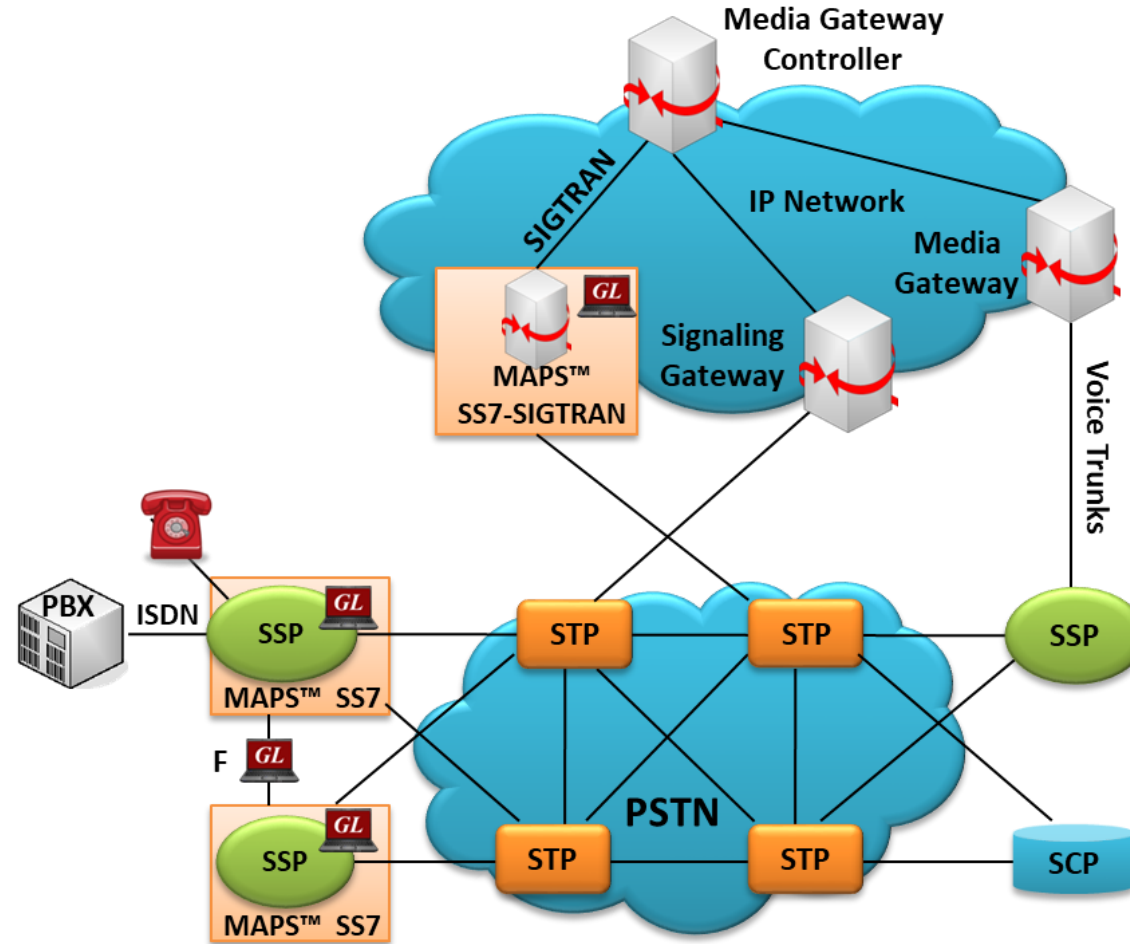

MAPS™ SS7 Protocol Emulator

(SS7/ISUP Protocol Emulation over TDM/ATM)



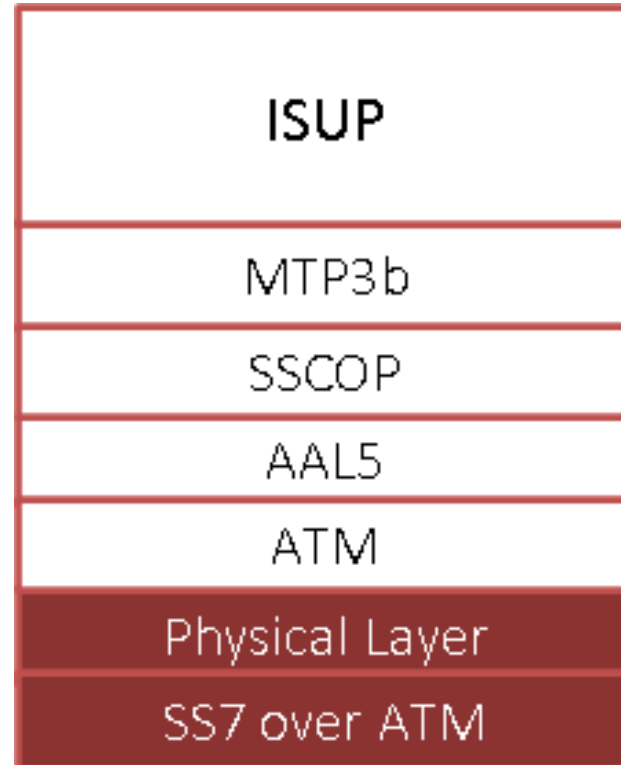
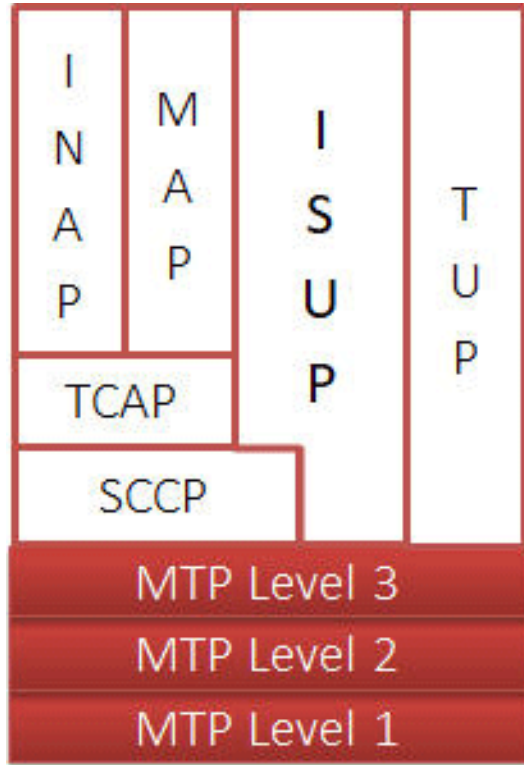
818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878
Phone: (301) 670-4784 Fax: (301) 670-9187 Email: info@gl.com
Website: <http://www.gl.com>

SS7 Network Architecture



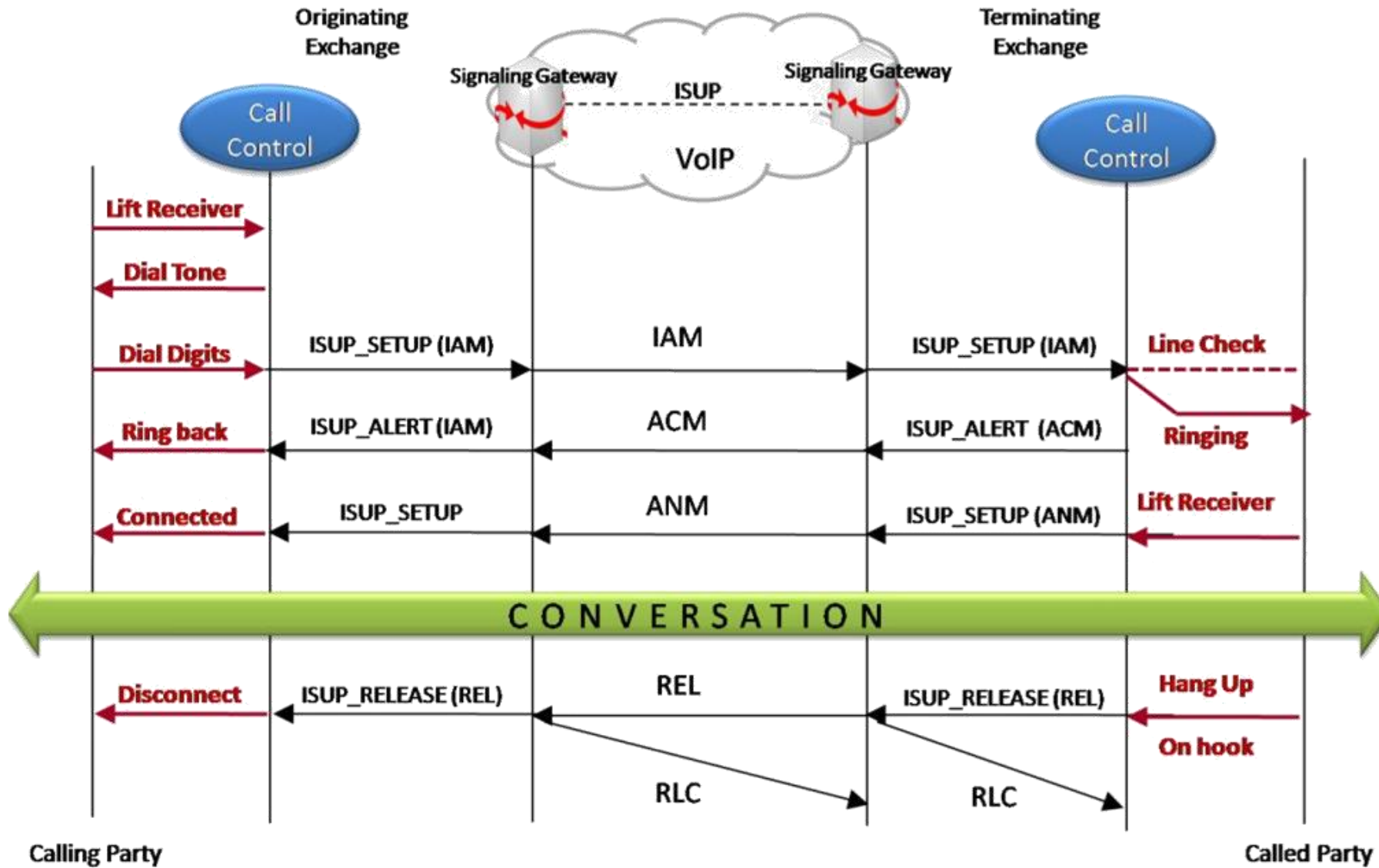
 **MAPS™ SS7 Emulator**
over TDM/ Network

Supported Protocol Standards



Supported Protocols	Standard / Specification Used
TDM	
MTP3 (ITU)	ITU-T Q.704
ISUP (ITU)	ITU - Q.761, Q.762, Q.763 and Q.764
ISUP Conformance testing	ITU - Q.784.1
ISUP CHINA	Ministry of Posts and Telecommunications of the People's Republic of China, Technical Specification of ISUP, 1996
MTP3 (ANSI)	T1.111.4-1996
ISUP (ANSI)	ANSI - T1.113.1 to T1.113.4
Test & Network Management Messages (ITU, China)	ITU-T Q.703, Q.704
Test & Network Management Messages (ANSI)	ANSI T1.111.4, ANSI T1.111.7
ISUP ETSI	EN 300 356 -1 V3.2.2 (1998-08) Part 1
ATM	
ISUP (ITU)	ITU - Q.761, Q.762, Q.763 and Q.764
ATM	ITU-T I.361
SSCOP	ITU-T Q.2110
MTP3b	ITU-T Recommendation Q.2210
AAL5	Class C & D (ITU-T I.363.5)

ISUP Call Flow



Testbed Setup Configuration

MTP2 Testbed Setup

The screenshot shows the MAPS configuration window for MTP2. The main configuration table is as follows:

Config	Value
Signalling Switching Point	
Exchange Type	Control
CIC to Circuit Mapping	Timeslot Based
CIC Handling Method for CIC Based Mapping	Configured in Profile
SSP	1
SSP 1	
SSP Point Code	1.1.1
Network Indicator	National
Link Set Parameters	1
Link Set Parameters 1	
Adjacent Destination Point Code	2.2.2
Link Set Id	1
Link	1
Link 1	
Signaling Port	1
Signaling Timeslot	31
SignalingSubchannel	1..8
Signaling Link Selection	1
Destination SSP	1
Destination SSP 1	
Destination Point Code	2.2.2
Circuit Group	1
Circuit Group 1	
Port Number	1
CIC	1
Routes	1
Routes 1	
RoutingLinkSet	1
Routing Destination Point Code	2.2.2
End User Configuration	ISUP_Profiles.xml

On the right, the `_CircuitSelection` dropdown menu is open, showing `Timeslot Based` selected.

