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# MAPS™ ISDN SIGTRAN

Scripted SIGTRAN ISDN over IP Emulation

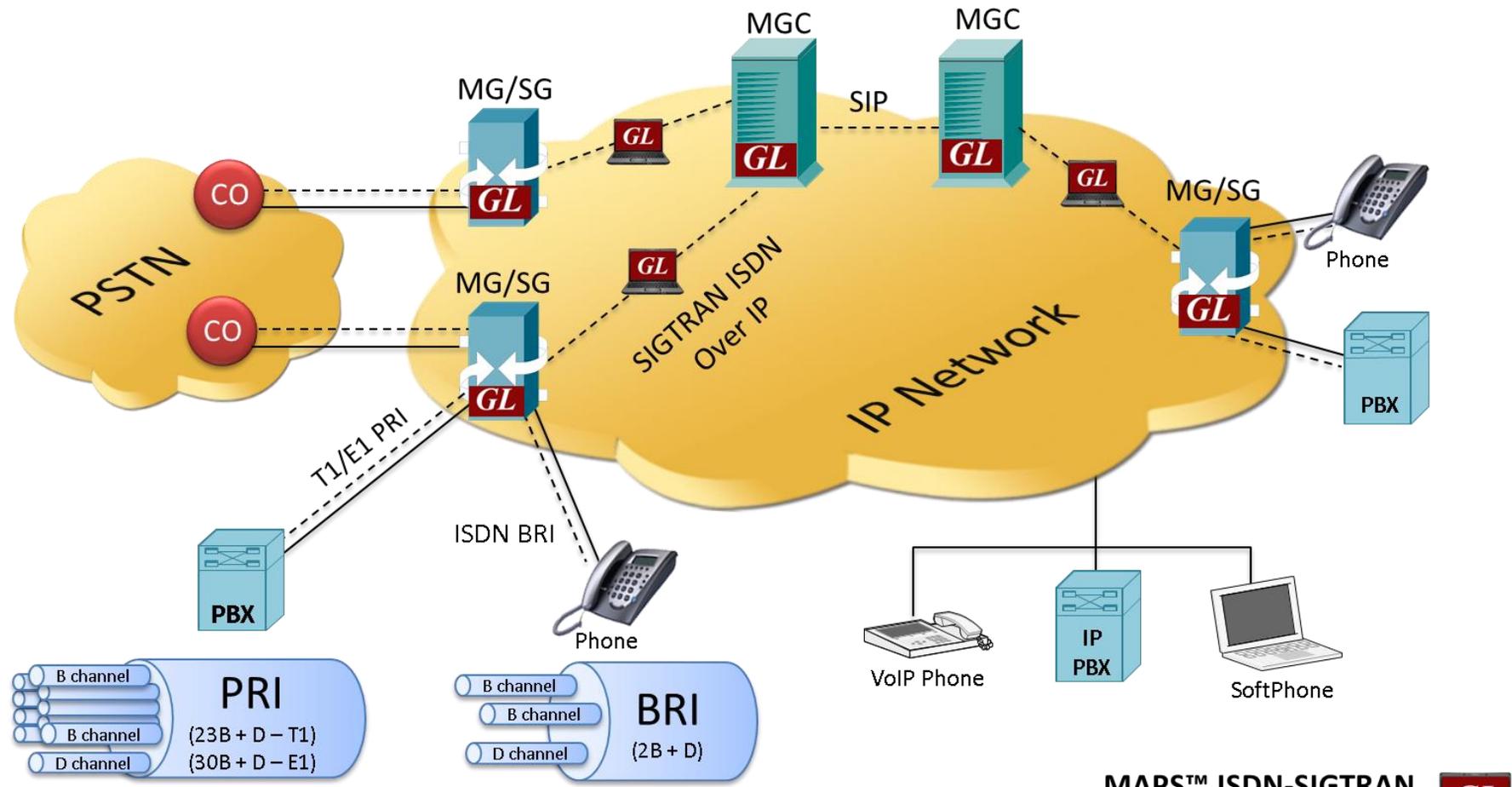
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# ISDN SIGTRAN

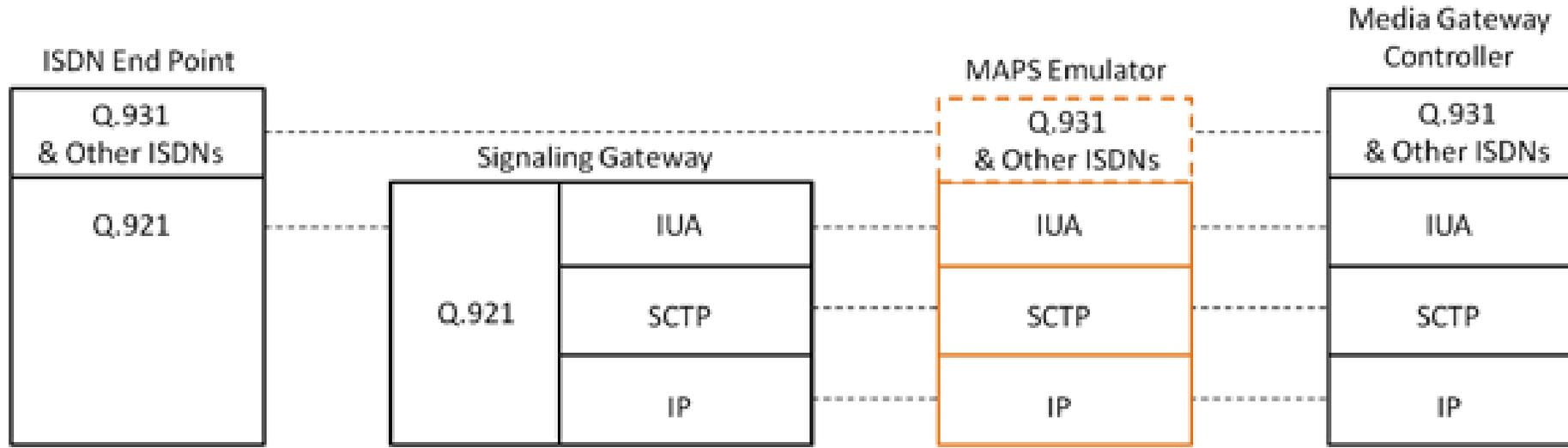


MAPS™ ISDN-SIGTRAN  
Simulate Elements in ISDN Network over IP 

# Features

- Simulates ISDN signaling over IP (ISDN-SIGTRAN)
- Generates and process all ISDN messages such as Setup, Connect, Release messages, and more
- Switch and Subscriber Emulation
- Supports interfacing with both high-speed PRI (Primary Rate Interface or 23B +D) and low-speed BRI (Basic Rate Interface, or 2B + D) digital lines
- User controlled access to optional ISDN parameters such as timers
- Provides various release cause codes such as rejected, no user response, user busy, congested, and so on to troubleshoot the problems in ISDN
- Impairments can be applied to messages to simulate error conditions
- Supports TDM traffic (including digits, voice file, tones, IVR, FAX, Dynamic VF, IVR and Voice Quality Testing) over IP
- Supports Client-Server functionality requires additional license; clients supported are TCL, Python, VBScript, Java, and .Net
- Automation, Remote access, and Schedulers to run tests 24/7
- Supports customization of call flows and message templates using Script editor and Message editor
- Provides call statistics and associated captured events and error events during call simulation
- Supports Media (including Digits, Voice File, Tones, IVR, FAX, VQT, and Dynamic VF) over TDM lines for PRI

# SIGTRAN Protocol Stack



Supported Protocols	Standard / Specification Used
Q.931	ITU-T Q.931 / Q.932(Facility IE) / Q.955.3 (MLPP Procedures)
IUA	RFC 4233 Integrated Services Digital Network (ISDN) Q.921-User Adaptation Layer

