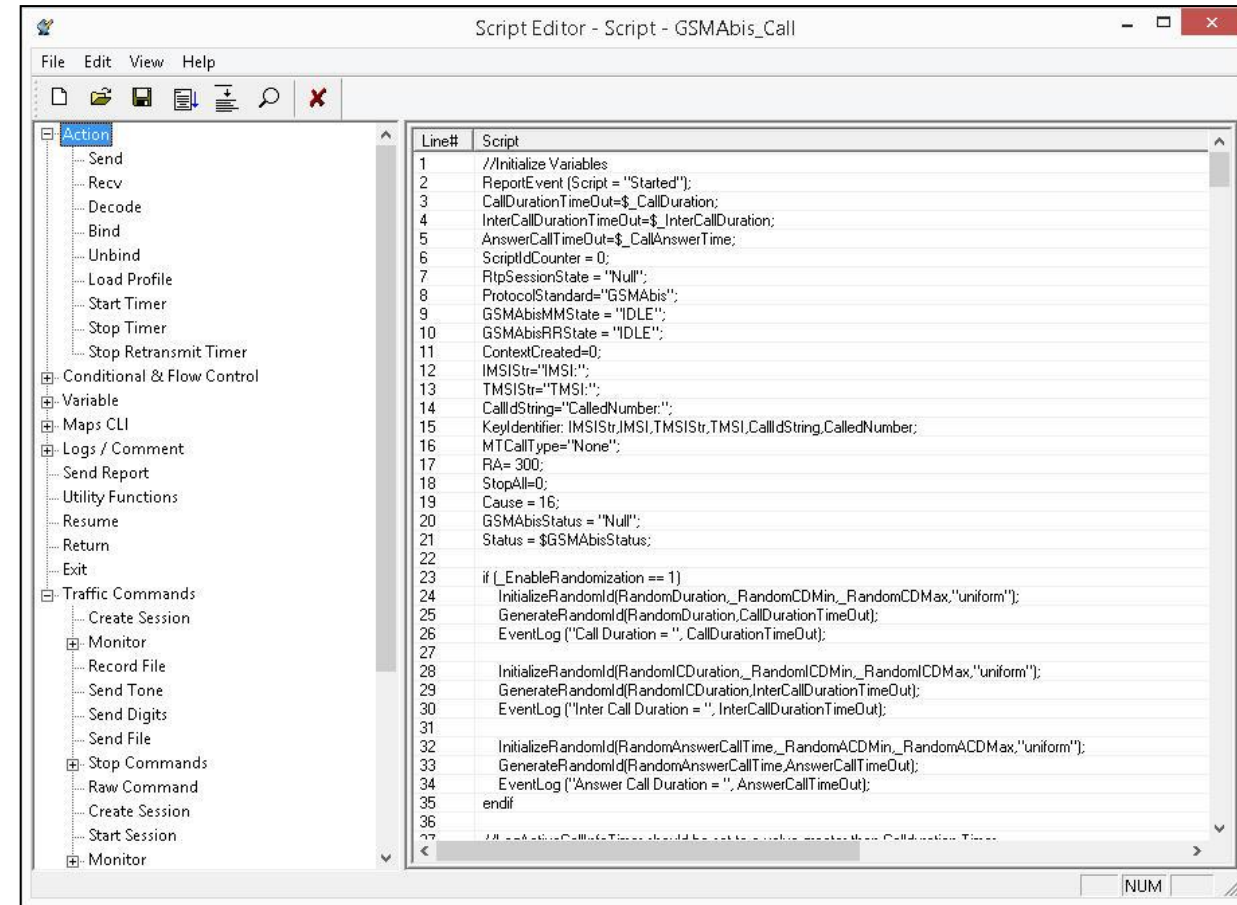
Message Stats

The screenshot shows a software window titled "Statistics" with two tabs: "Call Stats" and "Message Stats". The "Message Stats" tab is active, displaying a table with the following data:

Message Type	Tx Count	Rx Count	Retransmit Count
ASP Active	1	0	0
ASP Active Acknowledgement	0	1	0
ASP Up	1	0	0
ASP Up Acknowledgement	0	1	0
Apply Charging	0	4000	0
Event Report BCSM	1000	0	0
Initial DP	1000	0	0
Notify	0	2	0
Request Report BCSM Event	0	2000	0
SSA subsystem-allowed	1	1	0
SST subsystem-status-test	1	1	0
continue	0	1000	0
Apply Charging Report	3000	0	0

Customizations - Call Flow (Scripts)