ATM Testbed Setup

The screenshot shows the MAPS configuration window for ATM. The main configuration table is as follows:

Config	Value
Signalling Switching Point	
Exchange Type	Control
Circuit Mapping	Only CIC
CIC to Circuit Mapping	CIC Based
CIC Handling Method for CIC Based Mapping	Least Idle
SSP	1
SSP 1	
SSP Point Code	2.2.2
Network Indicator	International
Link Set Parameters	1
Link Set Parameters 1	
Adjacent Destination Point Code	1.1.1
Link Set Id	1
Link	1
Link 1	
T1 E1 Port Number	2
Signaling VPI	105
Signalling VCI	106
Signaling Link Selection	0
Destination SSP	1
Destination SSP 1	
Destination Point Code	1.1.1
CIC Configuration	
CIC Start	1
Number of CICs	4000
Routes	1
Route 1	
RoutingLinkSet	1
Routing Destination Point Code	1.1.1
End User Configuration	MS_Profiles.xml

On the right, the `Enable` checkbox is checked.

Profile Configuration

ISUP Profile

MAPS (Message Automation Protocol Simulation) SSP (ISUP ITU MTP2) - [Profile Editor - ISUP_Profiles]

Config

#	Profiles (Edit-F2)	Config	Value	Enable
3	Card1TS01	Card1TS01		<input checked="" type="checkbox"/>
4	Card1TS02			
5	Card1TS03			
6	Card1TS04			
7	Card1TS05			
8	Card1TS06			
9	Card1TS07			
10	Card1TS08			
11	Card1TS09			
12	Card1TS10			
13	Card1TS11			
14	Card1TS12			
15	Card1TS13			
16	Card1TS14			
17	Card1TS15			

ISUP Parameters

- Initial Address Message Parameters
 - Called Number: 4265375002
 - Nature Of Called Number: National
 - Calling Number: 5674532002
 - Nature Of Calling Number: National
- IAM Message Indicators
 - Continuity Check Indicator: Not Required
- Receive Call Parameters
 - IAM Response Type: Answer Call
 - Reject Cause: 87 - User not member of CUG
 - Release Location: 0 - User(U)
 - Suspend Resume Parameter: Subscriber Initiated

MS Profile

MAPS (Message Automation Protocol Simulation) SSP (ISUP ITU ATM) - [Profile Editor - MS_Profiles]

Config

#	Profiles (Edit-F2)	Config	Value	Enable
1	DefaultProfile			
2	MSProfile001			
3	MSProfile002	MSProfile002		<input checked="" type="checkbox"/>
4	MSProfile003			
5	MSProfile004			
6	MSProfile005			
7	MSProfile006			
8	MSProfile007			
9	MSProfile008			
10	MSProfile009			
11	MSProfile010			
12	MSProfile011			
13	MSProfile012			
14	MSProfile013			
15	MSProfile014			
16	MSProfile015			

ISUP Parameters

- Initial Address Message Parameters
 - Called Number: 4265375003
 - Nature Of Called Number: National
 - Calling Number: 5674532003
 - Nature Of Calling Number: National
- IAM Message Indicators
 - Continuity Check Indicator: Not Required
- Receive Call Parameters
 - IAM Response Type: Answer Call
 - Reject Cause: 1 - Unallocated (unassigned) number
 - Release Location: 0 - User(U)
 - Suspend Resume Parameter: Subscriber Initiated

Global Configuration

MTP2 Global Profile

The screenshot shows the 'Global Configuration' window for the MTP2 profile. The window title is 'MAPS (Message Automation Protocol Simulation) SSP (ISUP ITU MTP2) - [Global Configuration - Globalprofile]'. The interface includes a menu bar (Configurations, Emulator, Reports, Editor, Debug Tools, Windows, Help) and a toolbar. The main area is a tree view with columns for 'Config', 'Value', and 'Enable'. The 'Global Configuration' tree is expanded to show several sub-sections:

- Call Parameters**
 - Rx File Naming Convention: Sequential
 - Reattempt Count: 3
 - Call Duration in msec: 60000
 - Call Answer Time in msec: 0
 - Inter Call Duration in msec: 500
- Randomization Parameters**
 - Enable Randomization in msec: Disable
 - Minimum CalledNumber: 55550000
 - Maximum CalledNumber: 88880000
 - Minimum CallingNumber: 22220000
 - Maximum CallingNumber: 44440000
 - Minimum CallDuration in msec: 1000
 - Maximum CallDuration in msec: 60000
 - Minimum AnswerCallDuration in msec: 1000
 - Maximum AnswerCallDuration in msec: 30000
 - Minimum InterCallDuration in msec: 5000
 - Maximum InterCallDuration in msec: 20000
- ISUP Specific Timers**
 - T1 in msec: 15000
 - T2 in msec: 180000
 - T3 in msec: 120000
 - T4 in msec: 300000
 - T5 in msec: 300000
 - T6 in msec: 60000
 - T7 in msec: 20000
 - T8 in msec: 10000
 - T9 in msec: 90000
 - T12 in msec: 15000
 - T13 in msec: 300000
 - T14 in msec: 15000
 - T15 in msec: 300000
 - T16 in msec: 15000
 - T17 in msec: 300000
 - T18 in msec: 30000
 - T19 in msec: 300000
 - T20 in msec: 30000
 - T21 in msec: 300000
 - T22 in msec: 20000
 - T23 in msec: 300000
 - T28 in msec: 10000
 - T33 in msec: 12000
 - T38 in msec: 20000

Buttons for 'Apply' and 'Edit' are visible at the bottom right of the configuration area. The status bar at the bottom shows 'Initialisation Errors' and 'Error Events'.

ATM Global Profile

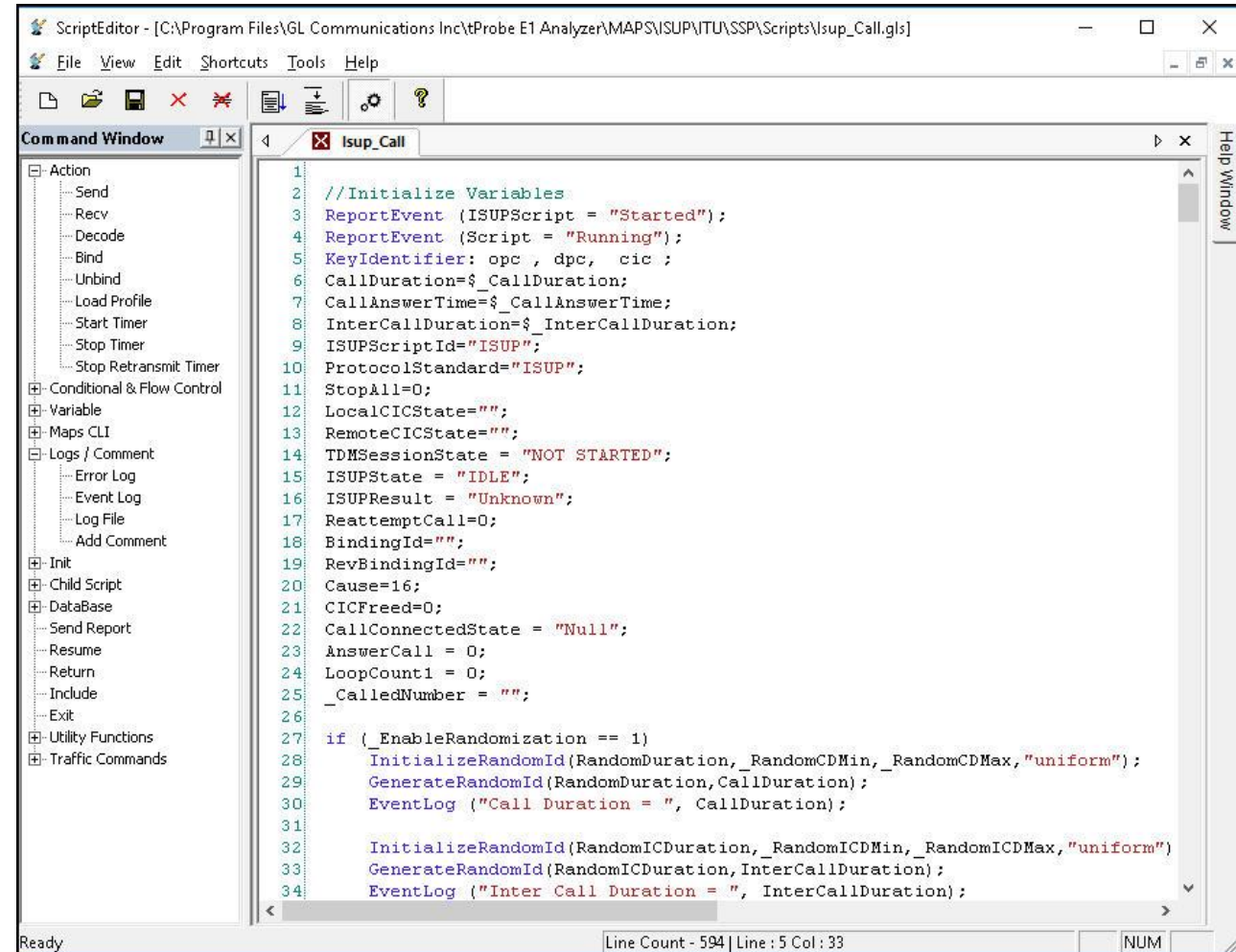
The screenshot shows the 'Global Configuration' window for the ATM profile. The window title is 'MAPS (Message Automation Protocol Simulation) SSP (ISUP ITU ATM) - [Global Configuration - Globalprofile]'. The interface includes a menu bar (Configurations, Emulator, Reports, Editor, Debug Tools, Windows, Help) and a toolbar. The main area is a tree view with columns for 'Config', 'Value', and 'Enable'. The 'Global Configuration' tree is expanded to show several sub-sections:

- Call Parameters**
 - Rx File Naming Convention: Sequential
 - Reattempt Count: 3
 - Call Duration in msec: 60000
 - Call Answer Time in msec: 0
 - Inter Call Duration in msec: 500
- Randomization Parameters**
 - Enable Randomization in msec: Disable
 - Minimum CalledNumber: 55550000
 - Maximum CalledNumber: 88880000
 - Minimum CallingNumber: 22220000
 - Maximum CallingNumber: 44440000
 - Minimum CallDuration in msec: 1000
 - Maximum CallDuration in msec: 60000
 - Minimum AnswerCallDuration in msec: 1000
 - Maximum AnswerCallDuration in msec: 30000
 - Minimum InterCallDuration in msec: 5000
 - Maximum InterCallDuration in msec: 20000
- ISUP Specific Timers**
 - T1 in msec: 15000
 - T2 in msec: 180000
 - T3 in msec: 120000
 - T4 in msec: 300000
 - T5 in msec: 300000
 - T6 in msec: 60000
 - T7 in msec: 20000
 - T8 in msec: 10000
 - T9 in msec: 90000
 - T12 in msec: 15000
 - T13 in msec: 300000
 - T14 in msec: 15000
 - T15 in msec: 300000
 - T16 in msec: 15000
 - T17 in msec: 300000
 - T18 in msec: 30000
 - T19 in msec: 300000
 - T20 in msec: 30000
 - T21 in msec: 300000
 - T22 in msec: 20000
 - T23 in msec: 300000
 - T28 in msec: 10000
 - T33 in msec: 12000
 - T38 in msec: 20000
- MTP3b Parameters**
 - Enable Initial Alignment: True
 - Proving Selection: Normal
 - Transmit Buffer Packet Limit: 5000

Buttons for 'Apply' and 'Edit' are visible at the bottom right of the configuration area. The status bar at the bottom shows 'Initialisation Errors' and 'Error Events'.

Script Editor

- 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 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



The screenshot shows the Script Editor interface with a menu bar (File, View, Edit, Shortcuts, Tools, Help) and a toolbar. On the left is a 'Command Window' tree with categories like Action, Conditional & Flow Control, Variable, Maps CLI, Logs / Comment, Init, Child Script, DataBase, Utility Functions, and Traffic Commands. The main editor area displays a script named 'Isup_Call' with the following code:

```
1 //Initialize Variables
2
3 ReportEvent (ISUPScript = "Started");
4 ReportEvent (Script = "Running");
5 KeyIdentifier: opc, dpc, cic ;
6 CallDuration=$_CallDuration;
7 CallAnswerTime=$_CallAnswerTime;
8 InterCallDuration=$_InterCallDuration;
9 ISUPScriptId="ISUP";
10 ProtocolStandard="ISUP";
11 StopAll=0;
12 LocalCICState="";
13 RemoteCICState="";
14 TDMSessionState = "NOT STARTED";
15 ISUPState = "IDLE";
16 ISUPResult = "Unknown";
17 ReattemptCall=0;
18 BindingId="";
19 RevBindingId="";
20 Cause=16;
21 CICFreel=0;
22 CallConnectedState = "Null";
23 AnswerCall = 0;
24 LoopCount1 = 0;
25 _CalledNumber = "";
26
27 if (_EnableRandomization == 1)
28     InitializeRandomId(RandomDuration, _RandomCDMin, _RandomCDMax, "uniform");
29     GenerateRandomId(RandomDuration, CallDuration);
30     EventLog ("Call Duration = ", CallDuration);
31
32     InitializeRandomId(RandomICDuration, _RandomICDMin, _RandomICDMax, "uniform")
33     GenerateRandomId(RandomICDuration, InterCallDuration);
34     EventLog ("Inter Call Duration = ", InterCallDuration);
```

The status bar at the bottom indicates 'Line Count - 594 | Line : 5 Col : 33' and a 'NUM' button.

Message Editor

- When the script 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

```
Message Editor - ATM_IAMsample
File View Direction Tools Help

MTP3b
  Service Indicator
  Sub-service field
  DPC
  OPC
  Signaling Link Code
ISUP
  Circuit Identification Code

===== MTP3b Layer =====
0000 Service Indicator           = ...0101 ISDN User Part
0000 Sub-service field         = 0001.... Spare (for international use only)
0001 DPC                       = 2.2.2(00010010 ..010000)
0002 OPC                       = 1.1.1(01..... 00000010 ....0010)
0004 Signaling Link Code      = 0001.... (1)
      Pdu                       = x000001000000000002000701100000000000
===== ISUP Layer =====
0005 Circuit Identification Code = 00000000 ....0000 (0)
0007 Message Type             = 00000001 Initial address
      Mandatory Fixed Parameters =
      Nature Of Connection Indicators Parameter =
0008 Satellite indicator       = .....00 no satellite circuit in the connection
0008 Continuity check indicator = ...00.. continuity check not required
0008 Echo ctrl dev.ind(Nat.Conn.Ind) = ...0.... outgoing echo control device not included
      Forward Call Indicators Parameter =
0009 National/international call ind = .....0 treated as a national call
0009 End-to-end method indicator = .....00. No end-to-end method available
0009 Interworking Indicator     = ...0... no interworking encountered (No. 7 signalling all the way)
0009 End-to-end infor.ind(ForwardCall.Ind) = ...0.... not available
0009 ISDN User Part Indicator   = ..0..... not used all the way
0009 ISDN User Part Preferences Indicators = 00..... preferred all the way (default)
000A ISDN Access Ind(ForwardCall Ind) = .....0 Originating Access non-ISDN
000A SCCP method indicator     = .....00. No Indication

Ready NUM
```

Incoming Call Handler Configuration

MAPS (Message Automation Protocol Simulation) SSP (ISUP ITU) - [Incoming Call Handlers Configurati...

Configurations Emulator Reports Editor Debug Tools Windows Help

Message Name Script Name

Signalling Link Test Message	SLTM.gls
Initial Address	Isup_Call.gls
Address Complete	Rx_IdleStateMsgHandler.gls
Connect	Rx_IdleStateMsgHandler.gls
Answer	Rx_IdleStateMsgHandler.gls
Suspend	Rx_IdleStateMsgHandler.gls
Resume	Rx_IdleStateMsgHandler.gls
Call Progress	Rx_IdleStateMsgHandler.gls
Release	Rx_CIC_Management.gls
Reset Circuit	Rx_CIC_Management.gls
Continuity Check Request	Rx_CIC_Management.gls
Blocking	Rx_CIC_Management.gls
Unblocking	Rx_CIC_Management.gls
Circuit Group Reset	Rx_CIC_Management.gls
Circuit Group Blocking	Rx_CIC_Management.gls
Circuit Group Unblocking	Rx_CIC_Management.gls
Release Complete	Rx_CIC_Management.gls
User Part Test	Rx_CIC_Management.gls

Scripts

Isup_Call.gls

Sequence
 Random

Up
Down

● Initialisation Errors ● Error Events

Call Generation

Active Calls Call Status Call Events

Loading Scripts and Profiles

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Result	Total Iterations	Completed Iterations
1	Isup_Call.gls	Card1TS01	1.1.1.2.2.2.1	Start	ISUP Call Released	None	Pass	1	1
2	Isup_Call.gls	Card1TS02	1.1.1.2.2.2.2	Stop	File Recorded	Terminate Call	Pass	1	0
3	Isup_Call.gls	Card1TS03	1.1.1.2.2.2.3	Stop	File Recorded	Terminate Call	Pass	1	0
4	Isup_Call.gls	Card1TS04	1.1.1.2.2.2.4	Stop	File Recorded	Terminate Call	Pass	1	0
5	Isup_Call.gls	Card1TS05	1.1.1.2.2.2.5	Stop	File Recorded	Terminate Call	Pass	1	0
6	Isup_Call.gls	Card1TS06	1.1.1.2.2.2.6	Stop	File Recorded	Terminate Call	Pass	1	0
7	Isup_Call.gls	Card1TS07	1.1.1.2.2.2.7	Stop	File Recorded	Terminate Call	Pass	1	0
8	Isup_Call.gls	Card1TS08	1.1.1.2.2.2.8	Stop	File Recorded	Terminate Call	Pass	1	0

Control buttons: Add, Delete, Insert, Refresh, Start, Start All, Stop, Stop All, Abort, Abort All, Save, Column Width.

Message Sequence Diagram:

```

sequenceDiagram
    participant MAPS
    participant DUT
    MAPS->>DUT: Initial Address
    DUT-->>MAPS: Address Complete
    DUT-->>MAPS: Answer
    MAPS->>DUT: File Transmitted :: a-law samples\count10.pcm
    DUT-->>MAPS: File Recorded :: MAPS\Recv Files\Isup\Feb6_E0101_1001.pcm
    MAPS->>DUT: Release
    DUT-->>MAPS: Release Complete
    
```

Decoded Message:

```

===== MTP3 Layer =====
0000 Service Indicator = ....0101 ISDN User Part
0000 Priority Code = ..00.... Priority Code 0
0000 Sub-service field = 10..... National Network
0001 DPC = 2.2.2(00010010 ..010000)
0002 OPC = 1.1.1(01..... 00000010 ....0010)
0004 Signalling Link Code = 0001.... (1)
Higher Layer Data = x0100010220010A000209070310245673052001
===== ISUP Layer =====
0005 Circuit Identification Code = 00000001 ....0000 (1)
0007 Message Type = 00000001 Initial address
Mandatory Fixed Parameters
Nature Of Connection Indicators Parameter =
0008 Satellite indicator = .....10 two satellite circuits in the
0008 Continuity check indicator = ....00.. continuity check not required
0008 Echo ctrl dev.ind(Nat.Comm.Ind) = ...0.... outgoing echo control device i
Forward Call Indicators Parameter =
0009 National/international call ind = .....0 treated as a national call
0009 End-to-end method indicator = ....00. No end-to-end method available
0009 Interworking Indicator = ...0... no interworking encountered (I
0009 End-to-end infor.ind(ForwardCall.Ind) = ...0.... not available
    
```

Message Sequence

Decode Message

Call Reception

MAPS (Message Automation Protocol Simulation) SSP (ISUP ITU) - [Call Reception]

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Call Info	Script Execution	Status	Events	Events Profile	Results
1	SLTM.gls	2.2.2.1.1.1	Stop	MTP3 Active	Initiate SLTM		Pass
2	Isup_Call.gls	2.2.2.1.1.1	Completed	ISUP Call Released	None		Pass
3	Isup_Call.gls	2.2.2.1.1.2	Completed	ISUP Call Released	None		Pass
4	Isup_Call.gls	2.2.2.1.1.3	Completed	ISUP Call Released	None		Pass
5	Isup_Call.gls	2.2.2.1.1.4	Completed	ISUP Call Released	None		Pass
6	Isup_Call.gls	2.2.2.1.1.5	Completed	ISUP Call Released	None		Pass
7	Isup_Call.gls	2.2.2.1.1.6	Completed	ISUP Call Released	None		Pass
8	Isup_Call.gls	2.2.2.1.1.7	Completed	ISUP Call Released	None		Pass
9	Isup_Call.gls	2.2.2.1.1.8	Completed	ISUP Call Released	None		Pass
10	Isup_Call.gls	2.2.2.1.1.9	Completed	ISUP Call Released	None		Pass