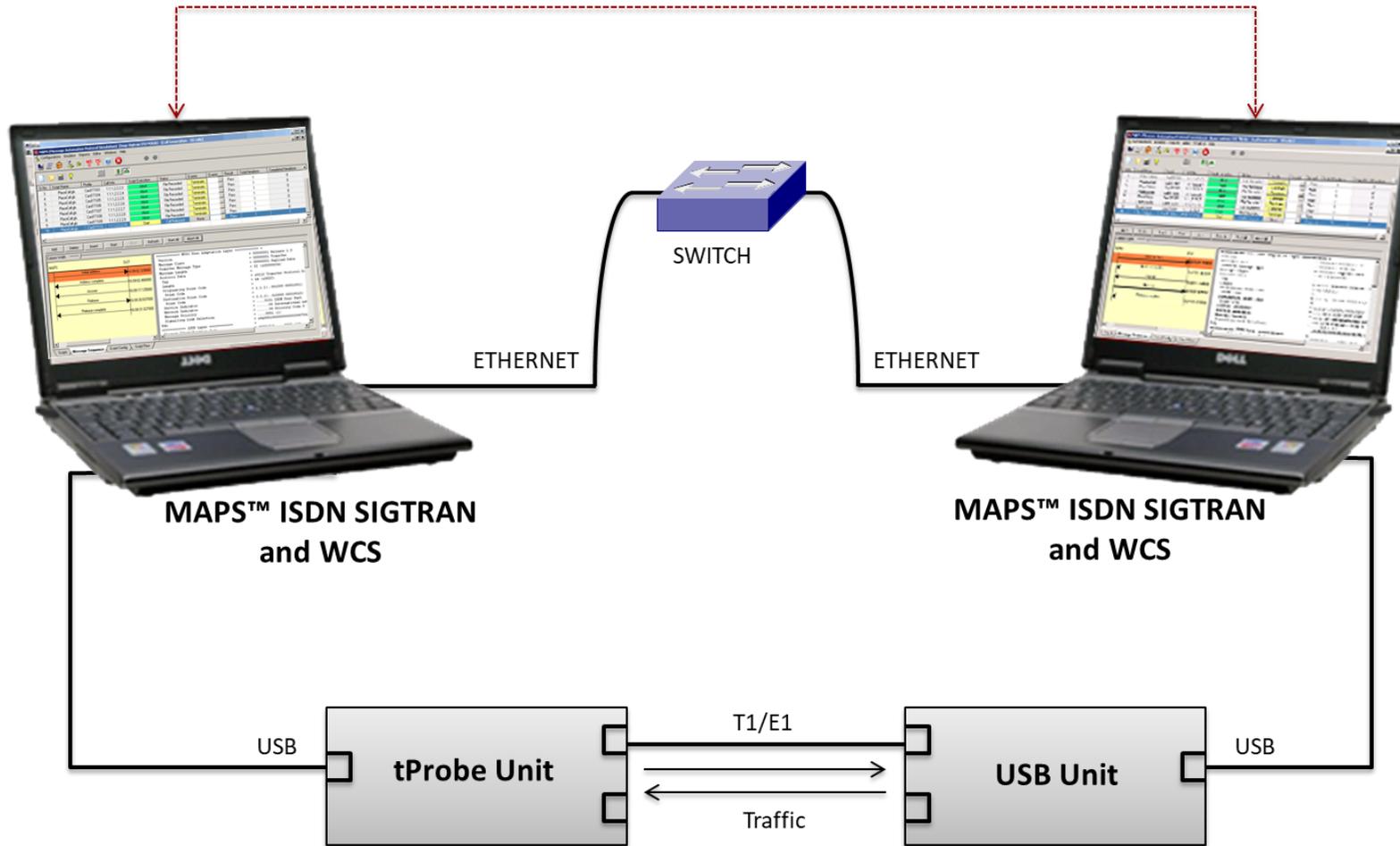
# Adaption Layers

SIGTRAN currently defines SIX adaption layers

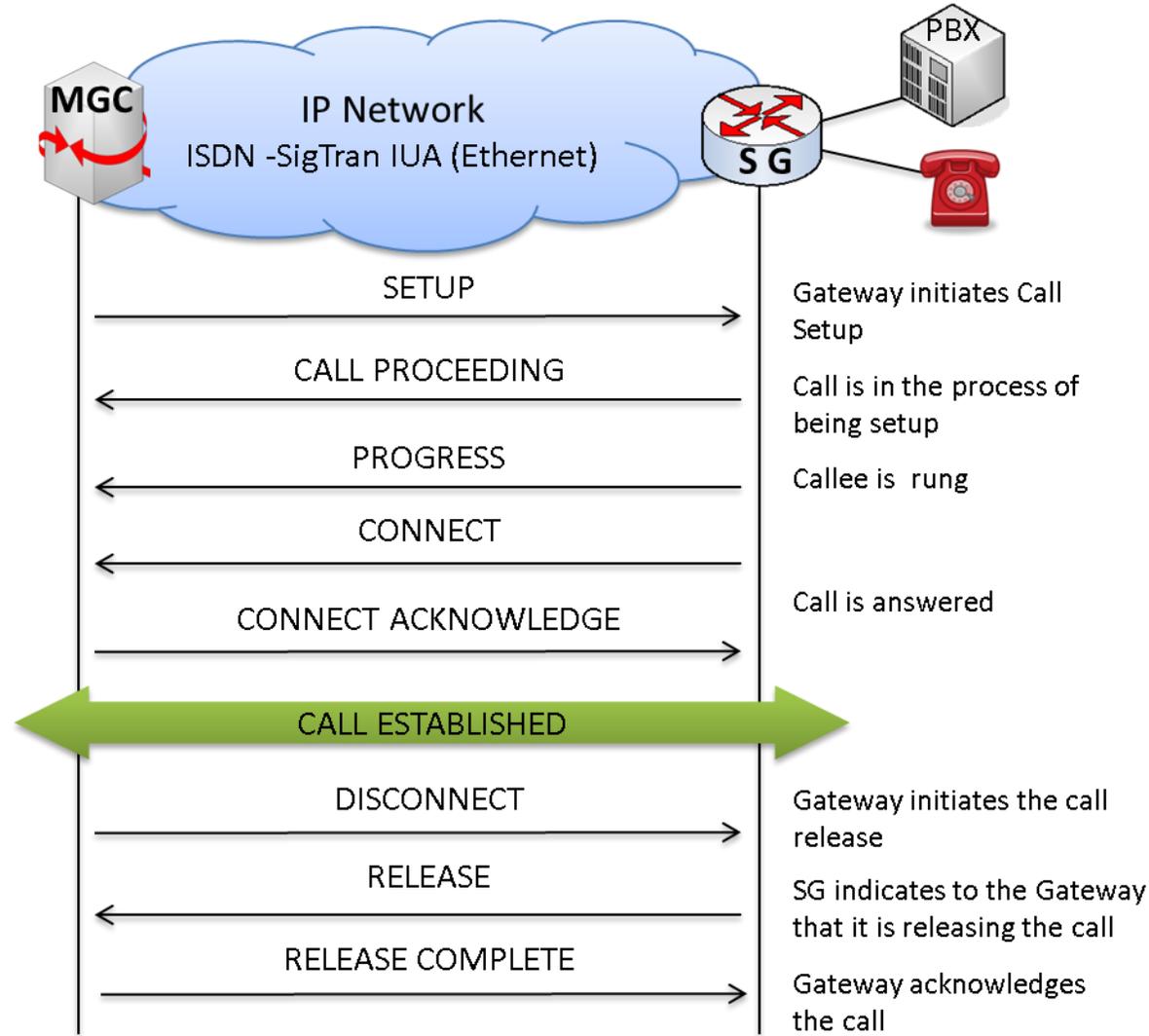
- **M2UA:** It provides the services of MTP2 in a Client-Server Situation, such as SG to MGC. Its user would be MTP3
- **M2PA :** It provides the services of MTP2 in a Peer-to-Peer Situation, such as SG to SG Connections. Its user would be MTP3
- **M3UA:** It provides the services of MTP3 in both a Client-Server Situation (SG to MGC) & Peer-to-Peer Architecture, Its user would be SCCP and/or ISUP
- **SUA:** It provides the services of SCCP in a Peer-to-Peer Situation, such as SG to IP SCP Connections. Its user would be TCAP
- **IUA:** It provides the services of the ISDN Data Link Layer (LAPD), Its user would be an ISDN Layer 3 (Q.931) entity
- **V5UA:** It provides the services of the V.5.2 Protocol

