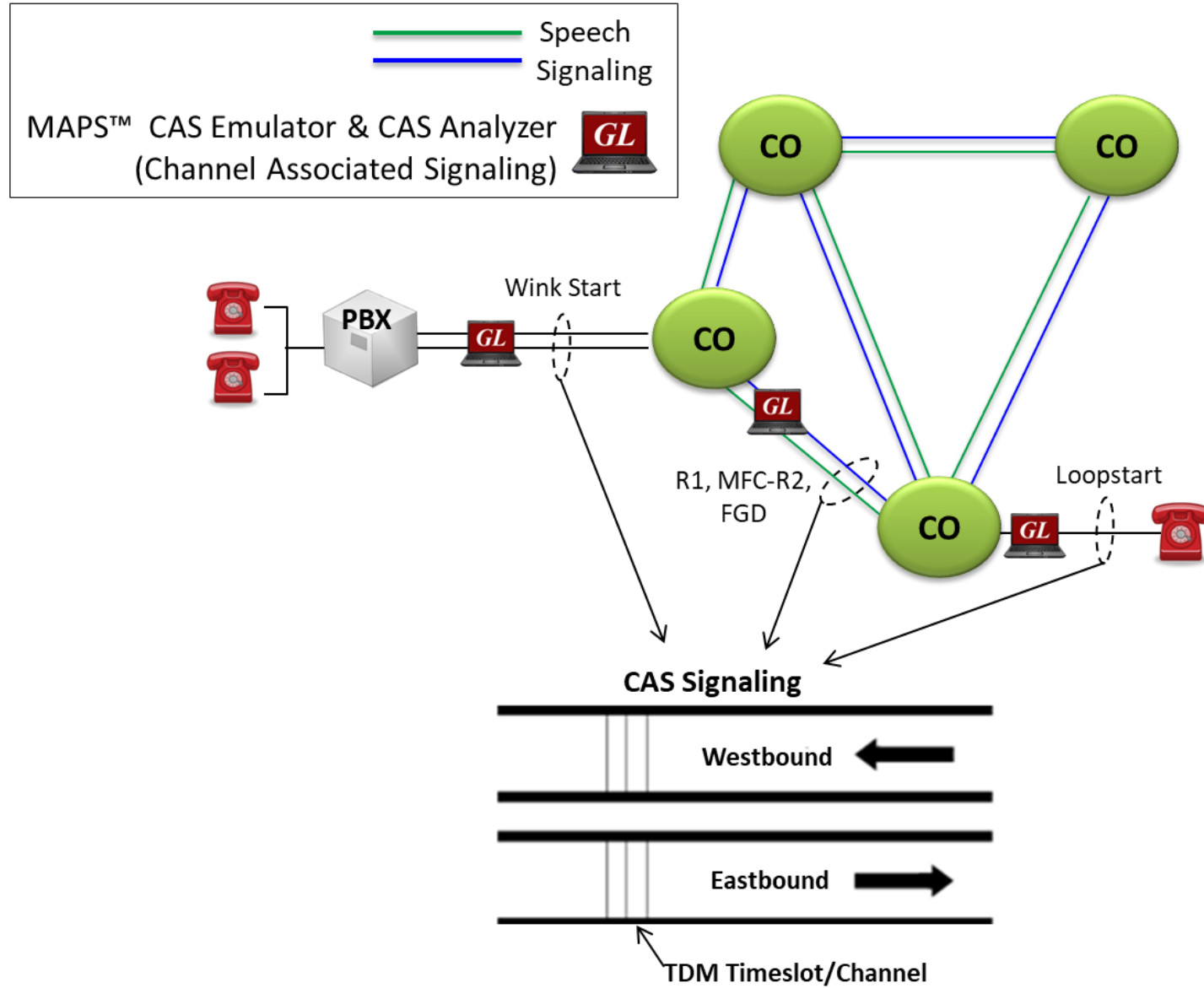

MAPS™ CAS Protocol Emulator

(Channel Association signaling (CAS) Emulation)



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

MAPS™ CAS Emulator in Telephony Network



MAPS™ CAS Features

Call Scenarios

- Caller ID
- Two-way Calling
- Three-way Calling
- Three-way Calling with Calling Party Number Identification
- VMWI – Voice Mail with MWI (message waiting indicator) and SDT (stutter dial tone)
- Call Waiting – Detect tone, call id, flash to accept call

Reporting

- Central Database of events/results/errors
- Multi-User, Multi-Test, Multi-Reporting
- Executed test cases
- Successful test cases
- Failed test cases
- Failed reason
- Test results showing voice quality, failed call attempts, dropped calls
- PDF and CSV file formats

MAPS™ CAS Features (Contd.)