- Scripts are written in our proprietary *.gls scripting language. They represent generic state machines intended provide protocol/signaling logic for a call and establish bearer traffic
- Each instance of a script corresponds to a single transaction/call, i.e., if you place 500 calls in parallel you will actually have 500 script instances running at once. If you place 500 calls in series the same script will execute and terminate 500 times
- It is possible to create your own scripts, but almost never necessary! We attempt to provide all necessary scripts out of the box



```
Script Editor - Script - GSMABIS_Call
File Edit View Help
Send
Recv
Decode
Bind
Unbind
Load Profile
Start Timer
Stop Timer
Stop Retransmit Timer
Conditional & Flow Control
Variable
Maps CLI
Logs / Comment
Send Report
Utility Functions
Resume
Return
Exit
Traffic Commands
Create Session
Monitor
Record File
Send Tone
Send Digits
Send File
Stop Commands
Raw Command
Create Session
Start Session
Monitor

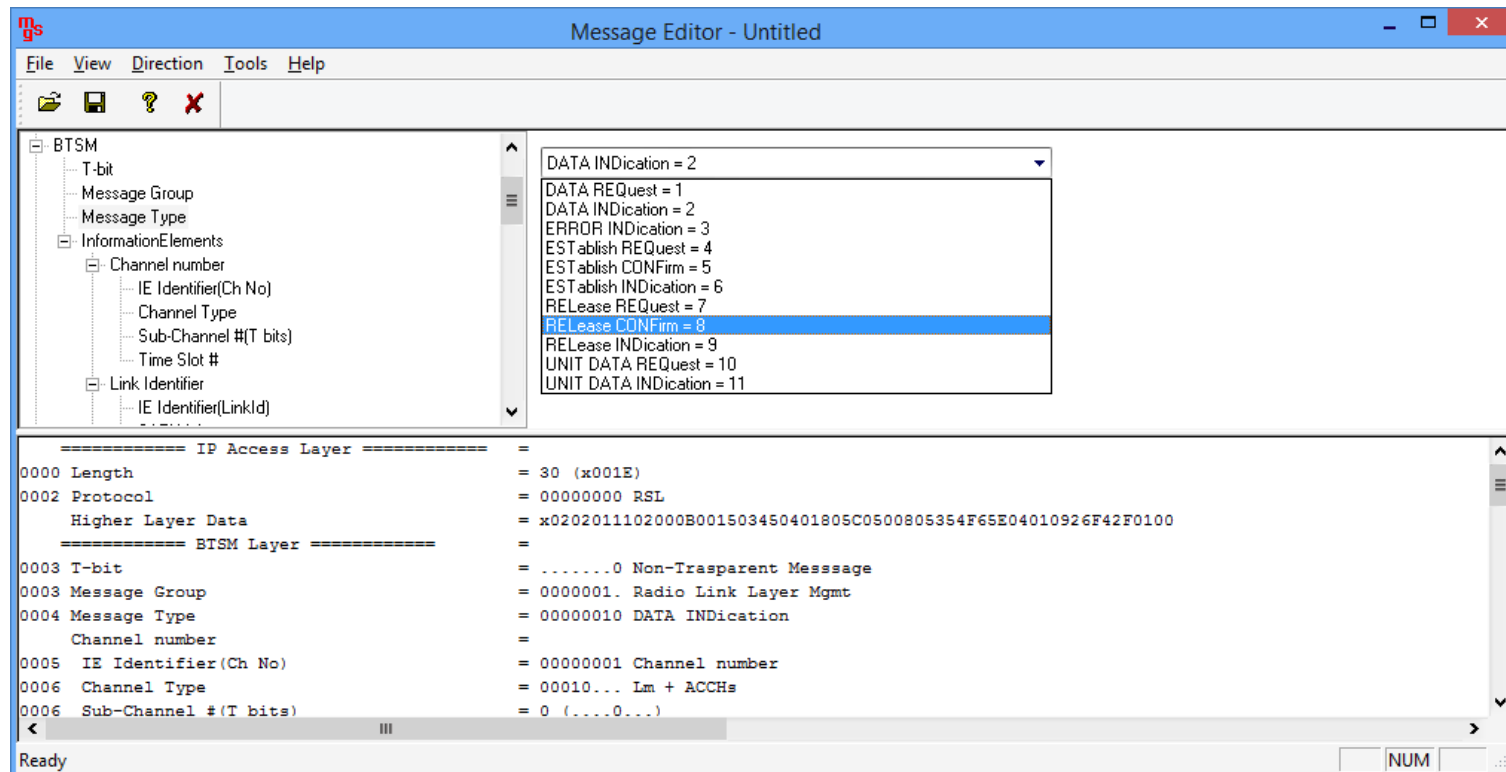
Line# Script
1 //Initialize Variables
2 ReportEvent (Script = "Started");
3 CallDurationTimeOut=$_CallDuration;
4 InterCallDurationTimeOut=$_InterCallDuration;
5 AnswerCallTimeOut=$_CallAnswerTime;
6 ScriptIdCounter = 0;
7 RtpSessionState = "Null";
8 ProtocolStandard="GSMABIS";
9 GSMABISMMState = "IDLE";
10 GSMABISRRState = "IDLE";
11 ContextCreated=0;
12 IMSIStr="IMSI:";
13 TMSIStr="TMSI:";
14 CallIdString="CalledNumber:";
15 KeyIdentifier: IMSIStr,IMSI,TMSIStr,TMSI,CallIdString,CalledNumber;
16 MTCallType="None";
17 RA= 300;
18 StopAll=0;
19 Cause = 16;
20 GSMABISStatus = "Null";
21 Status = $GSMABISStatus;
22
23 if (_EnableRandomization == 1)
24 InitializeRandomId(RandomDuration,_RandomCDMin,_RandomCDMax,"uniform");
25 GenerateRandomId(RandomDuration,CallDurationTimeOut);
26 EventLog ("Call Duration = ", CallDurationTimeOut);
27
28 InitializeRandomId(RandomCDuration,_RandomCDMin,_RandomCDMax,"uniform");
29 GenerateRandomId(RandomCDuration,InterCallDurationTimeOut);
30 EventLog ("Inter Call Duration = ", InterCallDurationTimeOut);
31
32 InitializeRandomId(RandomAnswerCallTime,_RandomACDMin,_RandomACDMax,"uniform");
33 GenerateRandomId(RandomAnswerCallTime,AnswerCallTimeOut);
34 EventLog ("Answer Call Duration = ", AnswerCallTimeOut);
35 endif
36
37 // -> Active Calls (if Time should be set to another greater than CallDuration Time
```

Customizations - Protocol Messages

When the script actually sends a message it does so by loading a hdl file template from disk

These message templates provide the actual structure of the message, the script simply populates it with values contained in its variables

These messages are customizable by the user, header fields can be altered and removed. Binary-based messages are edited in our provided message editor



Customizations - User Events

The screenshot displays the MAPS (Message Automation Protocol Simulation) software interface. The main window shows a table of call events with columns for Sr No, Script Name, Profile, Call Info, Script Execution, Status, Events, Events..., Result, Total Iterations, and Completed Iterations. The 'Retrieve' event is highlighted in yellow, and a context menu is open over it, showing options: Terminate Call, Initiate Reset, Clear Call, and Retrieve. A blue arrow points from the 'Retrieve' option in the menu to the 'Retrieve' section in the script editor below.