# Call Simulation over ISDN SIGTRAN

MAPS™ ISDN SIGTRAN Configuration for Signal



# ISDN SIGTRAN Call Procedure



# Testbed Configurations

## BRI ISDN Testbed Configurations

The screenshot shows the MAPS Subscriber configuration window for an ISDN-SigTran ITU BRI testbed. The configuration tree on the left includes Signaling Gateway, IUA Termination Type, Signaling Gateway, Signaling Gateway 1, IUA Interface, and IUA Interface 1. The right pane shows the configuration table with several values highlighted in red boxes.

Config	Value
Adapter Index	0
IUA Termination Type	ASP
Signaling Gateway	1
Signaling Gateway 1	
SGW IP Address	192.168.1.21
SGW Port	9900
MGC IP Address	192.168.1.185
MGC Port	9900
IUA Interface	1
IUA Interface 1	
Interface Identifier	1
SCTP Stream Identific	1
TEI	0
BRI Port Number	1
Channel Numbers	BRI - 2
End User Configuration	subscriber_profiles.xml

ChannelSize: Select Option: BRI - 2

## PRI ISDN Testbed Configurations

The screenshot shows the MAPS Subscriber configuration window for an ISDN-SigTran ITU PRI testbed. The configuration tree on the left includes Signaling Gateway, IUA Termination Type, Channels Mapping, Channel Selection, Signaling Gateway, Signaling Gateway 1, Media Gateway Controller, IUA Interface, and IUA Interface 1. The right pane shows the configuration table with an 'Enable' checkbox checked.

Config	Value	Enable
Signaling Gateway		<input checked="" type="checkbox"/>
IUA Termination Type	ASP	
Channels Mapping	Card-Timeslot Based	
Channel Selection	Configured in Profile	
Signaling Gateway	1	
Signaling Gateway 1		
SGW IP Address	192.168.12.219	
SGW Port	9900	
MGC IP Address	192.168.12.195	
MGC Port	9900	
Media Gateway Controller		
Enable Media	False	
MGC IP Address for Traffic	192.168.12.217	
IUA Interface	1	
IUA Interface 1		
Interface Identifier	1	
SCTP Stream Identifier	1	
TEI	0	
T1E1 Port Number	1	
Signaling Timeslot	31	
Channel Numbers	E1 - 31	
End User Configuration	subscriber_profiles.xml	

# Profiles

## BRI ISDN Profiles

MAPS (Message Automation Protocol Simulation) Switch (ISDN-SigTran ITU BRI) - [Profile Editor - Switch\_Profiles]

Configurations Emulator Reports Editor Windows Help

#	Profiles (Edit-F)	Config	Value
1	BRI 001 B1	BRI 001 B1	
2	BRI 001 B2	BRI Port Number	1
3	BRI 002 B1	Bearer Channel	1
4	BRI 002 B2	Called Party Number	0039054004001
5	BRI 003 B1	Calling Party Number	0039054005001
6	BRI 003 B2	User Information Layer 1 Protocol	A-law, Rec G.711
7	BRI 004 B1	Transit Network Selection Parameters	
8	BRI 004 B2	Network Identification Plan	Unknown
9	BRI 005 B1	Type Of Network Identification	User Specified
10	BRI 005 B2	Network Identification TNS	1234

CardNumber  
Enter Integer  
1

## PRI ISDN Profiles

MAPS (Message Automation Protocol Simulation) Subscriber (ISDN-SigTran ITU) - [Profile Editor - Subscriber\_Profiles]

Configurations Emulator Reports Editor Windows Help

#	Profiles (Edit-F)	Config	Value
1	Card1TS01	Card1TS01	
2	Card1TS02	Card Number	1
3	Card1TS03	Timeslot	1
4	Card1TS04	Signaling Gateway Identifier	1
5	Card1TS05	IUA Interface Identifier	1
6	Card1TS06	TEI	0
7	Card1TS07	Channel Number	1
8	Card1TS08	Called Party Number	7685612901
9	Card1TS09	Calling Party Number	8556782101
10	Card1TS10	User Information Layer 1 Protocol	A-law, Rec G.711
		Transit Network Selection Parameters	
		Network Identification Plan	Unknown
		Type Of Network Identification	User Specified
		Network Identification TNS	1234

CardNumber  
Enter Integer  
1

Add Insert Delete  
Properties

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

# Call Generation

## PRI ISDN Call Simulation

MAPS (Message Automation Protocol Simulation) Subscriber (ISDN-SigTran ITU) - [Call Generation - Untitled]

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Result	Total Iterations	Completed Iterations
1	Placecall.gls	Card1TS01	1,1	Start	Call Released	None	Pass	1	1

=====  
 0000 Version = 00000001 Rele  
 0002 Message Class = 00000101 Q.921  
 0003 QPM Message Type = 00000001 Data  
 0004 Message Length = 84 (x00000054)  
 0008 Interface-Identifier Tag = x0001 Interfac  
 000A Length = 8 (x0008)  
 000C Interface Identifier (integer) = 1 (x00000001)  
 0010 DLCI Tag = x0005 DLCI-Id  
 0012 Length = 8 (x0008)  
 0014 SAPI(Service Access Point Identifier) = 000000.. (0)  
 0015 TEI(Terminal Endpoint Identifier) = 00000000. (0)  
 001S Ext = .....1 1  
 Protocol Data =  
 0018 Protocol Data Tag = x000E Protocol  
 001A Length = 60 (x003C)  
 ISD-PDU = x080200020504C  
 ===== Q.93x Layer 3 Layer =====  
 001C Protocol Discriminator = 00001000 Q.931  
 001D Call Reference Length = ...0010 2 Byt  
 001E Call Reference Value = 2 (.00000000 0C  
 001F Call Reference Flag = 0..... FROM  
 0020 Message Type = 00000101 SETUP  
 Bearer capability =  
 0021 IEI Bearer Capability = 00000100 Bearer  
 0022 IE Bearer Capability Length = 3 (x03)

## BRI ISDN Call Simulation

MAPS (Message Automation Protocol Simulation) Switch (ISDN-SigTran ITU BRI) - [Call Reception]

Sr No	Script Name	Call Info	Script Execution	Status	Events	Results
1	Check_SCTP_Status.gls		Stop		None	Unknown
2	IUA.gls	1000	Stop	IUA Established	Send Heartbeat	Pass
3	IUAInterfaceMGMT.gls	1000,1,0	Stop	IUA Established	Send Release Indication	Unknown
4	Recvcall.gls	2,1	Completed	Call Released	None	Pass
5	Recvcall.gls	2,1	Completed	Call Released	None	Pass
6	Recvcall.gls	2,2	Completed	Call Released	None	Pass
7	Recvcall.gls	2,1	Stop	Call Active	DisconnectCall	Pass
8	Recvcall.gls	2,2	Stop	Call Active	DisconnectCall	Pass