Abort Abort All Show Records Auto Trash Trash

Save Column Width

Message Sequence

```

sequenceDiagram
    participant DUT
    participant MAPS
    DUT->>MAPS: Initial Address 18:51:54.643000
    MAPS->>DUT: Address Complete 18:51:54.645000
    MAPS->>DUT: Answer 18:51:54.646000
    DUT->>MAPS: File Transmitted :: a-law samples\count10.pcm 18:52:14.706000
    DUT->>MAPS: File Recorded :: MAPS\Recv Files\Isup\Feb6_W0201_1001 18:52:24.663000
    DUT->>MAPS: Release 18:52:55.195000
    MAPS->>DUT: Release Complete 18:52:55.196000
    
```

Decode Message

```

===== MTP3 Layer =====
0000 Service Indicator           = ...0101 ISDN User Part
0000 Priority Code               = ...00... Priority Code 0
0000 Sub-service field          = 10..... National Network
0001 DPC                        = 2.2.2(00010010 ..010000)
0002 OPC                        = 1.1.1(01..... 00000010 ....0010)
0004 Signalling Link Code      = 0001... (1)
Higher Layer Data               = x0100010220010A00020907031024567305200A0701116547
===== ISUP Layer =====
0005 Circuit Identification Code = 00000001 ...0000 (1)
0007 Message Type              = 00000001 Initial address
Mandatory Fixed Parameters
Nature Of Connection Indicators Parameter =
0008 Satellite indicator        = .....10 two satellite circuits in the connection
0008 Continuity check indicator = ...00.. continuity check not required
0008 Echo ctrl dev.ind(Nat.Conn.Ind) = ...0.... outgoing echo control device not include
Forward Call Indicators Parameter =
0009 National/international call ind = .....0 treated as a national call
0009 End-to-end method indicator = .....00. No end-to-end method available
0009 Interworking Indicator     = ....0... no interworking encountered (No. 7 signs
    
```

Scripts Message Sequence Event Config Script Flow

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

Call Results

Message Sequence

Decode Message

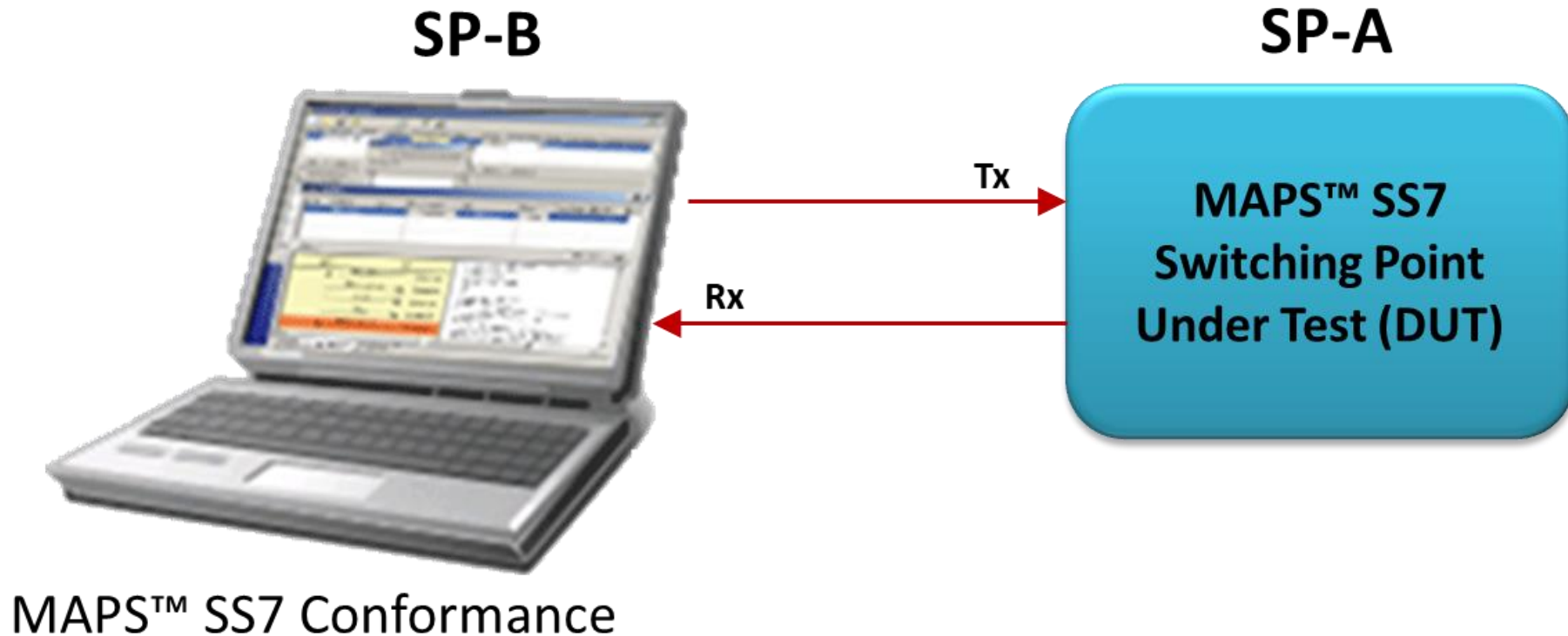
Events Log

Date/Time	Captured Events	Call Trace Id	Script Name	Script Id
2015-2-6 18:55:49.994000	LinkSetSize= 1	1.1.1,2.2.2,1	Isup_Call.gls	CGProtScriptId_10_1237553916-5282-1:
2015-2-6 18:55:49.997000	Call Initiated	1.1.1,2.2.2,1	ISUP.gls	CGProtScriptId_10_1237553916-5282-1:
2015-2-6 18:55:50.576000	Call Connected	1.1.1,2.2.2,1	ISUP.gls	CGProtScriptId_10_1237553916-5282-1:
2015-2-6 18:55:50.576000	Card and Timeslot = Card1TS01	1.1.1,2.2.2,1	Isup_Call.gls	CGProtScriptId_10_1237553916-5282-1:
2015-2-6 18:55:50.577000	Loaded Traffic Profile: Card1TS01	1.1.1,2.2.2,1	Isup_Call.gls	CGProtScriptId_10_1237553916-5282-1:
2015-2-6 18:56:10.690000	File Sending Complete	1.1.1,2.2.2,1	Isup_Call.gls	CGProtScriptId_10_1237553916-5282-1:
2015-2-6 18:56:20.639000	File Recorded : MAPS\Recv Files\Isup\Feb6_E0101_1012.pcm	1.1.1,2.2.2,1	Isup_Call.gls	CGProtScriptId_10_1237553916-5282-1:
2015-2-6 18:56:51.157000	Call Released	1.1.1,2.2.2,1	ISUP.gls	CGProtScriptId_10_1237553916-5282-1:

ISUP Conformance Testing (XX647)

ISUP Conformance Test Suite

- MAPS™ ISUP Conformance is configured as SP-B to send message using SPB-1.2.1.gls script; in the second scenario, MAPS™ ISUP Conformance is configured to receive message using SPB-4.1.gls script



ISUP Conformance Testbed Configuration

MAPS (Message Automation Protocol Simulation) SSP (ISUPConformance ITU) - [Testbed Setup - Card1]

Configurations Emulator Reports Editor Windows Help

Config	Value
TestBedDefault	
MTP Signalling Configuration	
T1E1 Port Number	1
Timeslot	31
Source Point Code	1.1.1
Destination Point Code	2.2.2
Signaling Link Code	1
Network Indicator	National
Default Profile	ISUP_Profiles.xml

_SignalingPortNumber
Enter Integer
1

Start Edit

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

ISUP Conformance Profile Configuration

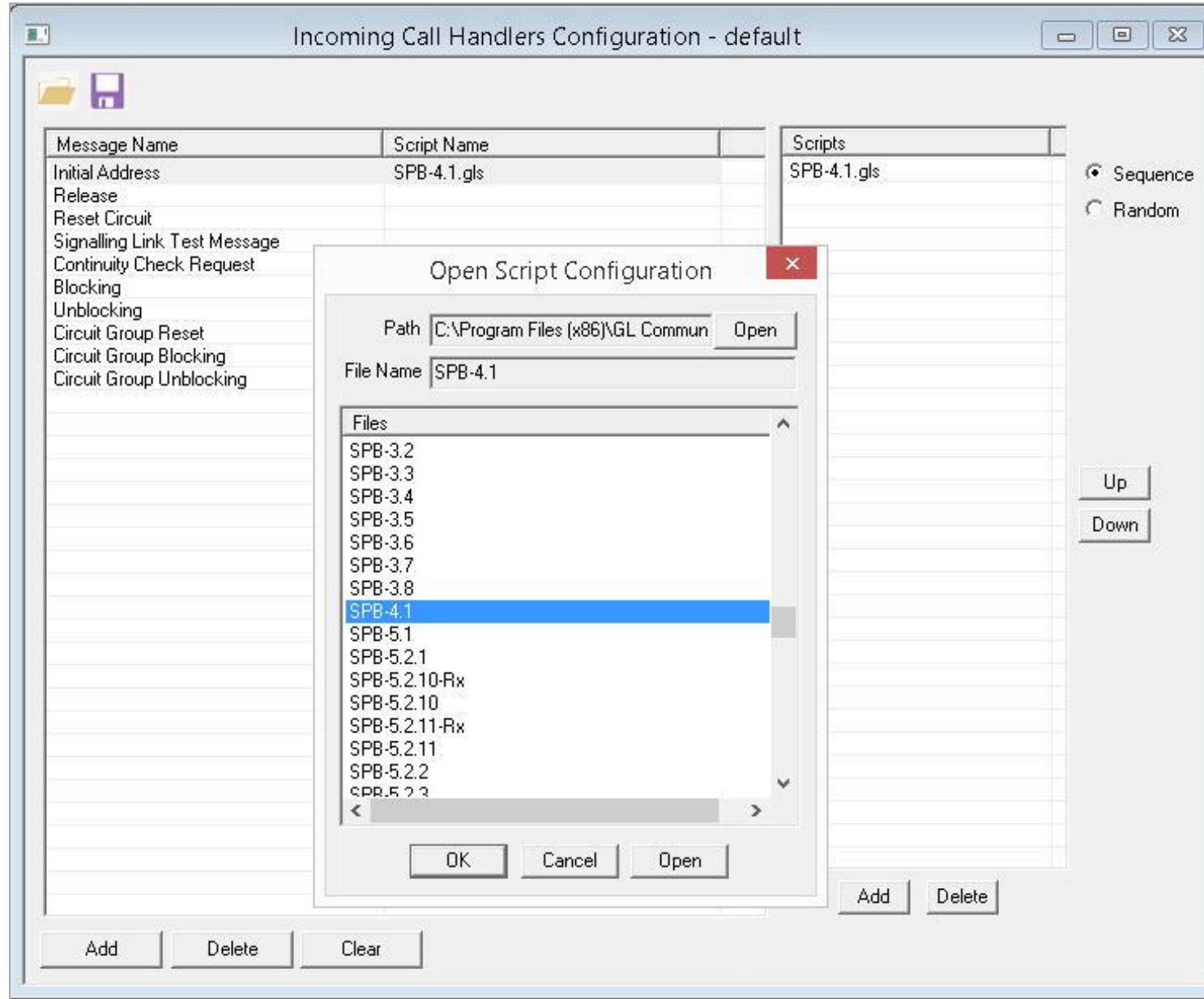
The screenshot displays the MAPS (Message Automation Protocol Simulation) SSP (ISUPConformance ITU) - [Profile Editor - ISUP_Profiles] application. The interface includes a menu bar (Configurations, Emulator, Reports, Editor, Debug Tools, Windows, Help) and a toolbar with various icons. The main workspace is divided into three sections:

- Profiles (Edit-F2):** A list of profiles from TS01 to TS14. Profile TS01 is selected.
- Config:** A tree view showing the configuration structure for the selected profile. The 'Calling Number' parameter is highlighted.
- Value:** A table showing the values for the selected parameters.