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events ...	Result	Total Iterations	Completed Iterations
1	Isup_Call.gls	Card1TS01	1.1.1.2.2.2.1	Abort	File Sent	Retrieve		Pass	1	0
2	Call.gls	Card1TS02		Start		None				0
3	Call.gls	Card1TS03		Start		None				0
4	Call.gls	Card1TS04		Start		None				0
5	Call.gls	Card1TS05		Start		None				0
6	Call.gls	Card1TS06		Start		None				0
7	Call.gls	Card1TS07		Start		None				0
8	Call.gls	Card1TS08		Start		None		Unknown	1	0

Script Contents

```
"Hold":
  CallHoldInitiated = 1;
  (ISUPScriptId) goto "Hold";
  resume;

"Retrieve":
  CallHoldInitiated = 0;
  (ISUPScriptId) goto "Retrieve";
  resume;

"Suspend":
  SuspendInitiated = 1;
  (ISUPScriptId) goto "Suspend Call";
  resume;
```

Control moves to "Retrieve" section, after selecting the "Retrieve" User Event

Customizations - Statistics and Reports

MOS, R-Factor

Packet Loss

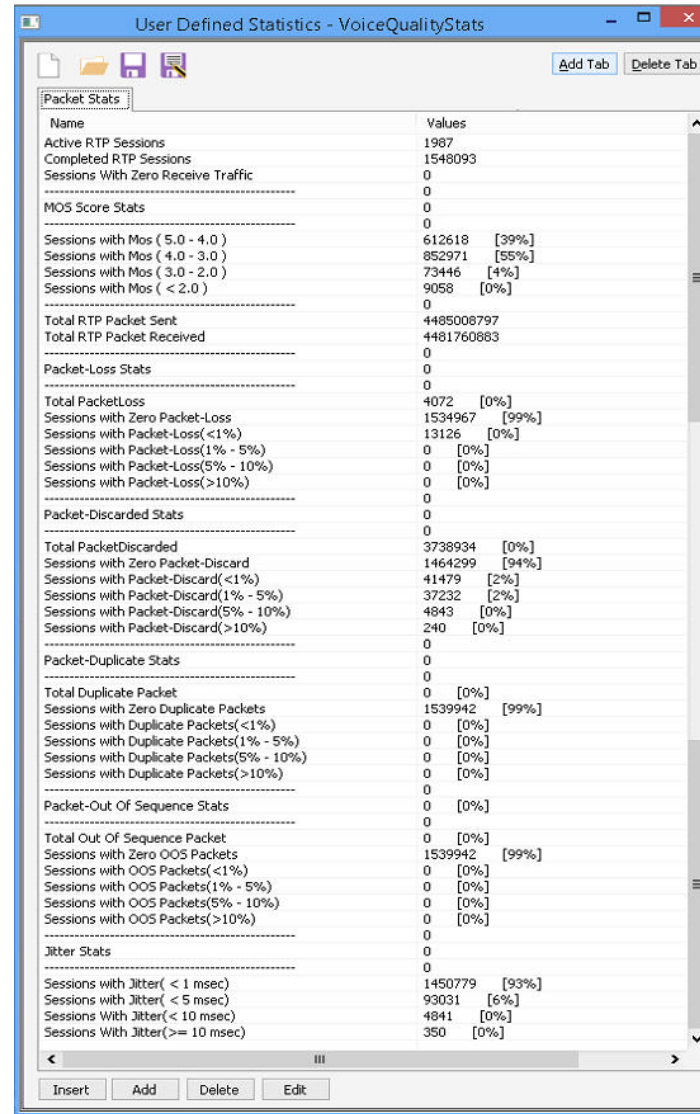
Packets Discarded

Duplicate Packets

Out-Of-Sequence

Packets

Jitter Statistics



Name	Values
Active RTP Sessions	1987
Completed RTP Sessions	1548093
Sessions With Zero Receive Traffic	0

MOS Score Stats	0

Sessions with Mos (5.0 - 4.0)	612618 [39%]
Sessions with Mos (4.0 - 3.0)	852971 [55%]
Sessions with Mos (3.0 - 2.0)	73446 [4%]
Sessions with Mos (< 2.0)	9058 [0%]

Total RTP Packet Sent	4485008797
Total RTP Packet Received	4481760883

Packet-Loss Stats	0

Total PacketLoss	4072 [0%]
Sessions with Zero Packet-Loss	1534967 [99%]
Sessions with Packet-Loss(<1%)	13126 [0%]
Sessions with Packet-Loss(1% - 5%)	0 [0%]
Sessions with Packet-Loss(5% - 10%)	0 [0%]
Sessions with Packet-Loss(>10%)	0 [0%]

Packet-Discarded Stats	0

Total PacketDiscarded	3738934 [0%]
Sessions with Zero Packet-Discard	1464299 [94%]
Sessions with Packet-Discard(<1%)	41479 [2%]
Sessions with Packet-Discard(1% - 5%)	37232 [2%]
Sessions with Packet-Discard(5% - 10%)	4843 [0%]
Sessions with Packet-Discard(>10%)	240 [0%]

Packet-Duplicate Stats	0

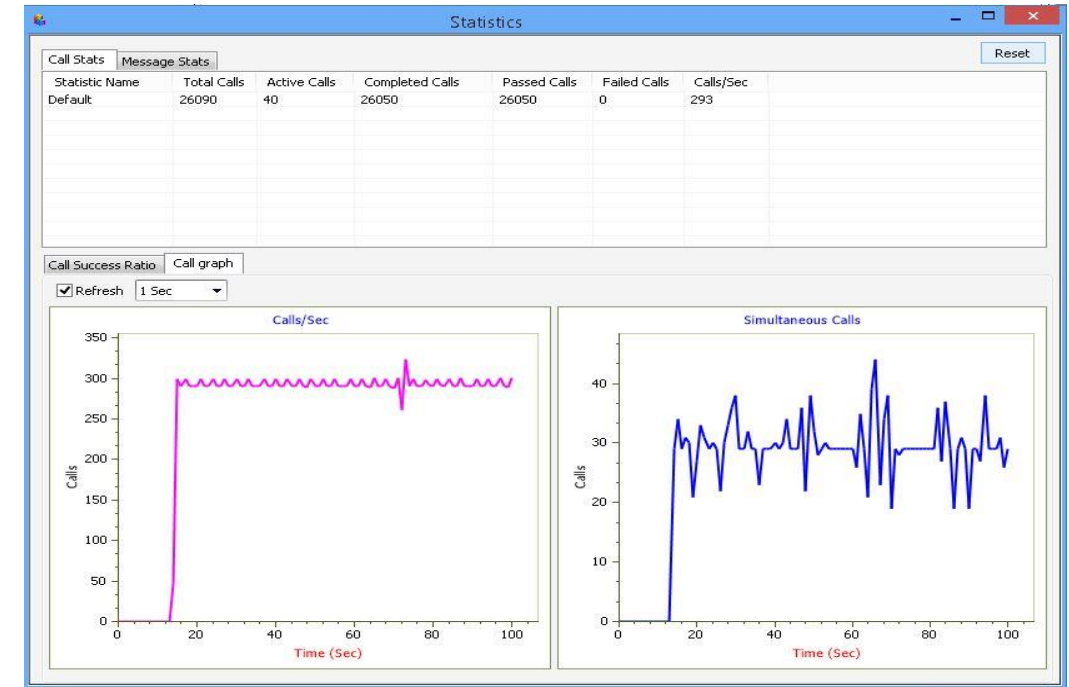
Total Duplicate Packet	0 [0%]
Sessions with Zero Duplicate Packets	1539942 [99%]
Sessions with Duplicate Packets(<1%)	0 [0%]
Sessions with Duplicate Packets(1% - 5%)	0 [0%]
Sessions with Duplicate Packets(5% - 10%)	0 [0%]
Sessions with Duplicate Packets(>10%)	0 [0%]