=====  
 0000 Version = 00000001 Release 1.0  
 0002 Message Class = 00000101 Q.921/Q.931 Boundary Primitives Transport (QPT  
 0003 QPM Message Type = 00000001 Data Request Message  
 0004 Message Length = 80 (x00000050)  
 0008 Interface-Identifier Tag = x0001 Interface-Identifier(integer)-Id  
 000A Length = 8 (x0008)  
 000C Interface Identifier (integer) = 1 (x00000001)  
 0010 DLCI Tag = x0005 DLCI-Id  
 0012 Length = 8 (x0008)  
 0014 SAPI(Service Access Point Identifier) = 000000.. (0)  
 0015 TEI(Terminal Endpoint Identifier) = 00000000. (0)  
 001S Ext = .....1 1  
 Protocol Data =  
 0018 Protocol Data Tag = x000E Protocol Data  
 001A Length = 56 (x0038)  
 ISD-PDU = x080200030504038080A31801816C0E81303033393035343030353C  
 ===== Q.93x Layer 3 Layer =====  
 001C Protocol Discriminator = 00001000 Q.931/I.451 user-network call control messages  
 001D Call Reference Length = ...0010 2 Bytes  
 001E Call Reference Value = 3 (.00000000 00000011)  
 001F Call Reference Flag = 0..... FROM side that originated callref  
 0020 Message Type = 00000101 SETUP

# Call Reception

## PRI ISDN Call Reception

MAPS (Message Automation Protocol Simulation) Switch (ISDN-SigTran ITU) - [Call Reception]

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Call Info	Script Execution	Status	Events	Ev...	Results
1	Check_SCTP_Status.gls		Stop		None		Unknown
2	IUA.gls	1005	Stop	IUA Established	Send-Heartbeat		Pass
3	IUAInterfaceMGMT.gls	1005,1,0	Stop	IUA Established	Send Release Indication		Unknown
4	Recvcall.gls	2,1	Completed	Call Released	None		Pass

Abort Abort All Show Records Auto Trash Trash

Save Column Width

DUT MAPS

```

===== ISDN Q.921-User Adaptation Layer Layer =====
0000 Version = 00000001 Relea
0002 Message Class = 00000101 Q.921
0003 QPTM Message Type = 00000001 Data
0004 Message Length = 84 (x00000054)
0008 Interface-Identifier Tag = x0001 Interfac
000A Length = 8 (x0008)
000C Interface Identifier (integer) = 1 (x00000001)
0010 DLCI Tag = x0005 DLCI-Id
0012 Length = 8 (x0008)
0014 SAPI(Service Access Point Identifier) = 000000.. (0)
0015 TEI(Terminal Endpoint Identifier) = 0000000.. (0)
0015 Ext = .....1 1
Protocol Data
0018 Protocol Data Tag = x000E Protocol
001A Length = 60 (x003C)
ISD-PDU = x0802000205040
===== Q.93x Layer 3 Layer =====
001C Protocol Discriminator = 00001000 Q.931
001D Call Reference Length = ....0010 2 Byt
001E Call Reference Value = 2 (.00000000 00
001E Call Reference Flag = 0..... FROM
0020 Message Type = 00000101 S8TP
Bearer capability
0021 IEI Bearer Capability = 00000100 Bearer
    
```

Scripts Message Sequence Event Config Script Flow Capture Events Error Events Captured E

## BRI ISDN Call Reception

MAPS (Message Automation Protocol Simulation) Switch (ISDN-SigTran ITU BRI) - [Call Reception]

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Profile	Results
1	Check_SCTP_Status.gls			Stop		None		Unknown
2	IUA.gls		0	Stop	IUA Established	Send-Heartbeat		Pass
3	IUAInterfaceMGMT.gls		0,1,0	Stop	IUA Established	Send Release Indication		Unknown
4	Recvcall.gls		2,1	Completed	Call Released	None		Pass
5	Recvcall.gls		2,2	Completed	Call Released	None		Pass

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

Save Column Width Show Latest

DUT MAPS

```

===== ISDN Q.921-User Adaptation Layer Layer =====
0000 Version = 00000001 Release 1.0
0002 Message Class = 00000101 Q.921/Q.931 Boundary Prin
0003 QPTM Message Type = 00000001 Data Request Message
0004 Message Length = 80 (x00000050)
0008 Interface-Identifier Tag = x0001 Interface-Identifier[integer]
000A Length = 8 (x0008)
000C Interface Identifier (integer) = 1 (x00000001)
0010 DLCI Tag = x0005 DLCI-Id
0012 Length = 8 (x0008)
0014 SAPI(Service Access Point Identifier) = 000000.. (0)
0015 TEI(Terminal Endpoint Identifier) = 0000000.. (0)
0015 Ext = .....1 1
Protocol Data
0018 Protocol Data Tag = x000E Protocol Data
001A Length = 56 (x0038)
ISD-PDU = x080200020504038080A31801816C0E818
===== Q.93x Layer 3 Layer =====
001C Protocol Discriminator = 00001000 Q.931/I.451 user-network
001D Call Reference Length = ....0010 2 Bytes
001E Call Reference Value = 2 (.00000000 00000010)
001E Call Reference Flag = 0..... FROM side that originated
    
```

Scripts Message Sequence Event Config Script Flow Capture Events

Initialisation Errors Error Events Captured Events Link Status Up=

# ISDN Sigtran Events Log

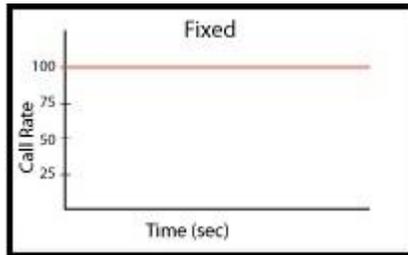
Date/Time	Captured Events	Call Trace Id	Script Name	Script Id
2015-6-25 12:12:39.399000	ASP Acknowledged	1005	IUA.gls	ProtScriptId_16_26082277-3254-3732
2015-6-25 12:12:39.399000	AS Status Notified	1005	IUA.gls	ProtScriptId_16_26082277-3254-3732
2015-6-25 12:12:39.407000	ASP Active Received	1005	IUA.gls	ProtScriptId_16_26082277-3254-3732
2015-6-25 12:12:39.407000	AS Status Notified	1005	IUA.gls	ProtScriptId_16_26082277-3254-3732
2015-6-25 12:12:39.407000	IUA Up On ConnectionId = 1005		Check_SCTP_Status.gls	ProtScriptId_15_26080413-3253-3732
2015-6-25 12:12:39.450000	IUA Requested	1005,1,0	IUAInterfaceMGMT.gls	ProtScriptId_17_26082328-3255-3732
2015-6-25 12:12:39.450000	IUA Established	1005,1,0	IUAInterfaceMGMT.gls	ProtScriptId_17_26082328-3255-3732
2015-6-25 12:12:39.450000	IUA Established: TEI = 0, Interfaceld = 1	1005	IUA.gls	ProtScriptId_16_26082277-3254-3732
2015-6-25 12:12:57.765000	Call Initiated	2,1	Recvcall.gls	ProtScriptId_18_26100641-3256-3732
2015-6-25 12:12:57.771000	Outgoing Call Proceeding	2,1	Recvcall.gls	ProtScriptId_18_26100641-3256-3732
2015-6-25 12:12:57.774000	Call Delivered	2,1	Recvcall.gls	ProtScriptId_18_26100641-3256-3732
2015-6-25 12:12:57.774000	Call Connected	2,1	Recvcall.gls	ProtScriptId_18_26100641-3256-3732
2015-6-25 12:12:57.774000	Card and Timeslot = Card2TS01	2,1	Recvcall.gls	ProtScriptId_18_26100641-3256-3732
2015-6-25 12:12:57.953000	Loaded Traffic Profile: Card2TS01	2,1	Recvcall.gls	ProtScriptId_18_26100641-3256-3732
2015-6-25 12:12:59.697000	Digits Sent: Type:dtmf Digits = 1234567890	2,1	Recvcall.gls	ProtScriptId_18_26100641-3256-3732
2015-6-25 12:13:57.804000	Disconnect Requested	2,1	Recvcall.gls	ProtScriptId_18_26100641-3256-3732
2015-6-25 12:13:57.805000	Release Requested	2,1	Recvcall.gls	ProtScriptId_18_26100641-3256-3732
2015-6-25 12:13:57.817000	Call Released	2,1	Recvcall.gls	ProtScriptId_18_26100641-3256-3732

Clear  Save Events  Capture Events to file

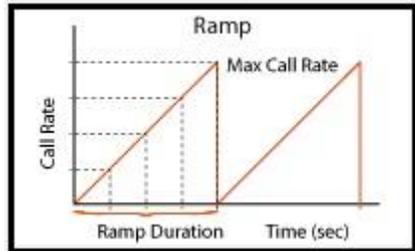
# Load Generation

- 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.