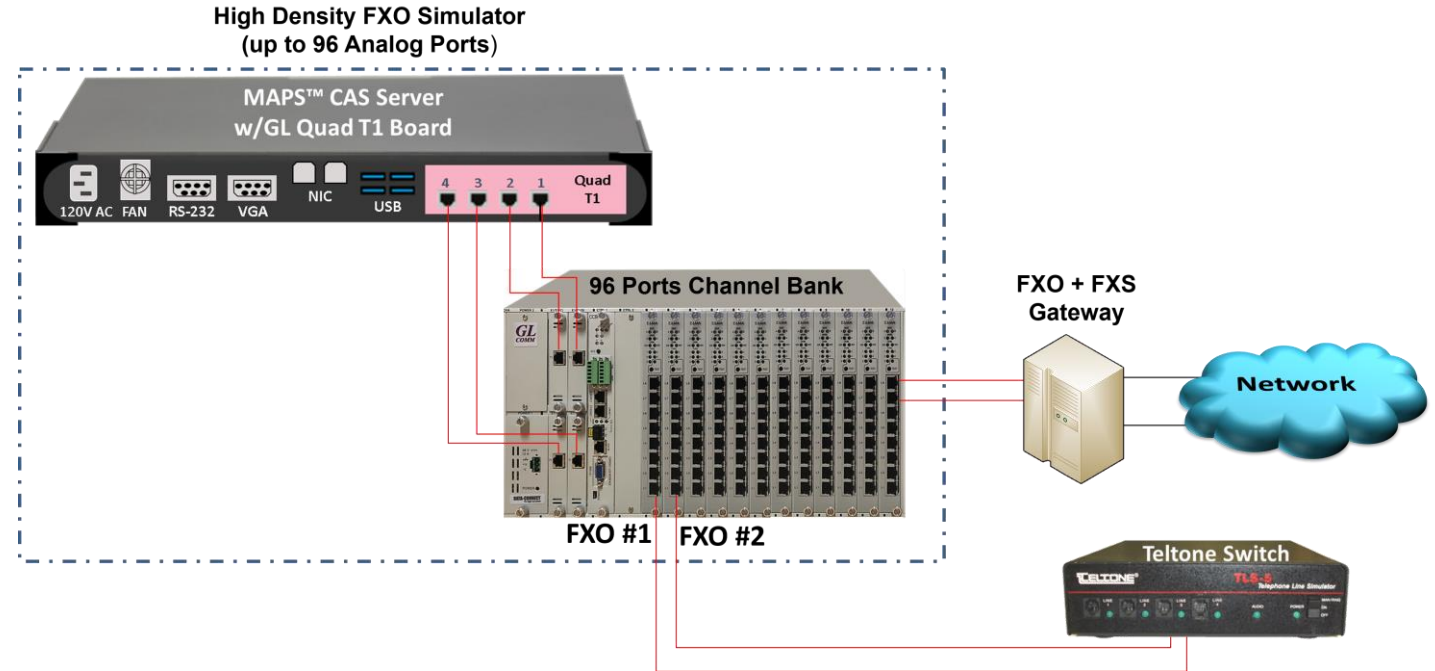
Functionalities

- Voice Prompt Confirmation (requires VQT)
- Voice Quality and Delay Measurements (requires VQT)
- Detect Caller ID, and VMWI
- Basic telephony functions - On-hook, Off-hook, Detect ringing signal, Dial, and 3-Way Call (using flash hook)
- Both analog and digital (T1) CAMA simulation is supported
- Dial Tone Delay, Post Pickup Delay, special dial tone, stutter dial tone, special information tone, call waiting, call in progress tone, reorder tone, busy tone, congestion tone, confirmation tone, howler tone, and ring-back tone
- Fax - Send /Receive fax image (TIFF format) file from/to the specified location
- Call Failure events
- Call Completion events
- Call Drop (sustain calls) events