Packet-Out Of Sequence Stats	0 [0%]

Total Out Of Sequence Packet	0 [0%]
Sessions with Zero OOS Packets	1539942 [99%]
Sessions with OOS Packets(<1%)	0 [0%]
Sessions with OOS Packets(1% - 5%)	0 [0%]
Sessions with OOS Packets(5% - 10%)	0 [0%]
Sessions with OOS Packets(>10%)	0 [0%]

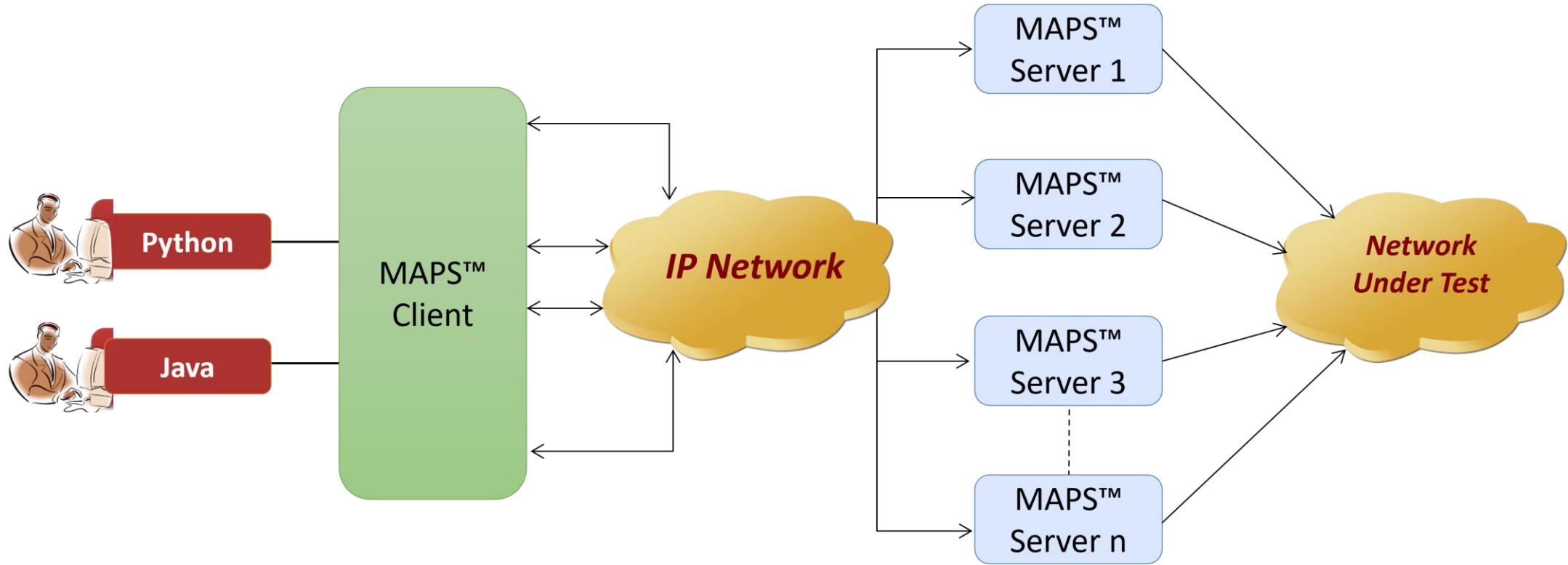
Jitter Stats	0

Sessions with Jitter(< 1 msec)	1450779 [93%]
Sessions with Jitter(< 5 msec)	93031 [6%]
Sessions With Jitter(< 10 msec)	4841 [0%]
Sessions With Jitter(>= 10 msec)	350 [0%]



Call Stats provide a running tabular log of system level stats, tracked stats include: Total Calls, Active Calls, Completed Calls, Passed Calls, Failed Calls, Instantaneous Calls/Sec