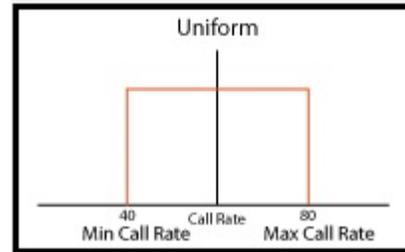
**Fixed**



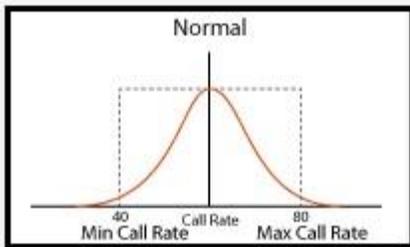
**Ramp**



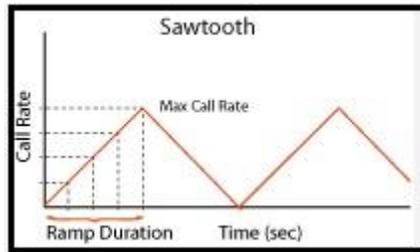
**Uniform**



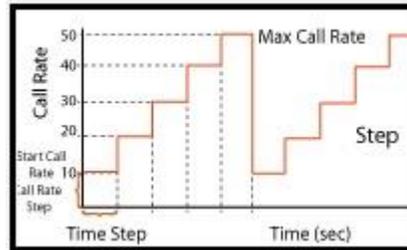
**Normal**



**Saw-tooth**



**Step**



The screenshot shows the 'Load Generation - LoadGendefault' software interface. It includes a toolbar with icons for file operations and help. The main configuration area includes:

- Total Calls To Generate:** \* (\* indicates no limit)
- Max Active Calls:** 30
- Unique Distributions Per Script**
- Multi Distributions**
- Distributions Table:**

Distributions	Description	
Uniform	MinCR=40, MaxCR=80, Duration=10	Add Remove
Fixed	Call Rate=200, Duration=10	Remove All
Normal	MinCR=40, MaxCR=80, Duration=10	Edit
- Scripts:** Placecall
- Profile:**  **Exclusive Profiles**
- Profile List:** Card1TS01, Card1TS02, Card1TS03, Card1TS04, Card1TS05, Card1TS06, Card1TS07, Card1TS08, Card1TS09, Card1TS10, Card1TS11, Card1TS12, Card1TS13
- Buttons:** Add, Delete
- Stop Time:**  Stop Time
- Time Settings:** Days 0, Hours 0, Minutes 0
- Start Time:** 00:00:00.000
- End Time:** 00:00:00.000
- Buttons:** Pause, Start

# ISDN Sigtran Bulk Call Generation

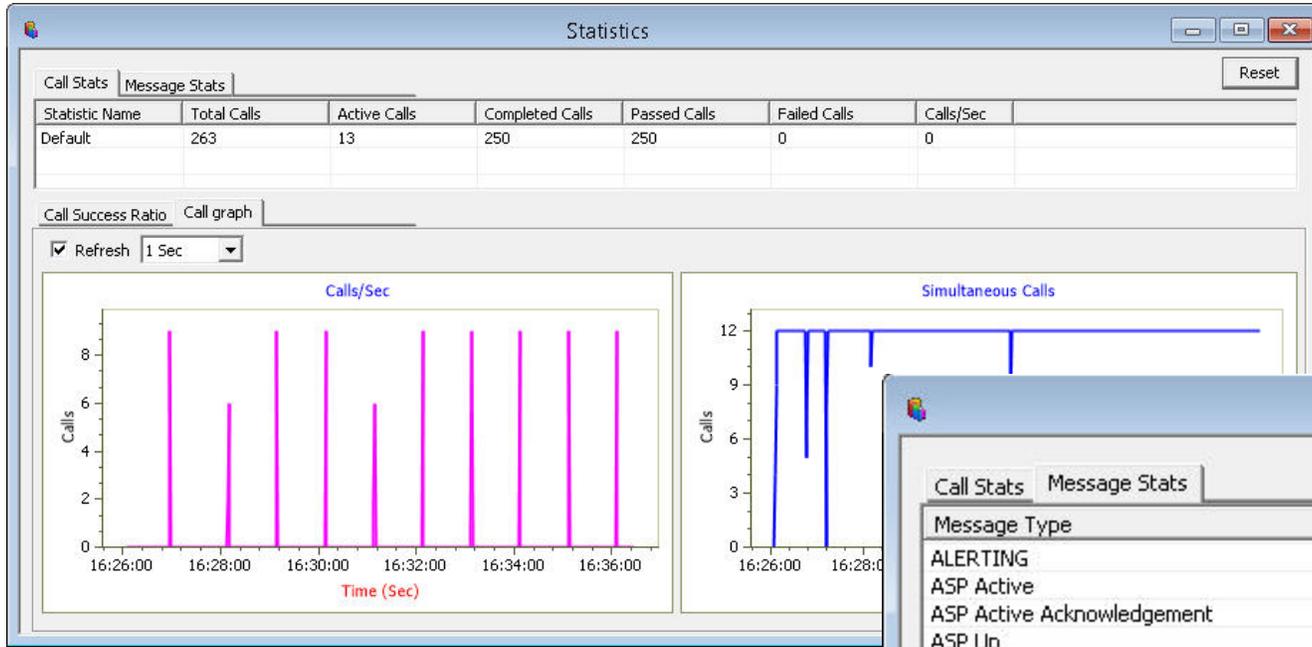
The screenshot displays the MAPS (Message Automation Protocol Simulation) Subscriber (ISDN-SigTran ITU) - [Call Generation - Untitled] application. The interface includes a menu bar (Configurations, Emulator, Reports, Editor, Windows, Help) and a toolbar with various icons. Below the toolbar is a table with the following columns: Sr No, Script Name, Profile, Call Info, Script Execution, Status, Events, Result, Total Iterations, and Completed Iterations. The table contains 10 rows, all with 'Placecall.gls' as the script name and 'Card1TS01' through 'Card1TS10' as profiles. The 'Script Execution' column shows 'Start' for all rows, and the 'Status' column is empty. The 'Events' column shows 'None' for all rows, and the 'Result' column shows 'Unknown' for all rows. The 'Total Iterations' column shows '10' for all rows, and the 'Completed Iterations' column shows '0' for all rows. Below the table is a toolbar with buttons: Add, Delete, Insert, Refresh, Start, Start All, Stop, Stop All, Abort, and Abort All. Below the toolbar is a checkbox labeled 'View Executing Line' and a text area labeled 'Script Contents' containing the following text:

```
//////////////// Place Call Subscriber Side //////////////////
////////// START PlaceCall //////////
/// Initialization Section ///
ReportEvent (ISDNScript = "Started");
State = "IDLE";
IsGeneration=1;
Direction="E";
AllocUniqueId "Subscriber" crv;
Restart="False";
Reserved="False";
RestartIndicatorClass=0;
CM=CTimout;
```

At the bottom of the window, there are tabs for 'Scripts', 'Message Sequence', 'Event Config', 'Script Flow', and 'Capture Events'. The 'Scripts' tab is currently selected. In the bottom right corner, there are three status indicators: 'Error Events' (red dot), 'Captured Errors' (grey dot), and 'Link Status Up=1 Down=1' (grey dot).