Config	Value
TS01	
ISUP Parameters	
Circuit Identification Code	2
Calling Number	9987095801
Called Number	8978675401
Range	5
Status	6795480800
Cause	0
Signaling Link Test Message Parameters	
Test Pattern	563901
Traffic Options	
Digit Parameters	
TypeOfDigit	DTMF
Digits	
Tone Parameters	
Frequency1 in Hz	1000
Frequency2 in Hz	2000
Tx Tone Duration in msec	10000

The right-hand pane shows the 'CallingNumber' property with an 'Enter Digit' input field containing the value '9987095801'. Below this are buttons for 'Add', 'Insert', 'Delete', and 'Properties'.

ISUP Conformance Incoming Call Handler Configuration



ISUP Conformance Call Generation

Active Calls **Call Status** **Call Events**

GL MAPS (Message Automation Protocol Simulation) SSP (ISUPConformance ITU) - [Call Generation - Untitled]

Configurations Emulator Reports Editor Windows Help

Loading Scripts and Profiles

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Ev...	Result	Total Iterations	Completed Iterations
1	SPB-1.2.1.gls	TS01	1	Start	Circuit is Reset	None		Pass	1	1

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

Save Column Width

Message Sequence

Decode Message

```

===== MTP3 Layer =====
0000 Service Indicator           = ....0101 ISDN User Part
0000 Priority Code               = ..00.... Priority Code 0
0000 Sub-service field          = 10..... National Network
0001 DPC                        = 2.2.2(00010010 ..010000)
0002 OPC                        = 1.1.1(01..... 00000010 ....0010)
0004 Signalling Link Code       = 0001.... (1)
Higher Layer Data               = x010012
===== ISUP Layer =====
0005 Circuit Identification Code = 00000001 ...0000 (1)
0007 Message Type               = 00010010 Reset Circuit
    
```

Scripts Message Sequence Event Config Script Flow

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

ISUP Conformance Call Reception

The screenshot displays the MAPS (Message Automation Protocol Simulation) SSP (ISUPConformance ITU) - [Call Reception] interface. The interface is divided into several sections:

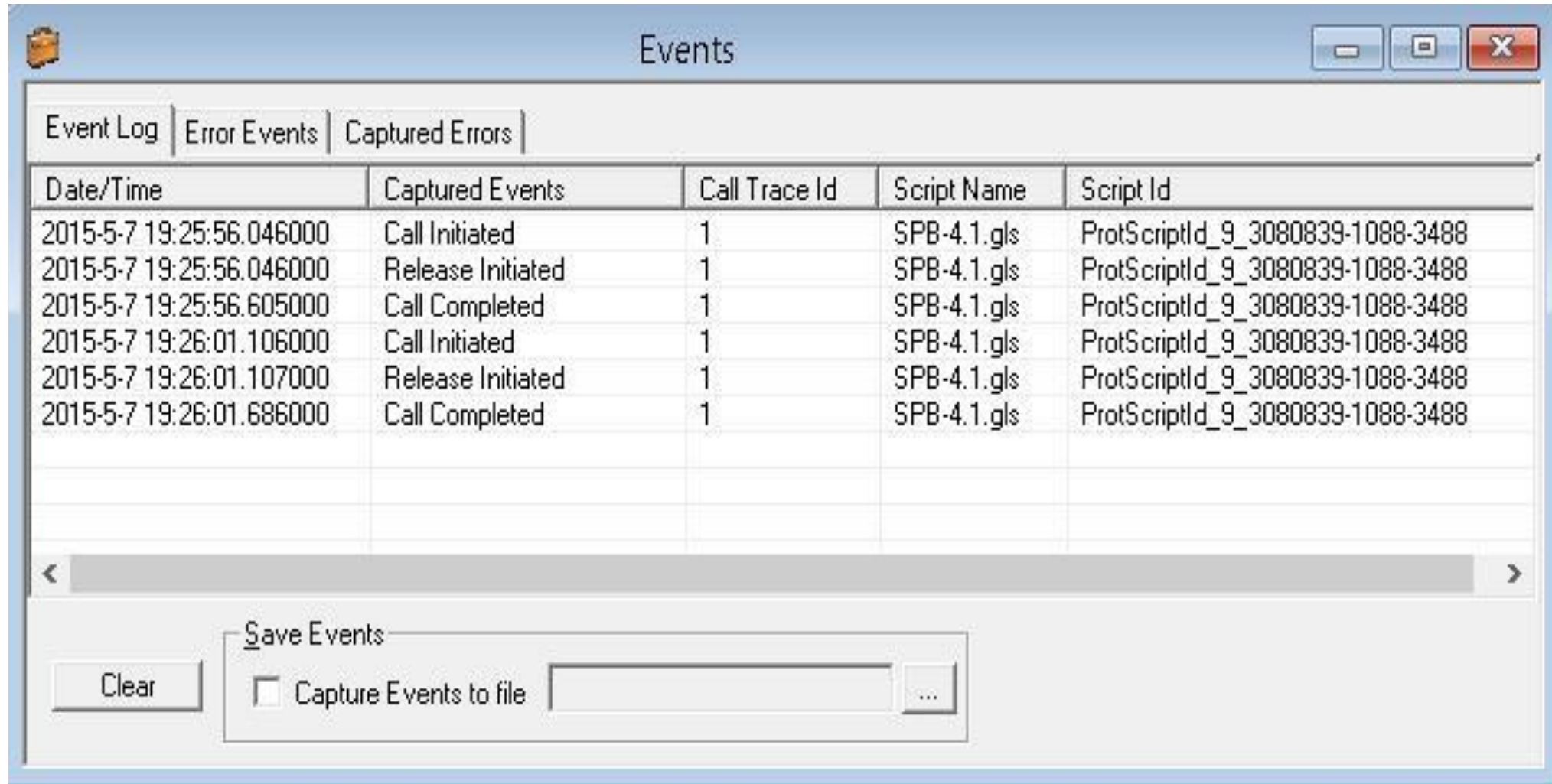
- Table:** A table showing call results for two scripts. The first script, SLTM.gls, is in a 'Stop' state with 'MTP3 Active' and 'Initiate SLTM' events. The second script, SPB-4.1.gls, is in a 'Completed' state with 'Call Completed' and 'None' events. Both scripts show a 'Pass' result.
- Message Sequence:** A diagram showing the sequence of messages between DUT and MAPS. The sequence includes: Initial Address (19:15:02.432000), Release (19:15:02.433000), Release Complete (19:15:02.994000), Initial Address (19:15:16.314000), Address Complete (19:15:16.350000), Release (19:15:16.350000), and Release Complete (19:15:16.928000).
- Decode Message:** A detailed view of the decoded message, showing the MTP3 Layer and ISUP Layer. The MTP3 Layer includes fields like Service Indicator, Priority Code, Sub-service field, DPC, OPC, Signalling Link Code, and Higher Layer Data. The ISUP Layer includes fields like Circuit Identification Code, Message Type, Pointer to Mandatory Parameter, Pointer to optional parameters, Mandatory Variable Length Parameters, Cause Indicators Parameter, Parameter length, Location, Coding Standard(Cause Ind), Extension Indicator, Extension Bit (Oct 2), Cause Value, and Diagnostic(s).

Call Results

Message Sequence

Decode Message

ISUP Conformance Events Log



Events

Event Log | Error Events | Captured Errors

Date/Time	Captured Events	Call Trace Id	Script Name	Script Id
2015-5-7 19:25:56.046000	Call Initiated	1	SPB-4.1.gls	ProtScriptId_9_3080839-1088-3488
2015-5-7 19:25:56.046000	Release Initiated	1	SPB-4.1.gls	ProtScriptId_9_3080839-1088-3488
2015-5-7 19:25:56.605000	Call Completed	1	SPB-4.1.gls	ProtScriptId_9_3080839-1088-3488
2015-5-7 19:26:01.106000	Call Initiated	1	SPB-4.1.gls	ProtScriptId_9_3080839-1088-3488
2015-5-7 19:26:01.107000	Release Initiated	1	SPB-4.1.gls	ProtScriptId_9_3080839-1088-3488
2015-5-7 19:26:01.686000	Call Completed	1	SPB-4.1.gls	ProtScriptId_9_3080839-1088-3488

Save Events

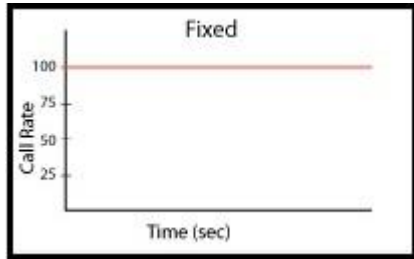
Capture Events to file ...

Clear

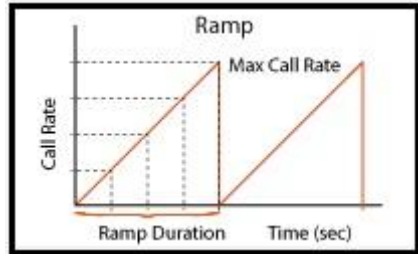
Load Generation

- 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.