MAPS™ API Architecture

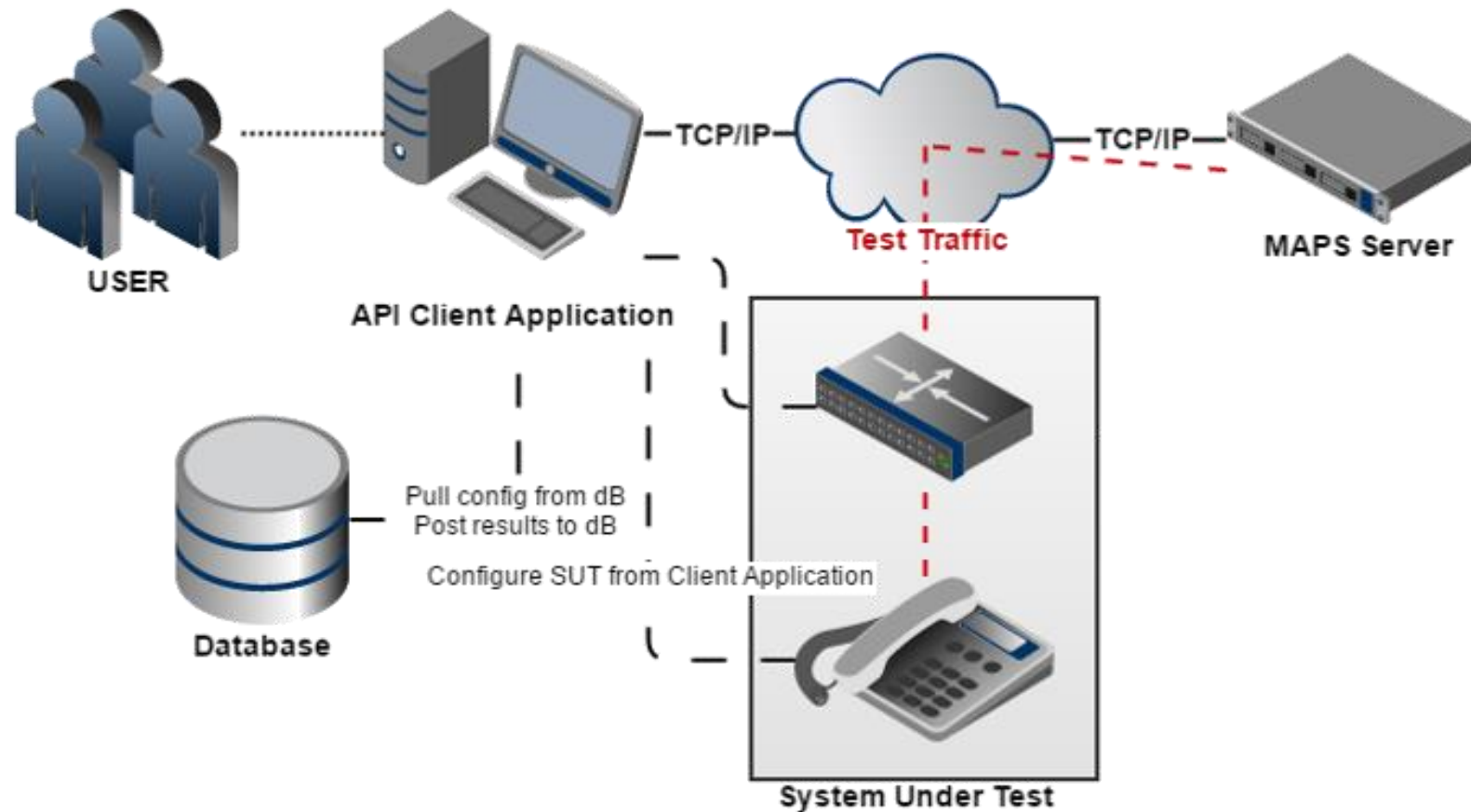


- API wraps our proprietary scripting language in standard languages familiar to the user:
 - Python
 - Java
- Clients and Servers support a “Many-to-Many” relationship, making it very easy for users to develop complex test cases involving multiple signaling protocols

API Architecture (Contd.)

System Integration

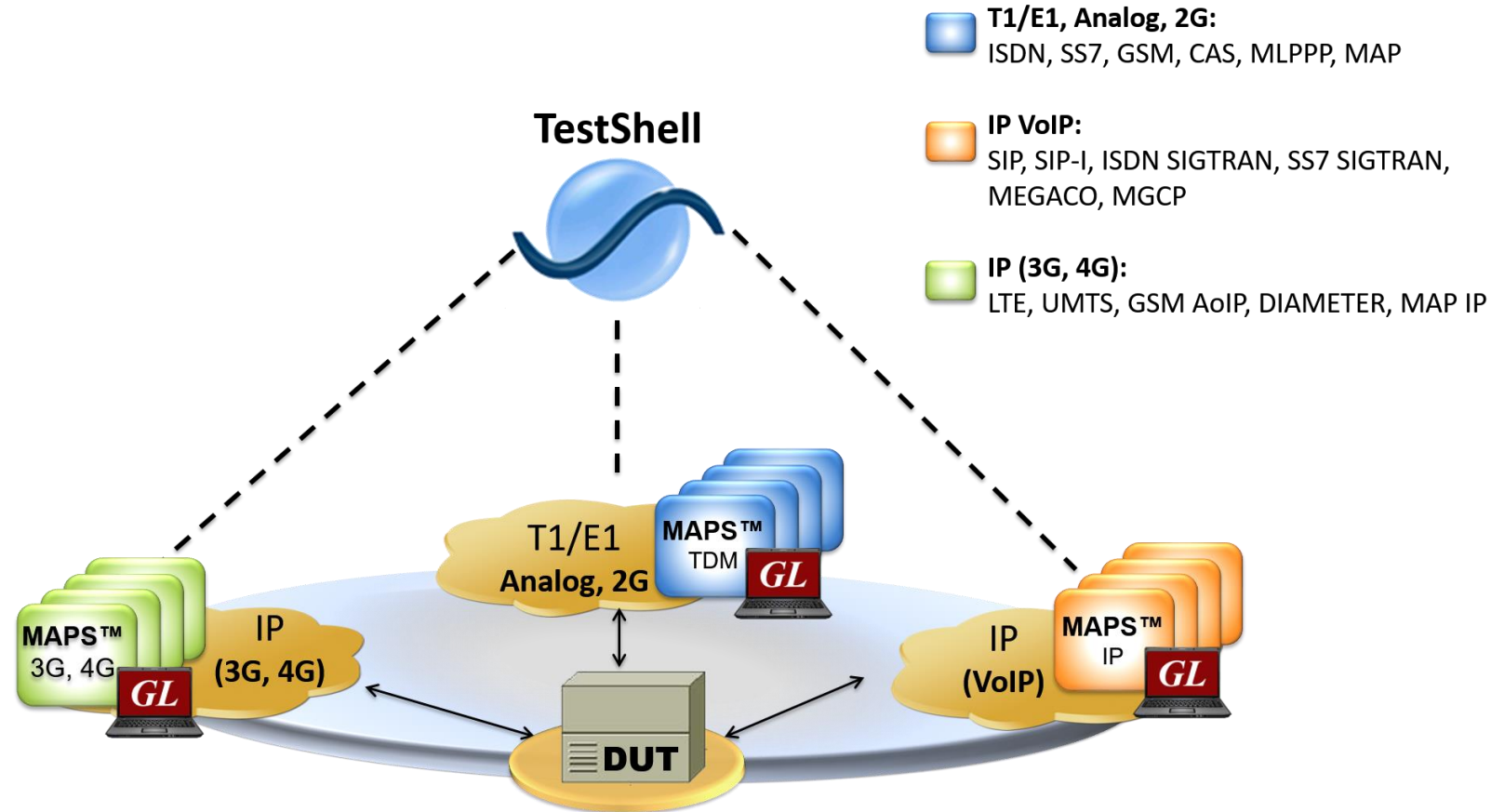
- The same Client Application used to control MAPS™ can be, and very often is, used to control other elements of the System Under Test