# Call and Message Statistics

## Call Statistics

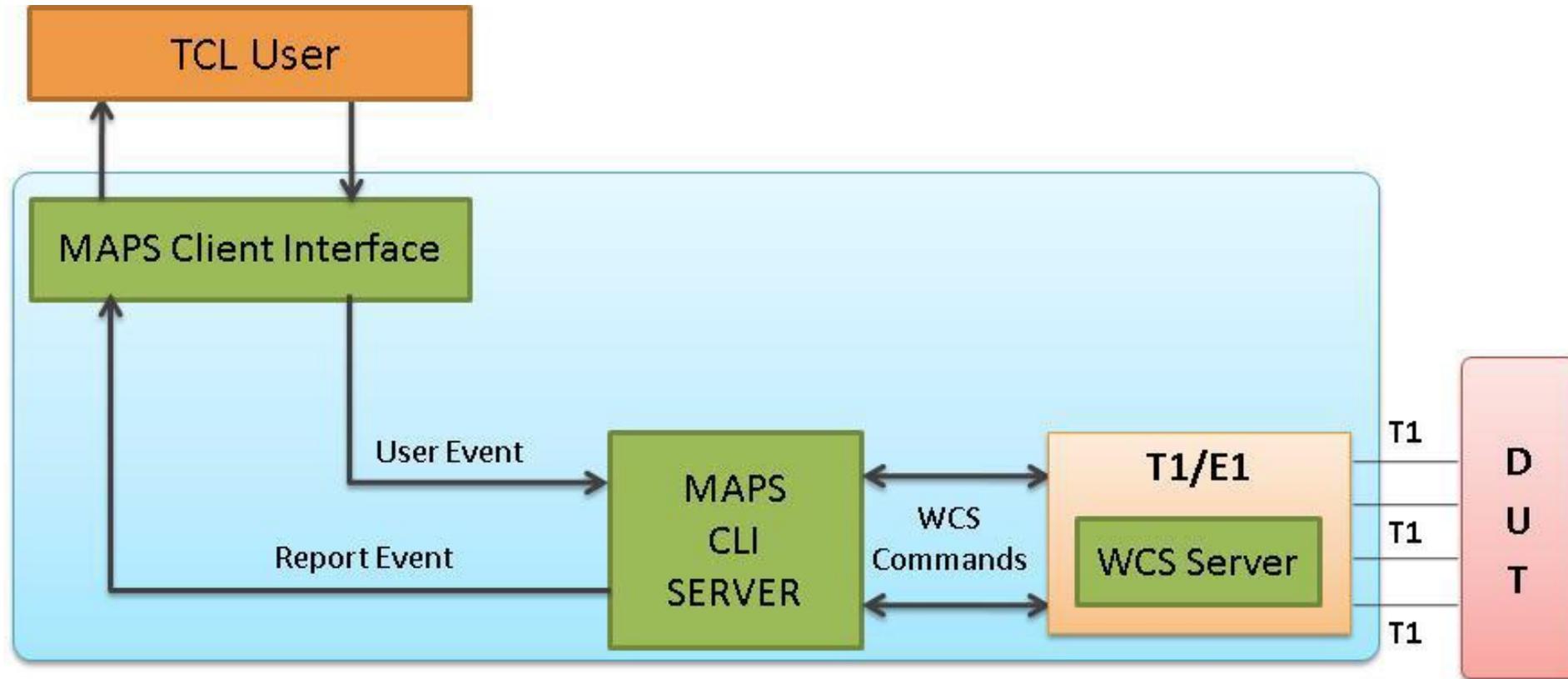


## Message Statistics

The Message Statistics window displays a table with the following data:

Message Type	Tx Count	Rx Count	Retransmit Count
ALERTING	0	160	0
ASP Active	1	0	0
ASP Active Acknowledgement	0	1	0
ASP Up	1	0	0
ASP Up Acknowledgement	0	1	0
CALL PROCEEDING	0	160	0
CONNECT	0	160	0
CONNECT ACKNOWLEDGE	160	0	0
Establish Confirm	0	1	0
Establish Request	1	0	0
Notify	0	2	0
SETUP	160	0	0
DISCONNECT	150	0	0
RELEASE	0	150	0
RELEASE COMPLETE	150	0	0

# MAPS™ Sigtran Test System



# Schedule Test to Run Automatically

The screenshot shows the 'Scheduler - default' application window. It contains a table with the following data:

Sl No	Config	Process	Start Time	Duration (Hr:Min)	Emulator
1	master config	Daily	15:23	1:0	Load Generation
2	config1	Daily	15:23	1:0	Manual Call Generation
3	config 2	Daily	15:24	1:0	Manual Call Generation
4	master config	Daily	15:24	1:0	Load Generation
5	test config	Daily	15:26	1:0	Manual Call Generation

Two 'Duration' dialog boxes are overlaid on the table. The first dialog box is positioned over the 'Duration' column for the first row (15:23) and has 'Hours' set to 15 and 'Minutes' set to 26. The second dialog box is positioned over the 'Duration' column for the fifth row (1:0) and has 'Hours' set to 1 and 'Minutes' set to 0. Red arrows point from the dialog boxes to the corresponding cells in the table.

At the bottom of the window, there are buttons for 'Start', 'Add', 'Insert', 'Delete', and 'Clear'. The 'Process' column for the fifth row has a dropdown menu open showing options: 'Daily', 'Run Once', 'Daily', 'Exit', and 'On Complete'. The 'Emulator' column for the fifth row has a dropdown menu open showing options: 'Manual Call Generation', 'Load Generation', and 'Manual Call Reception'.

# Customizations - Call Flow (Scripts)

Script Editor - Script - GSMAbis\_Call

File Edit View Help

Action

- 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	// -- Action Call's Times should be set to make greater than CallDuration Time

NUM

# Customizations - Protocol Messages

The screenshot displays the 'Message Editor - Untitled' window. On the left, a tree view shows the 'BTSM' structure with expandable nodes for 'T-bit', 'Message Group', 'Message Type', 'InformationElements', 'Channel number', 'Link Identifier', and their respective sub-elements. A dropdown menu is open, listing message types such as 'DATA INDication = 2', 'DATA REQuest = 1', 'ERROR INDication = 3', 'ESTablish REQuest = 4', 'ESTablish CONFirm = 5', 'ESTablish INDication = 6', 'RELease REQuest = 7', 'RELease CONFirm = 8' (highlighted), 'RELease INDication = 9', 'UNIT DATA REQuest = 10', and 'UNIT DATA INDication = 11'. The main editing area shows a hex dump of the message structure:

```
===== IP Access Layer ===== =
0000 Length = 30 (x001E)
0002 Protocol = 00000000 RSL
      Higher Layer Data = x0202011102000B001503450401805C0500805354F66E04010926F42F0100
===== BTSM Layer ===== =
0003 T-bit = .....0 Non-Transparent Message
0003 Message Group = 00000001. Radio Link Layer Mgmt
0004 Message Type = 00000010 DATA INDication
      Channel number =
0005 IE Identifier(Ch No) = 00000001 Channel number
0006 Channel Type = 00010... Lm + ACCHs
0006 Sub-Channel #(T bits) = 0 (....0...)
```

The status bar at the bottom indicates 'Ready' and includes a 'NUM' button.