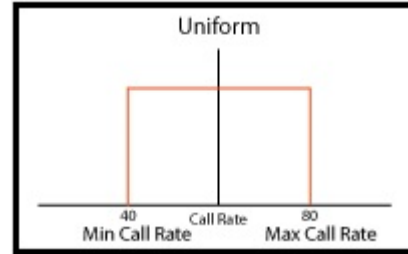
Fixed



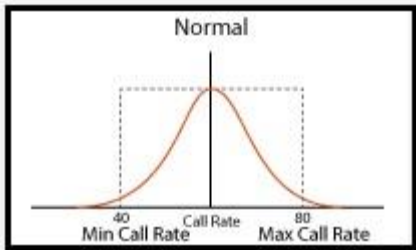
Ramp



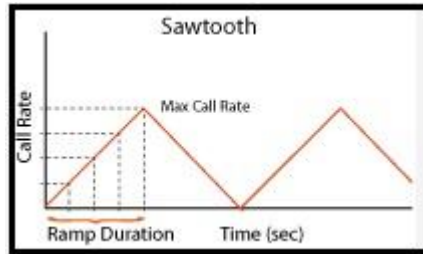
Uniform



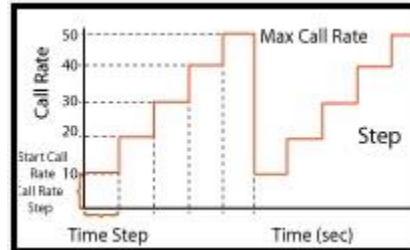
Normal



Saw-tooth



Step



The screenshot shows the 'Load Generation - LoadGendefault' window. It includes a toolbar with icons for file operations. The main configuration area has the following settings:

- Total Calls To Generate: *
- Max Active Calls: 30
- Unique Distributions Per Script:
- Multi Distributions:

Distributions	Description	
Uniform	MinCR=40, MaxCR=80, Duration=10	Add
Fixed	Call Rate=30, Duration=10	Remove
Normal	MinCR=40, MaxCR=80, Duration=10	Remove All
		Edit

Scripts: Exclusive Profiles

Scripts	Profile
Isup_Call	Card1TS01
	Card1TS02
	Card1TS03
	Card1TS04
	Card1TS05
	Card1TS06
	Card1TS07
	Card1TS08
	Card1TS09
	Card1TS10
	Card1TS11
	Card1TS12
	Card1TS13

Buttons: Add, Delete, Add, Delete

Stop Time: Stop Time

Start Time: 00:00:00.000 (Pause)

End Time: 00:00:00.000 (Start)

SS7 Bulk Call Generation

MAPS (Message Automation Protocol Simulation) SSP (ISUP ITU E1) - [Call Generation - Untitled]

Configurations Emulator Reports Editor Windows Help

S...	Script Name	Profile	Call Info	Script Execution	Status	Events	Events ...	Result	Total Iterations	Completed Iterations
1	Isup_Call.gls	Card1TS01		Start		None	...	Unknown	10	0
2	Isup_Call.gls	Card1TS02		Start		None	...	Unknown	10	0
3	Isup_Call.gls	Card1TS03		Start		None	...	Unknown	10	0
4	Isup_Call.gls	Card1TS04		Start		None	...	Unknown	10	0
5	Isup_Call.gls	Card1TS05		Start		None	...	Unknown	10	0
6	Isup_Call.gls	Card1TS06		Start		None	...	Unknown	10	0
7	Isup_Call.gls	Card1TS07		Start		None	...	Unknown	10	0
8	Isup_Call.gls	Card1TS08		Start		None	...	Unknown	10	0
9	Isup_Call.gls	Card1TS09		Start		None	...	Unknown	10	0
10	Isup_Call.gls	Card1TS10		Start		None	...	Unknown	10	0

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

View Executing Line

Script Contents

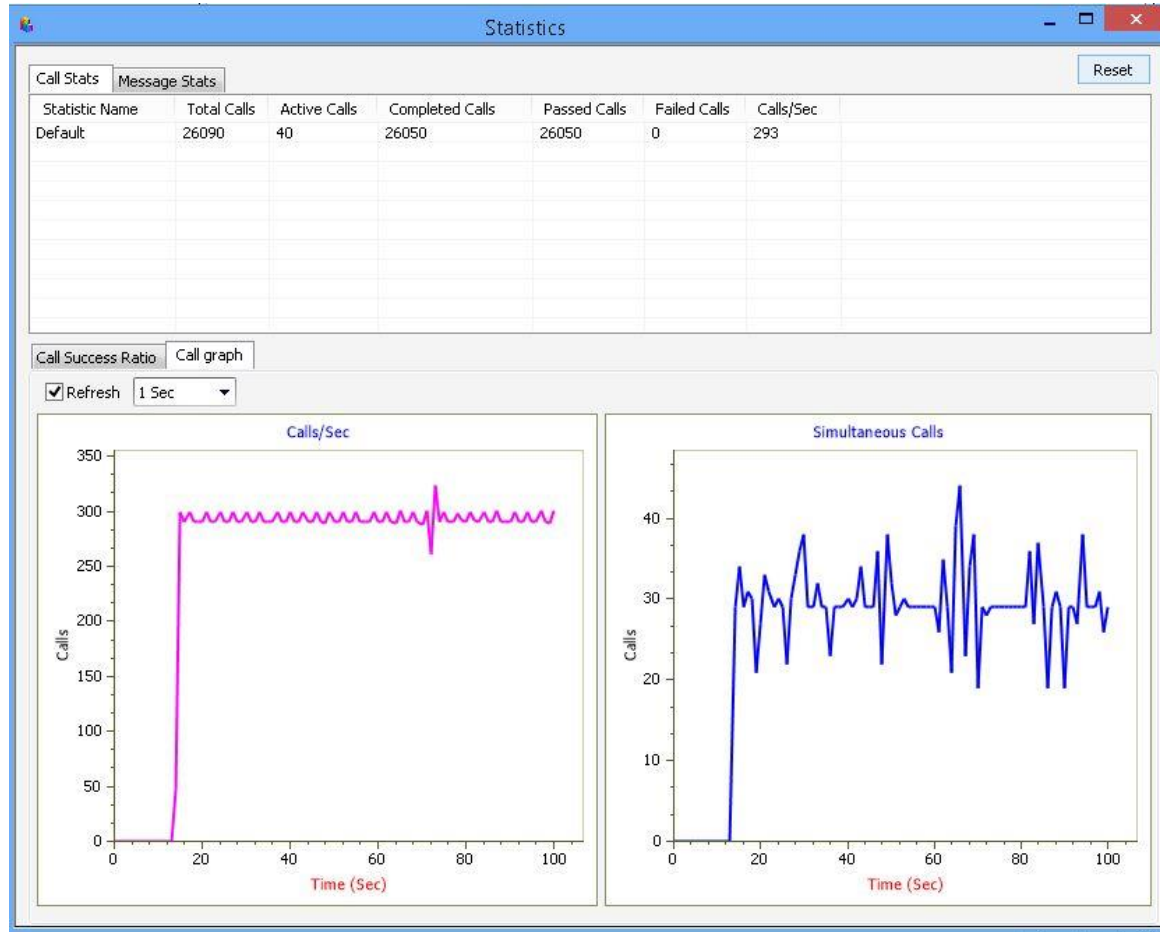
```
//Initialize Variables
ReportEvent (ISUPScript = "Started");
KeyIdentifier: opc , dpc, cic ;
CallDuration=$_CallDuration;
CallAnswerTime=$_CallAnswerTime;
InterCallDurationTimeOut=$_InterCallDuration;
ISUPScriptId="ISUP";
ProtocolStandard="Isup";
StopAll=0;
LocalCICState="";
RemoteCICState="";
```

Scripts Message Sequence Event Config Script Flow Capture Events

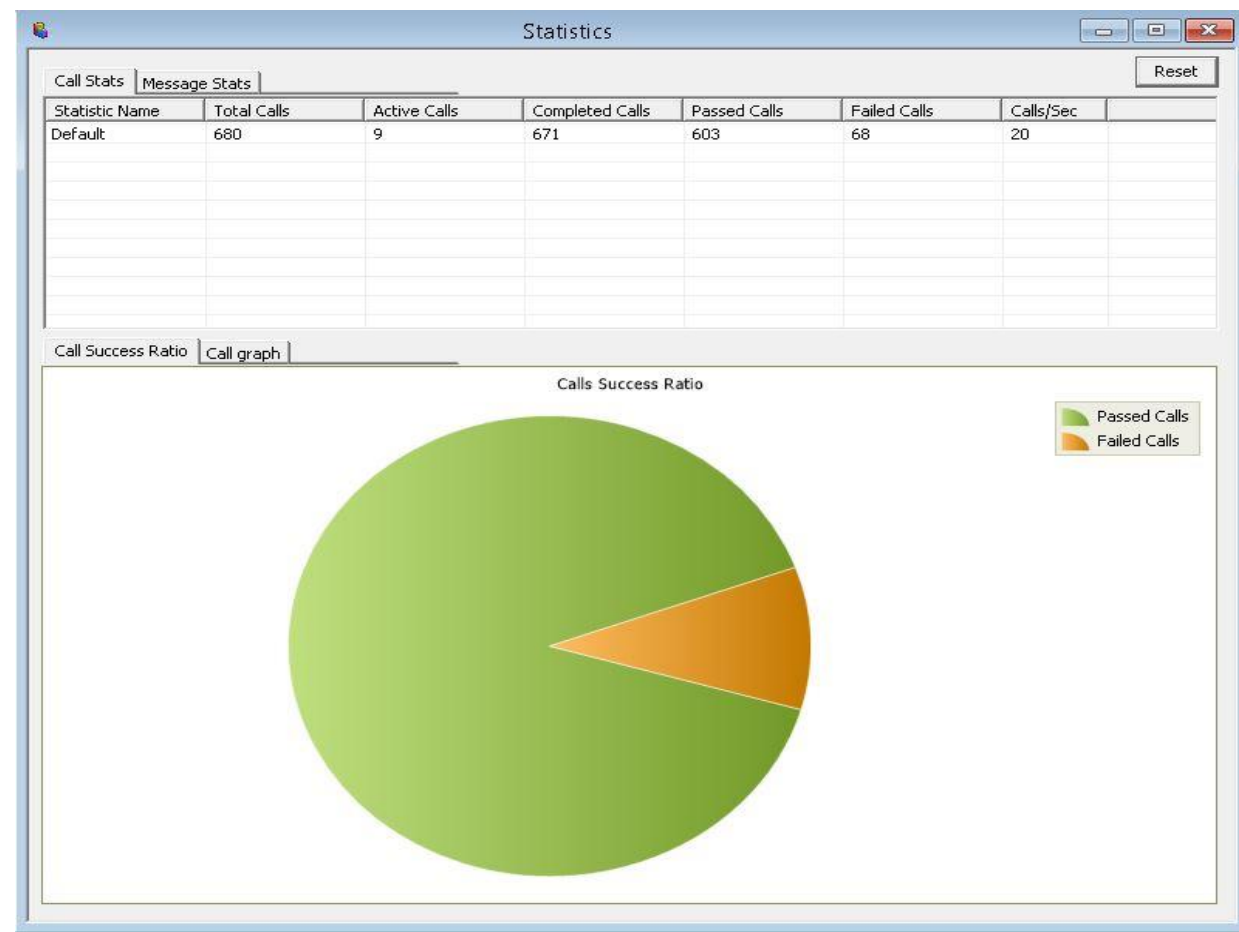
Error Events Captured Errors Link Status Up=0 Down=1

SS7 Call Ratio Statistics

Call Graph



Call Stats



Customizations - User Events

MAPS (Message Automation Protocol Simulation) [Call Generation - CallGenDefault]