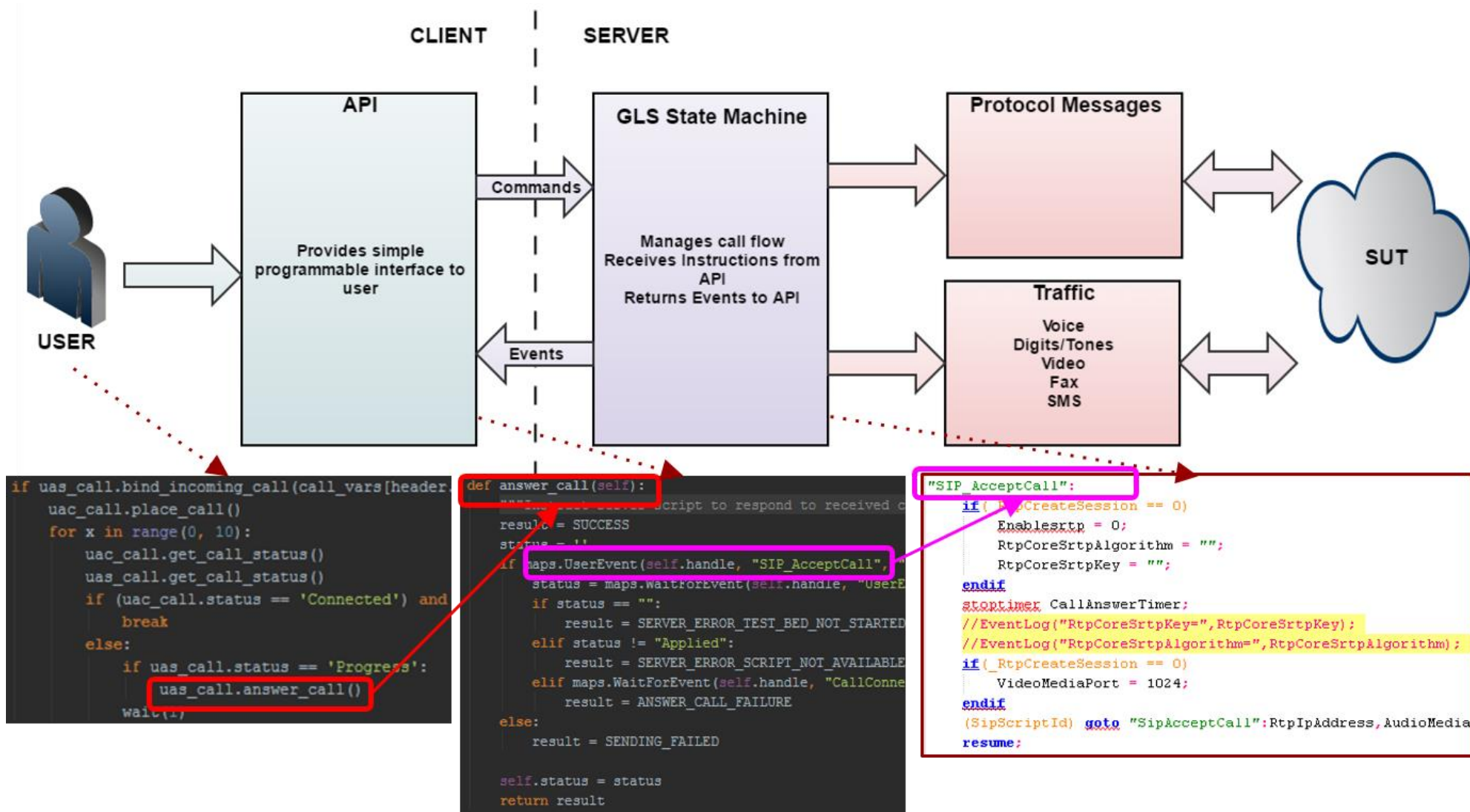
API Architecture (Contd.)

System Integration

- Client Application can be as simple as executing a script from an IDE or it can be integrated into a full-fledged automation test suite like QualiSystems TestShell or HP UFT



API Architecture (Contd.)



```

if uas_call.bind_incoming_call(call_vars[header
uas_call.place_call()
for x in range(0, 10):
uas_call.get_call_status()
uas_call.get_call_status()
if (uas_call.status == 'Connected') and
break
else:
if uas_call.status == 'Progress':
uas_call.answer_call()
wait(1);
  
```

```

def answer_call(self):
"""Sip script to respond to received c
result = SUCCESS
status = ""
if maps.UserEvent(self.handle, "SIP_AcceptCall",
status = maps.WaitForEvent(self.handle, "UserE
if status == "":
result = SERVER_ERROR_TEST_BED_NOT_STARTED
elif status != "Applied":
result = SERVER_ERROR_SCRIPT_NOT_AVAILABLE
elif maps.WaitForEvent(self.handle, "CallConne
result = ANSWER_CALL_FAILURE
else:
result = SENDING_FAILED

self.status = status
return result
  
```

```

"SIP_AcceptCall":
if (RtpCreateSession == 0)
EnableSrtp = 0;
RtpCoreSrtpAlgorithm = "";
RtpCoreSrtpKey = "";
endif
STARTTIME CallAnswerTimer;
//EventLog("RtpCoreSrtpKey=", RtpCoreSrtpKey);
//EventLog("RtpCoreSrtpAlgorithm=", RtpCoreSrtpAlgorithm);
if (RtpCreateSession == 0)
VideoMediaPort = 1024;
endif
(SipScriptId) goto "SipAcceptCall":RtpIpAddress, AudioMedia
resume;
  