# Customizations - Statistics and Reports

MOS, R-Factor

Packet Loss

Packets Discarded

Duplicate Packets

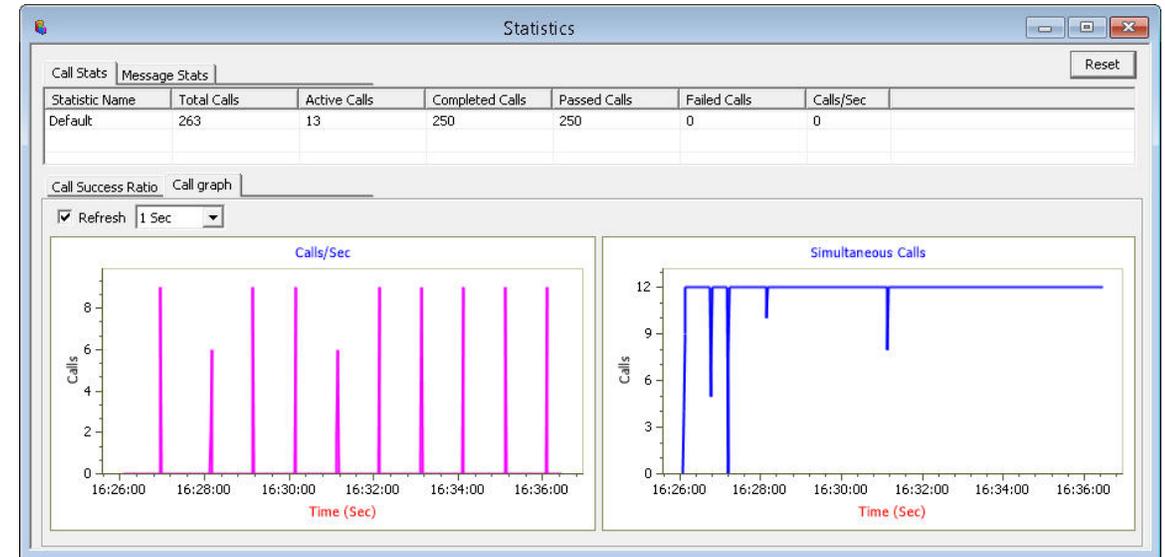
Out-Of-Sequence

Packets

Jitter Statistics

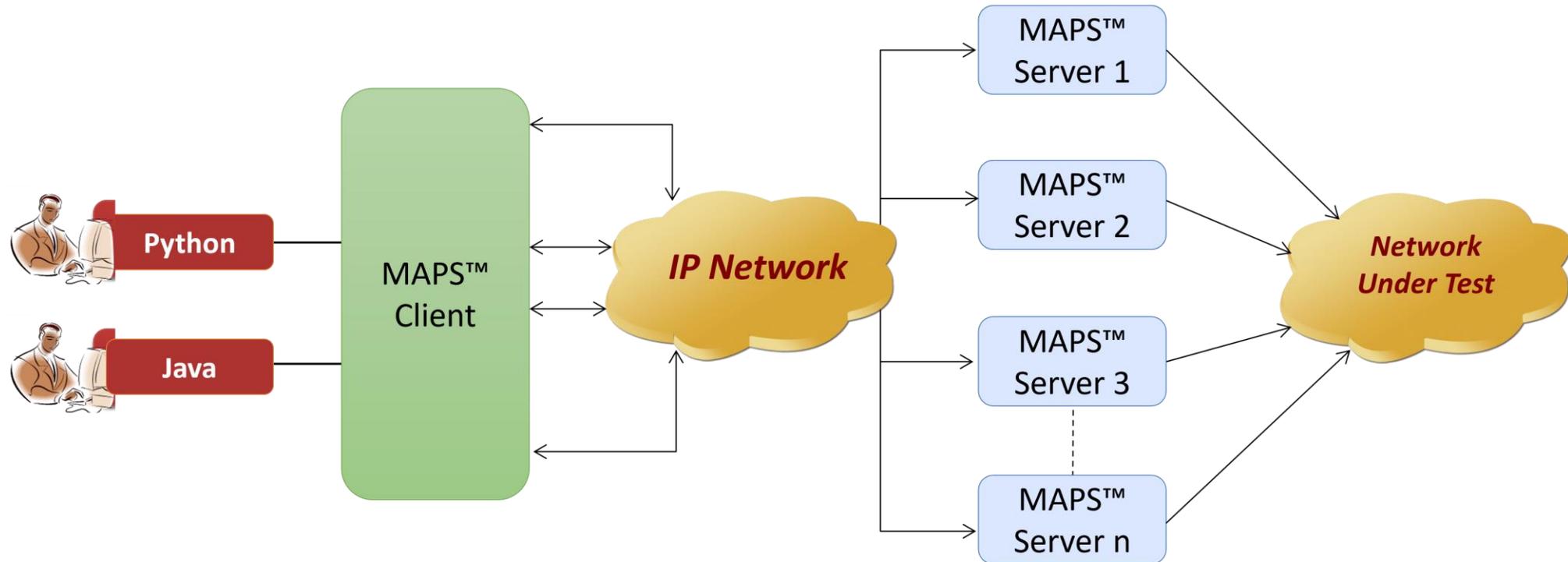
User Defined Statistics - VoiceQualityStats

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%]



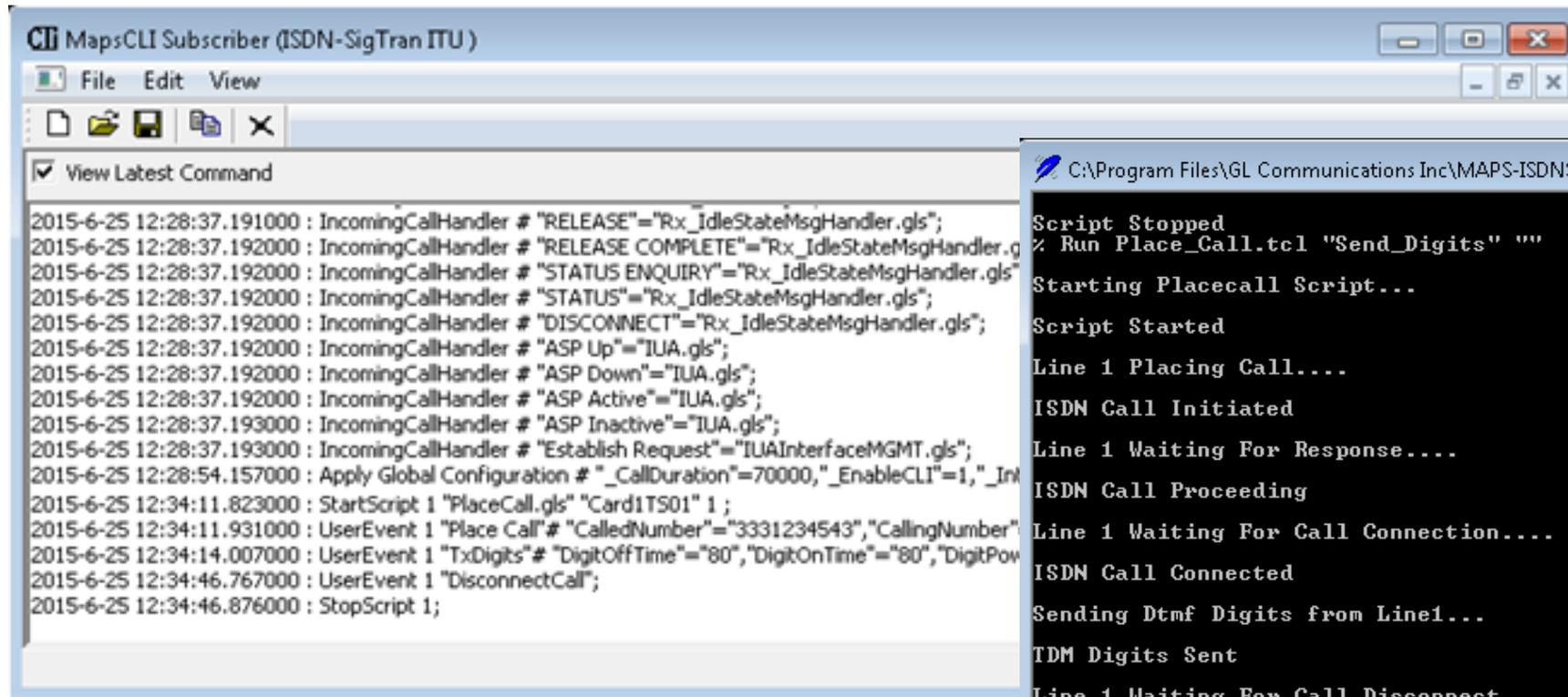
Call Stats provide a running tabular log of system level stats, tracked stats include: Total Calls, Active Calls, Completed Calls, Passed Calls, Failed Calls, Instantaneous Calls/Sec