Configurations Emulator Reports Editor Windows Help

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

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

View Executing Line

Script Contents

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

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

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

Scripts Message Sequence Event Config Script Flow

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

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

Customizations - Statistics and Reports

MOS, R-Factor

Packet Loss

Packets

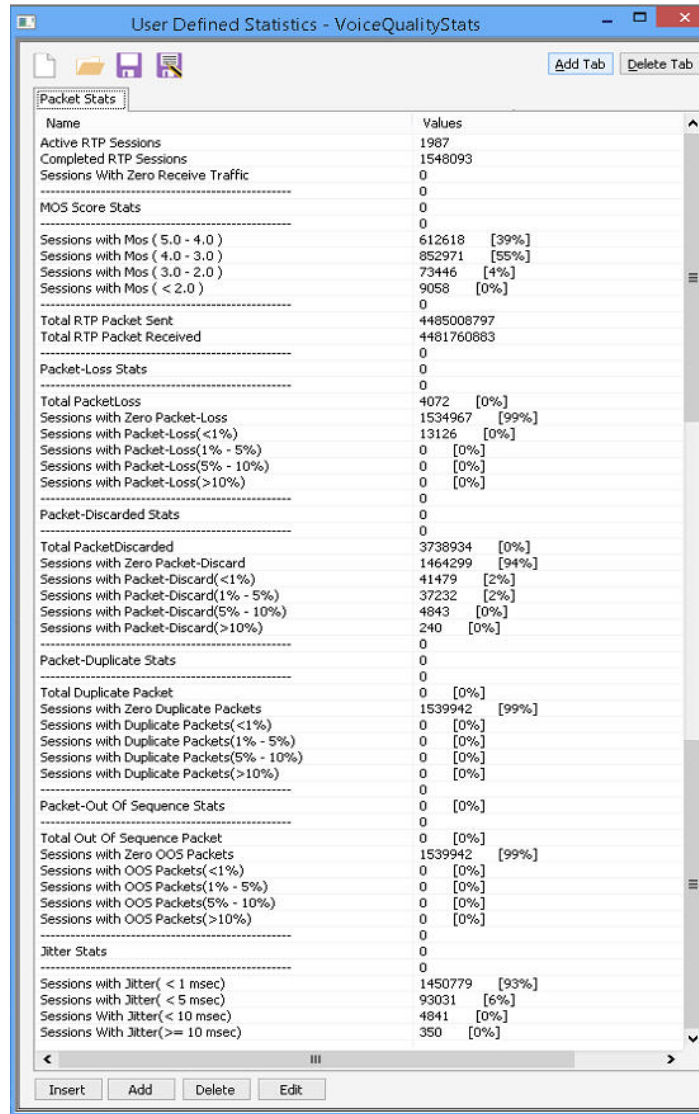
Discarded

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

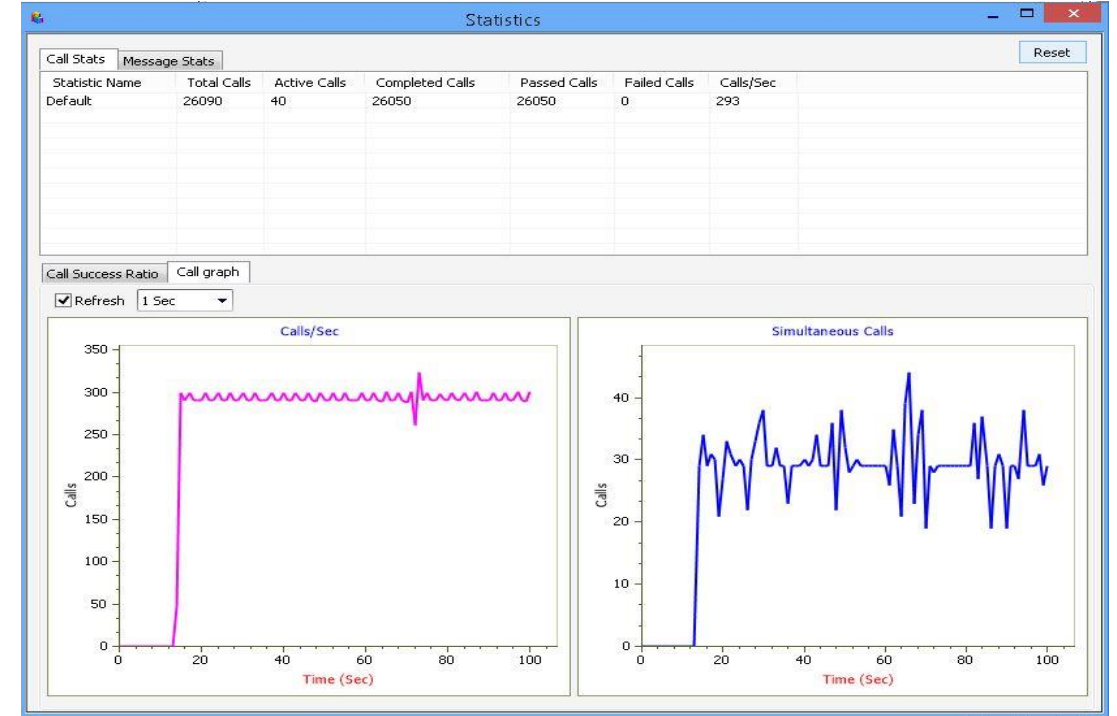
Total Duplicate Packet	0 [0%]
Sessions with Zero Duplicate Packets	1539942 [99%]
Sessions with Duplicate Packets(<1%)	0 [0%]
Sessions with Duplicate Packets(1% - 5%)	0 [0%]
Sessions with Duplicate Packets(5% - 10%)	0 [0%]
Sessions with Duplicate Packets(>10%)	0 [0%]

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

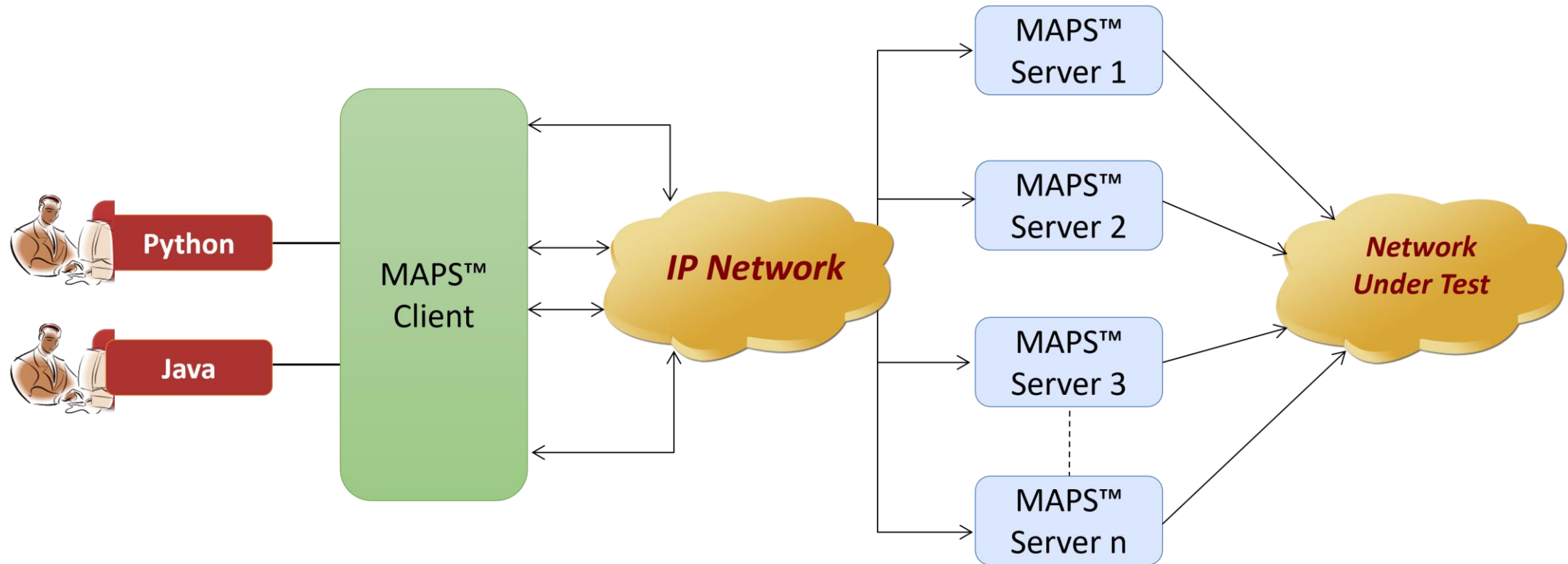
Sessions with Jitter(< 1 msec)	1450779 [93%]
Sessions with Jitter(< 5 msec)	93031 [6%]
Sessions With Jitter(< 10 msec)	4841 [0%]
Sessions With Jitter(>= 10 msec)	350 [0%]



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

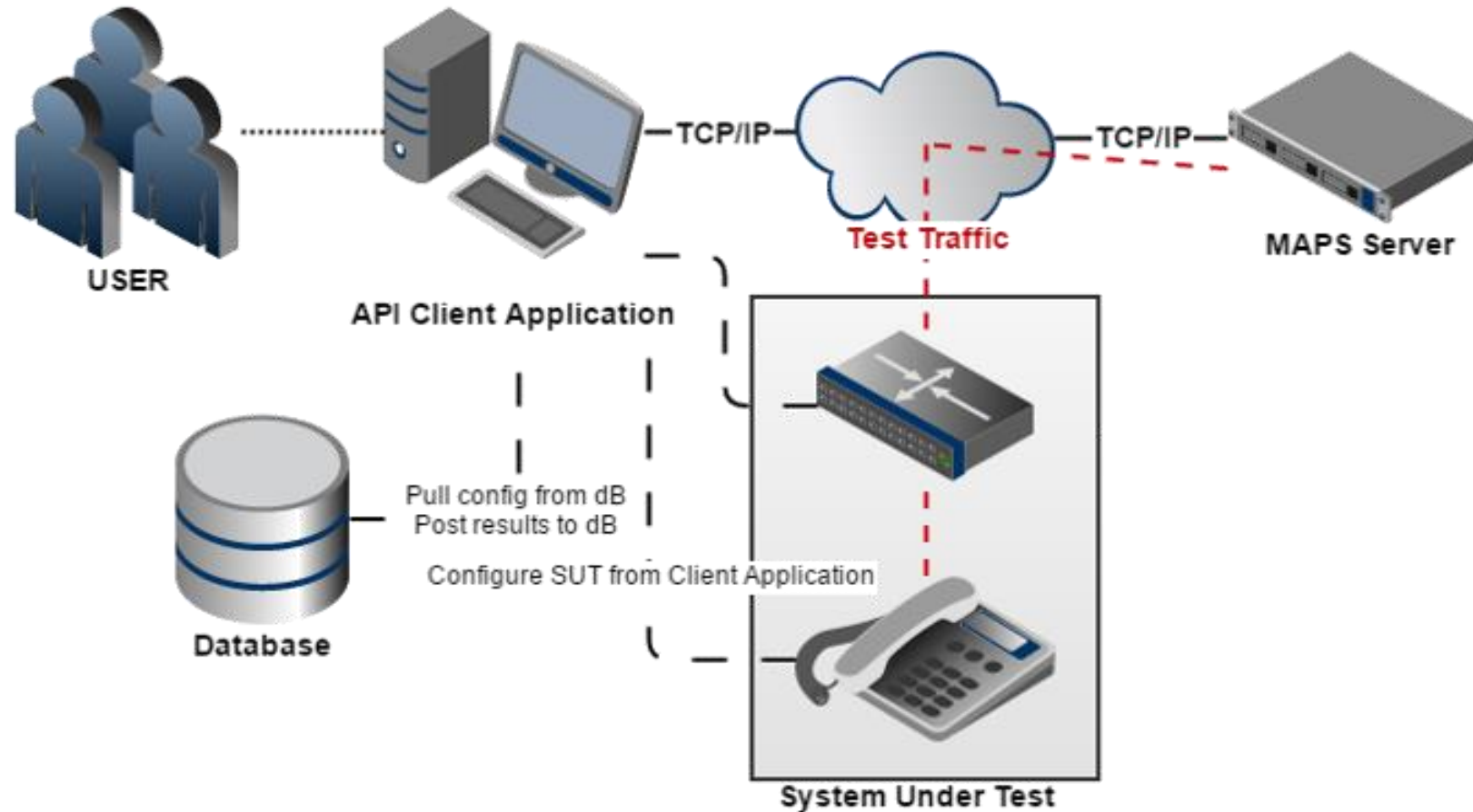
- API wraps our proprietary scripting language in standard languages familiar to the user:
 - Python
 - Java
- Clients and Servers support a “Many-to-Many” relationship, making it very easy for users to develop complex test cases involving multiple signaling protocols