```

APIs High Level vs Low Level

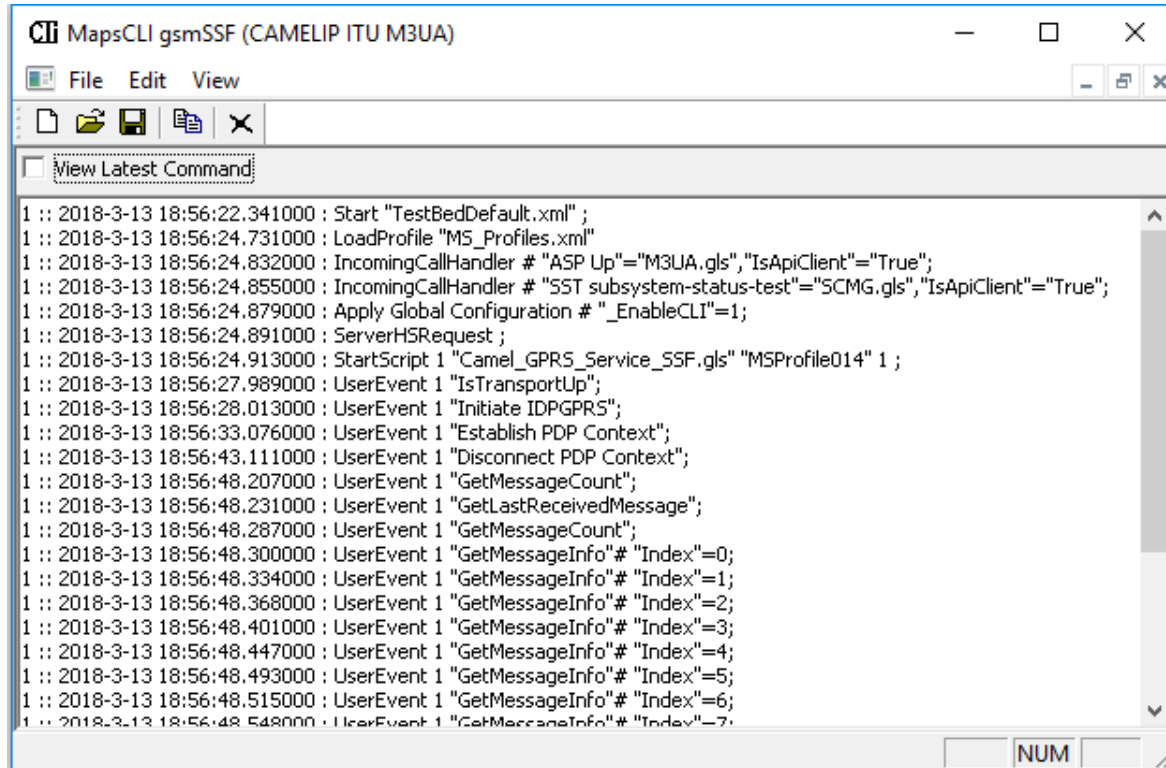
- The API is broken into High and Low level function calls / scripts
- For High Level scripts, all the fine-grained protocol control happen in the script running on the MAPS server, hidden from the API user
- Low Level scripts put the API user in complete control of the protocol stack. This makes Low Level scripts more flexible and powerful, but also correspondingly more complex

```
my_call = local_server.start_call_script("HIGH", "PLACE_CALL")
if my_call.handle != 0:
    my_call.set_local_variable("Contact", "(s)", local_contact)
    my_call.set_local_variable("AddressOfRecord", "(s)", local_aor)
    my_call.set_local_variable("To", "(s)", remote_uri)
    my_call.place_call()
```

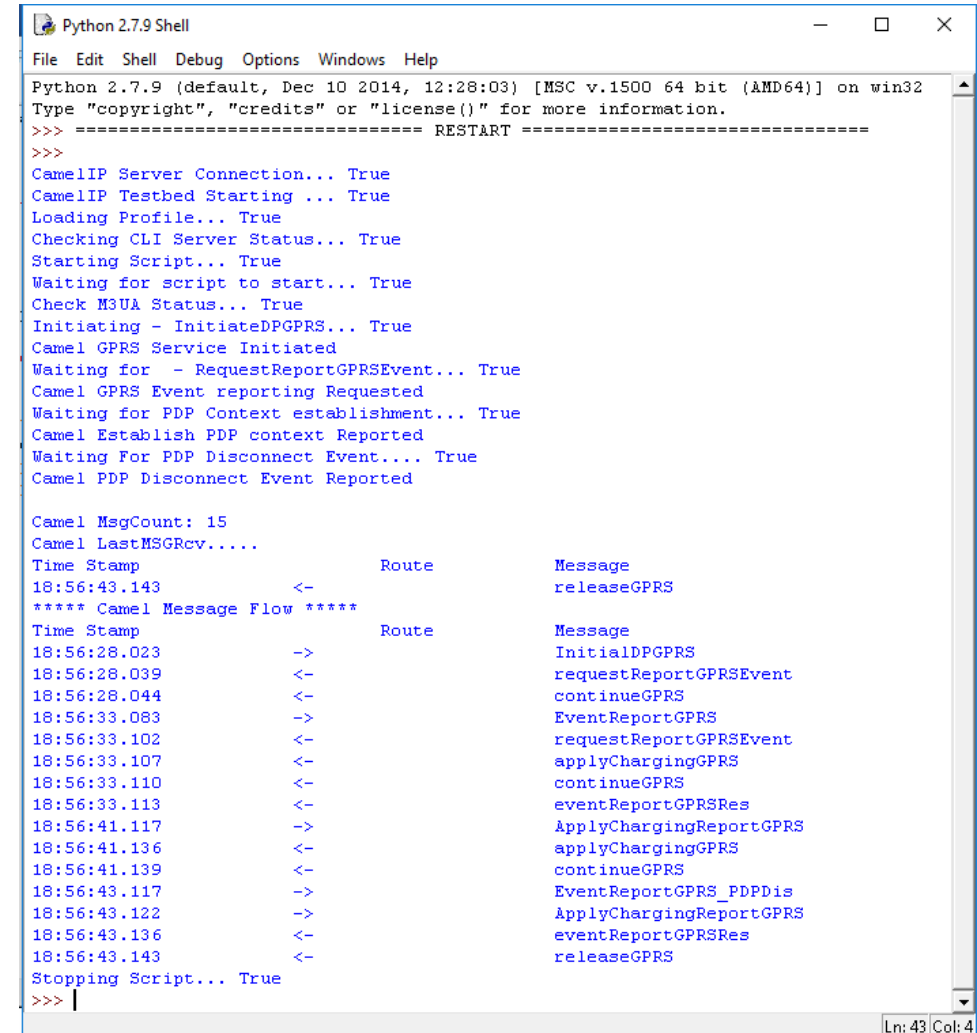
```
if local_server.status == "STARTED":
    my_call = local_server.start_call_script("LOW", "PLACE_CALL")
    if my_call.handle != 0:
        my_call.set_local_variable("Contact", "(s)", local_contact)
        my_call.set_local_variable("AddressOfRecord", "(s)", local_aor)
        my_call.set_local_variable("To", "(s)", remote_uri)
        if my_call.rtp_action.create_session(rtp_address, rtp_port) == SUCCESS:
            my_call.send_message("Invite", "InviteImport")
            recvd_msg = my_call.receive_message(timeout)
            if recvd_msg == "100 TRYING" or recvd_msg == "180 RINGING":
```