# MAPS™ API Architecture

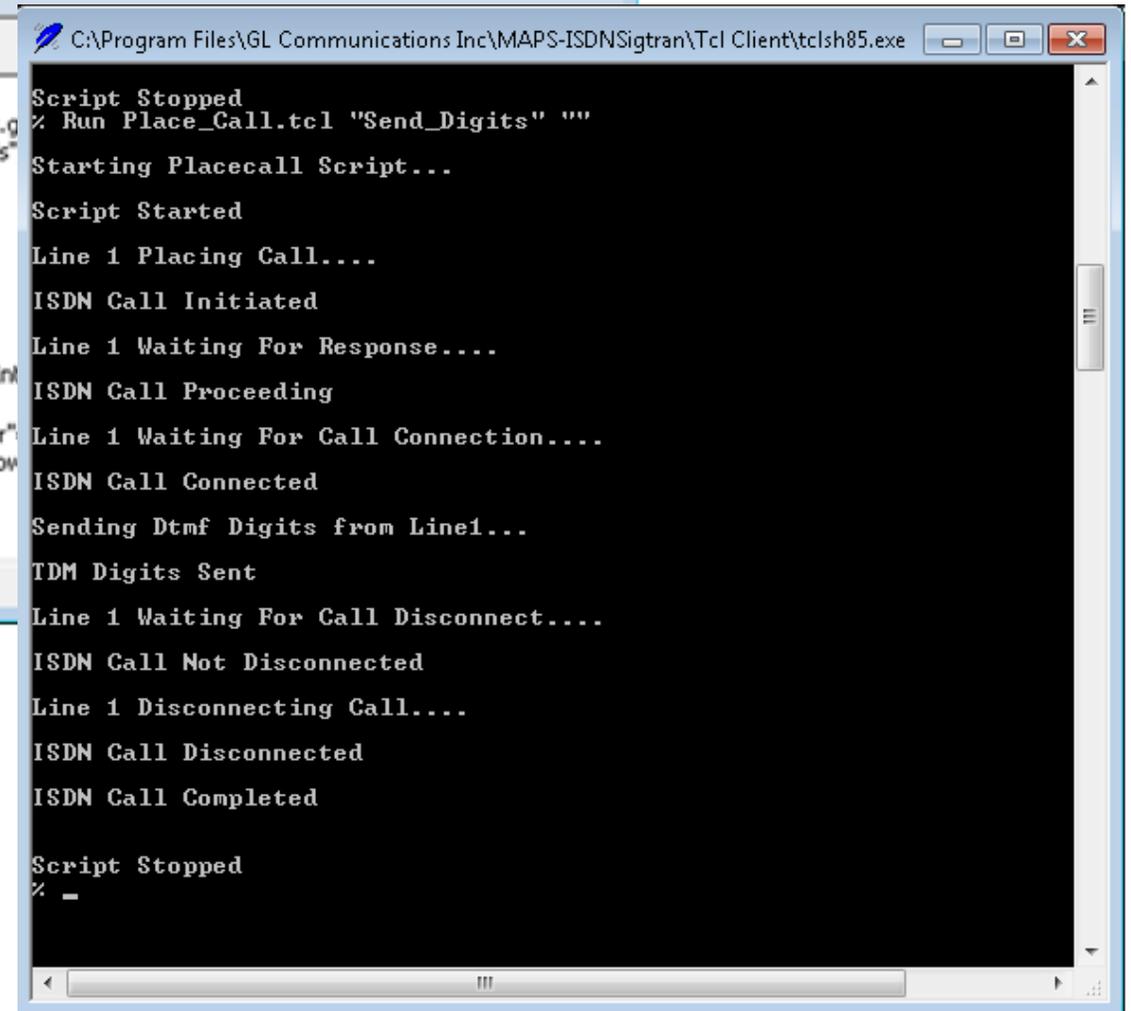


- API wraps our proprietary scripting language in standard languages familiar to the user:
  - Python
  - Java
- Clients and Servers support a “Many-to-Many” relationship, making it very easy for users to develop complex test cases involving multiple signaling protocols

# CLI Support



```
MapsCLI Subscriber (ISDN-SigTran ITU)
File Edit View
View Latest Command
2015-6-25 12:28:37.191000 : IncomingCallHandler # "RELEASE"="Rx_IdleStateMsgHandler.gls";
2015-6-25 12:28:37.192000 : IncomingCallHandler # "RELEASE COMPLETE"="Rx_IdleStateMsgHandler.gls";
2015-6-25 12:28:37.192000 : IncomingCallHandler # "STATUS ENQUIRY"="Rx_IdleStateMsgHandler.gls";
2015-6-25 12:28:37.192000 : IncomingCallHandler # "STATUS"="Rx_IdleStateMsgHandler.gls";
2015-6-25 12:28:37.192000 : IncomingCallHandler # "DISCONNECT"="Rx_IdleStateMsgHandler.gls";
2015-6-25 12:28:37.192000 : IncomingCallHandler # "ASP Up"="IUA.gls";
2015-6-25 12:28:37.192000 : IncomingCallHandler # "ASP Down"="IUA.gls";
2015-6-25 12:28:37.192000 : IncomingCallHandler # "ASP Active"="IUA.gls";
2015-6-25 12:28:37.193000 : IncomingCallHandler # "ASP Inactive"="IUA.gls";
2015-6-25 12:28:37.193000 : IncomingCallHandler # "Establish Request"="IUAInterfaceMGMT.gls";
2015-6-25 12:28:54.157000 : Apply Global Configuration # "_CallDuration"=70000,"_EnableCLI"=1,"_Int
2015-6-25 12:34:11.823000 : StartScript 1 "PlaceCall.gls" "Card1TS01" 1 ;
2015-6-25 12:34:11.931000 : UserEvent 1 "Place Call" # "CalledNumber"="3331234543","CallingNumber"
2015-6-25 12:34:14.007000 : UserEvent 1 "TxDigits" # "DigitOffTime"="80","DigitOnTime"="80","DigitPow
2015-6-25 12:34:46.767000 : UserEvent 1 "DisconnectCall";
2015-6-25 12:34:46.876000 : StopScript 1;
```



```
C:\Program Files\GL Communications Inc\MAPS-ISDN\Sigtran\Tcl Client\tclsh85.exe
Script Stopped
% Run Place_Call.tcl "Send_Digits" ""
Starting Placecall Script...
Script Started
Line 1 Placing Call....
ISDN Call Initiated
Line 1 Waiting For Response....
ISDN Call Proceeding
Line 1 Waiting For Call Connection....
ISDN Call Connected
Sending Dtmf Digits from Line1...
TDM Digits Sent
Line 1 Waiting For Call Disconnect....
ISDN Call Not Disconnected
Line 1 Disconnecting Call....
ISDN Call Disconnected
ISDN Call Completed
Script Stopped
% _
```

THANK YOU