API Architecture

System Integration

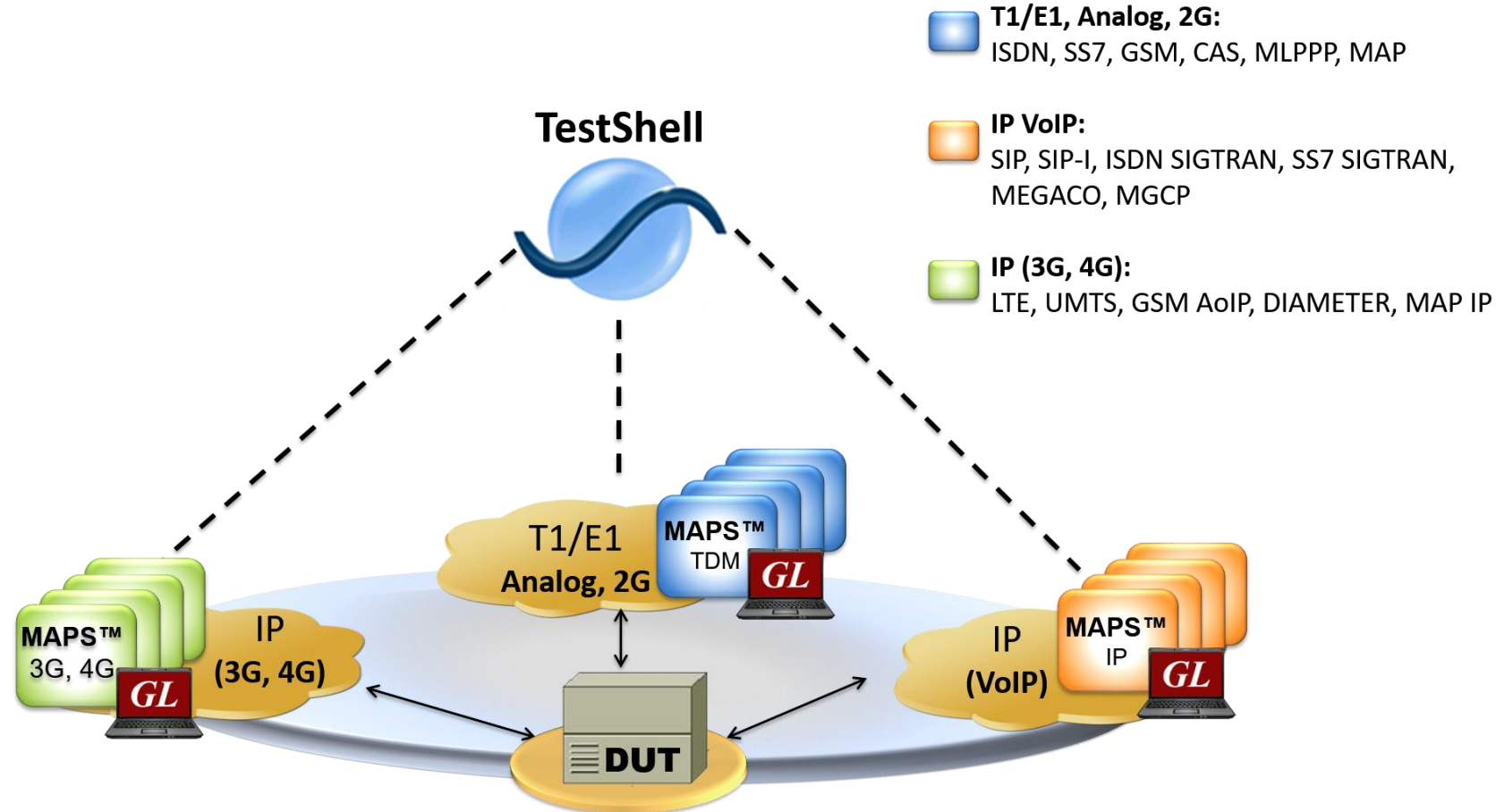
- The same Client Application used to control MAPS™ can be, and very often is, used to control other elements of the System Under Test



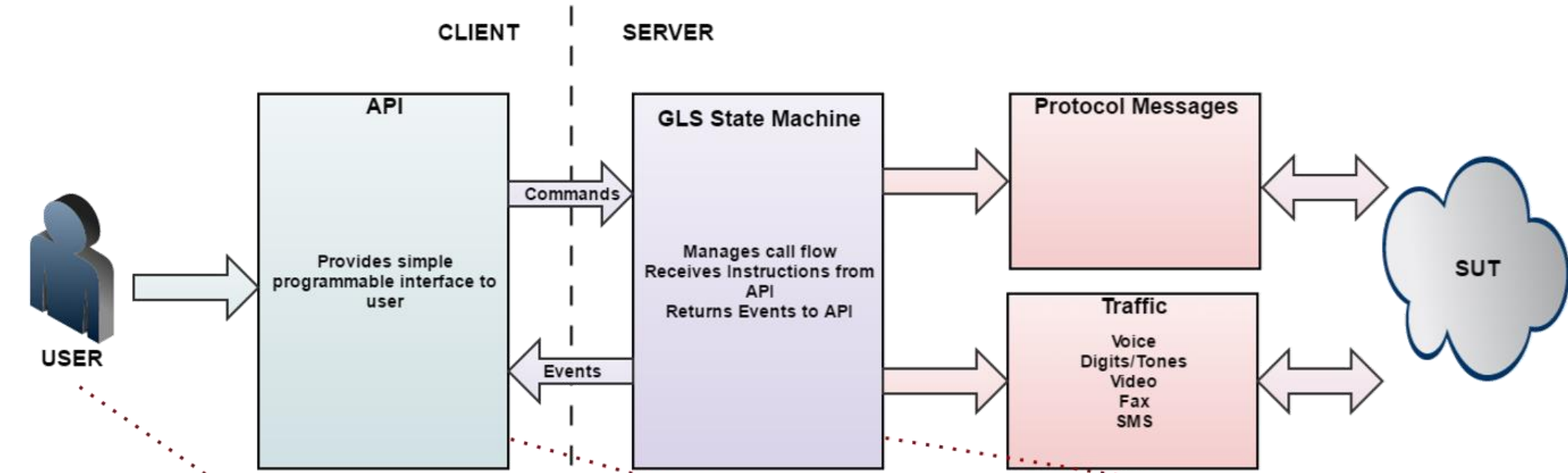
API Architecture

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



```

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):
uas_call.answer_call() 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;
    
```

CLI Support

MAPS™ Server

```
CLI MapsCLI SSP (ISUP ITU MTP2)
File Edit View
View Latest Command
1 :: 2020-4-23 16:00:05.849000 : Start "Sig-Card2_B-Port_2.xml" ;
1 :: 2020-4-23 16:00:07.161000 : LoadProfile "ISUP_Profiles.xml"
1 :: 2020-4-23 16:00:12.412000 : IncomingCallHandler # "Initial Address"="Isup_Call.gls", "IsApiClient"="True";
1 :: 2020-4-23 16:00:28.819000 : UserEvent 200001 "GetCallStatus";
1 :: 2020-4-23 16:00:28.924000 : UserEvent 200001 "Accept Call";
1 :: 2020-4-23 16:00:29.037000 : UserEvent 200001 "GetCallStatus";
1 :: 2020-4-23 16:00:31.111000 : UserEvent 200001 "Terminate Call";
1 :: 2020-4-23 16:00:32.753000 : UserEvent 200001 "GetMessageCount";
1 :: 2020-4-23 16:00:32.861000 : UserEvent 200001 "GetLastReceivedMessage";
1 :: 2020-4-23 16:00:32.974000 : UserEvent 200001 "GetMessageCount";
1 :: 2020-4-23 16:00:33.081000 : UserEvent 200001 "GetMessageInfo" # "Index"=0;
1 :: 2020-4-23 16:00:33.189000 : UserEvent 200001 "GetMessageInfo" # "Index"=1;
1 :: 2020-4-23 16:00:33.301000 : UserEvent 200001 "GetMessageInfo" # "Index"=2;
1 :: 2020-4-23 16:00:33.409000 : UserEvent 200001 "GetMessageInfo" # "Index"=3;
1 :: 2020-4-23 16:00:33.519000 : UserEvent 200001 "GetMessageInfo" # "Index"=4;
1 :: 2020-4-23 16:00:33.627000 : StopScript 200001;
ServerLog:errCode = 0,errString = connection has been gracefully closed for ClientId =1
```

Python Client

```
Python 3.7.7 Shell
File Edit Shell Debug Options Window Help
Python 3.7.7 (tags/v3.7.7:d7c567b08f, Mar 10 2020, 10:41:24) [MSC v.1900 64 bit (AMD 64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:\Program Files\GL Communications Inc\tProbe T1 Analyzer\MAPSCLI\MAPS Python Client\examples\isup\Isup_PlaceCall.py
Isup Server Connection... True
Isup Testbed Starting... True
Isup Profile Loading... True
MTP3 Health Status Checking... True
MTP3 Link is UP... True
Isup Call Placing On CARD1TS01... True
Isup Call Connecting... True
Isup Call Status...ISUP CALL CONNECTED
Isup Call Terminating... True
Isup MsgCount: 7
Isup LastMSGRCV: 16:00:34.067 <- Release Complete
===== MTP3 Layer =====
0000 Service Indicator = ...0101 ISDN User Part
0000 Priority Code = ..00.... Priority Code 0
0000 Sub-service field = 10..... National Network
0001 DPC = 1.1.1(00001001 ..001000)
0002 OPC = 2.2.2(10..... 00000100 ....0100)
0004 Signalling Link Code = 0001.... (1)
Higher Layer Data = x02001000
===== ISUP Layer =====
0005 Circuit Identification Code = 00000010 ...0000 (2)
0007 Message Type = 00010000 Release Complete
0008 Pointer to optional parameters = x00 (0)
Mandatory Variable Length Parameters = None
Optional Variable Length Parameters = None

**** Isup Call Flow ****
CLI <--> DUT

Time Stamp Route Message
16:00:28.046 -> Initial Address
16:00:29.0 <- Address Complete
16:00:29.213 <- Answer
16:00:31.399 <- Release
16:00:31.401 -> Release Complete
16:00:33.444 -> Release
16:00:34.067 <- Release Complete
Isup Script Stopping... True
Isup Server Disconnecting... True
>>>
```

THANK YOU