Python Client Sample Script

MAPS CLI Server



```
CLI MapsCLI gsmSSF (CAMELIP ITU M3UA)
File Edit View
View Latest Command
1 :: 2018-3-13 18:56:22.341000 : Start "TestBedDefault.xml";
1 :: 2018-3-13 18:56:24.731000 : LoadProfile "MS_Profiles.xml"
1 :: 2018-3-13 18:56:24.832000 : IncomingCallHandler # "ASP Up"="M3UA.gls", "IsApiClient"="True";
1 :: 2018-3-13 18:56:24.855000 : IncomingCallHandler # "SST subsystem-status-test"="SCMG.gls", "IsApiClient"="True";
1 :: 2018-3-13 18:56:24.879000 : Apply Global Configuration # "_EnableCLI"=1;
1 :: 2018-3-13 18:56:24.891000 : ServerHSRequest ;
1 :: 2018-3-13 18:56:24.913000 : StartScript 1 "Camel_GPRS_Service_SSF.gls" "M5Profile014" 1 ;
1 :: 2018-3-13 18:56:27.989000 : UserEvent 1 "IsTransportUp";
1 :: 2018-3-13 18:56:28.013000 : UserEvent 1 "Initiate IDPGPRS";
1 :: 2018-3-13 18:56:33.076000 : UserEvent 1 "Establish PDP Context";
1 :: 2018-3-13 18:56:43.111000 : UserEvent 1 "Disconnect PDP Context";
1 :: 2018-3-13 18:56:48.207000 : UserEvent 1 "GetMessageCount";
1 :: 2018-3-13 18:56:48.231000 : UserEvent 1 "GetLastReceivedMessage";
1 :: 2018-3-13 18:56:48.287000 : UserEvent 1 "GetMessageCount";
1 :: 2018-3-13 18:56:48.300000 : UserEvent 1 "GetMessageInfo" # "Index"=0;
1 :: 2018-3-13 18:56:48.334000 : UserEvent 1 "GetMessageInfo" # "Index"=1;
1 :: 2018-3-13 18:56:48.368000 : UserEvent 1 "GetMessageInfo" # "Index"=2;
1 :: 2018-3-13 18:56:48.401000 : UserEvent 1 "GetMessageInfo" # "Index"=3;
1 :: 2018-3-13 18:56:48.447000 : UserEvent 1 "GetMessageInfo" # "Index"=4;
1 :: 2018-3-13 18:56:48.493000 : UserEvent 1 "GetMessageInfo" # "Index"=5;
1 :: 2018-3-13 18:56:48.515000 : UserEvent 1 "GetMessageInfo" # "Index"=6;
1 :: 2018-3-13 18:56:48.548000 : UserEvent 1 "GetMessageInfo" # "Index"=7;
```



```
Python 2.7.9 Shell
File Edit Shell Debug Options Windows Help
Python 2.7.9 (default, Dec 10 2014, 12:28:03) [MSC v.1500 64 bit (AMD64)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> ===== RESTART =====
>>>
CamelIP Server Connection... True
CamelIP Testbed Starting ... True
Loading Profile... True
Checking CLI Server Status... True
Starting Script... True
Waiting for script to start... True
Check M3UA Status... True
Initiating - InitiateDPGPRS... True
Camel GPRS Service Initiated
Waiting for - RequestReportGPRSEvent... True
Camel GPRS Event reporting Requested
Waiting for PDP Context establishment... True
Camel Establish PDP context Reported
Waiting For PDP Disconnect Event.... True
Camel PDP Disconnect Event Reported

Camel MsgCount: 15
Camel LastMSGRev.....
Time Stamp                Route                Message
18:56:43.143              <-                  releaseGPRS
**** Camel Message Flow ****
Time Stamp                Route                Message
18:56:28.023              ->                  InitialDPGPRS
18:56:28.039              <-                  requestReportGPRSEvent
18:56:28.044              <-                  continueGPRS
18:56:33.083              ->                  EventReportGPRS
18:56:33.102              <-                  requestReportGPRSEvent
18:56:33.107              <-                  applyChargingGPRS
18:56:33.110              <-                  continueGPRS
18:56:33.113              <-                  eventReportGPRSRes
18:56:41.117              ->                  ApplyChargingReportGPRS
18:56:41.136              <-                  applyChargingGPRS
18:56:41.139              <-                  continueGPRS
18:56:43.117              ->                  EventReportGPRS_PDPDis
18:56:43.122              ->                  ApplyChargingReportGPRS
18:56:43.136              <-                  eventReportGPRSRes
18:56:43.143              <-                  releaseGPRS
Stopping Script... True
>>> |
```

Ln: 43 | Col: 4

Thank you