MAPS™ CAS Solution

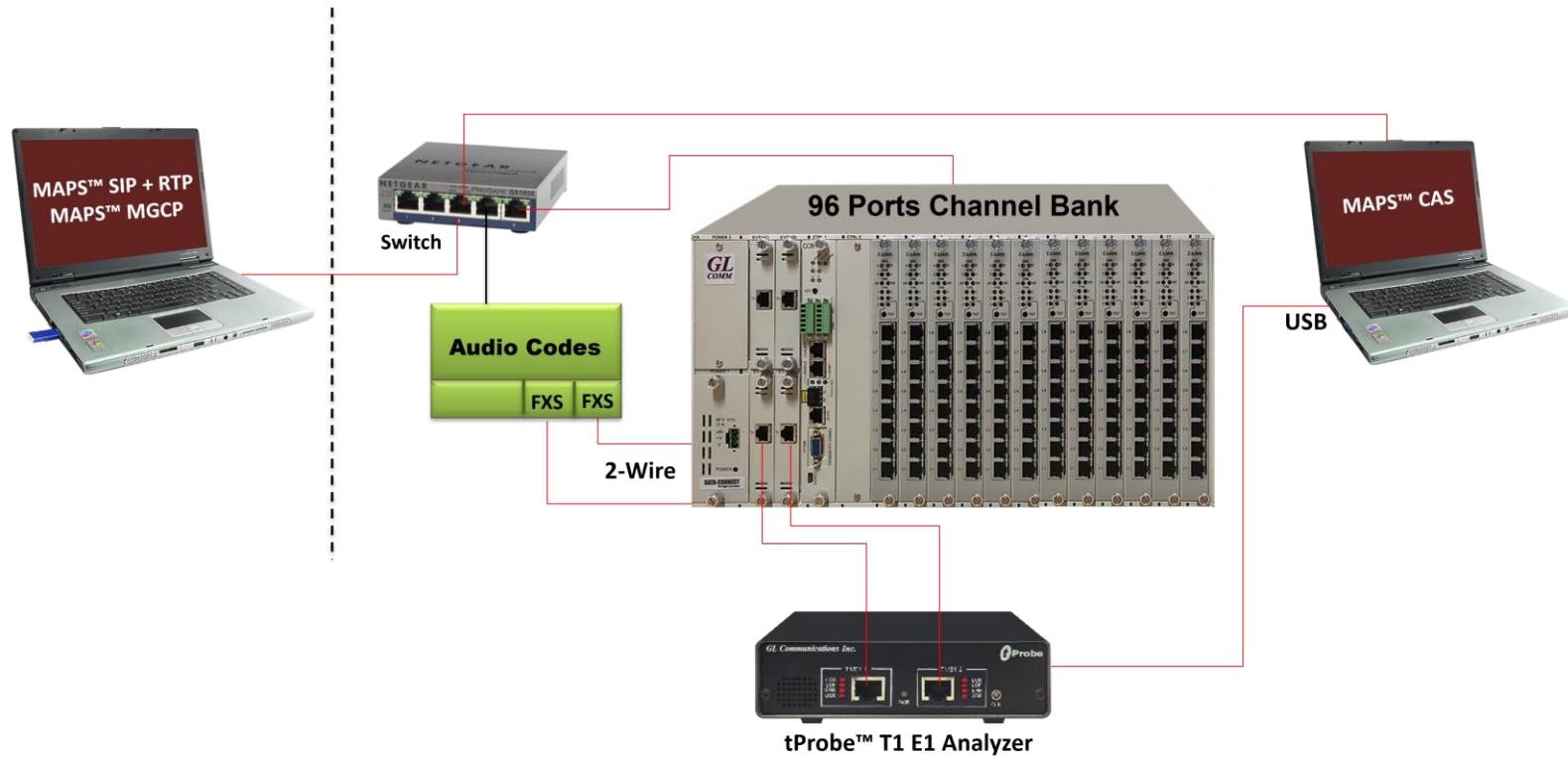
High Density FXO Simulation with MAPS™ CAS and Channel Bank

Features	High Density NB Solution MAPS™ CAS
Space Considerations	1U (MAPS™ CAS) 3U (Channel Bank)
Ports	Quad T1 (4 x T1) 96 Analog Channels
FXO Audio	NB Support
Operation	Fully Independent Ports with control b/w systems
Bulk Call	Yes – Supports



MAPS™ CAS Solution (Contd.)

End-to-End Hybrid Network Testing using High Density MAPS™ CAS and Channel Bank



Features	Hybrid Network Test Solution MAPS™ CAS
Space Considerations	1U (MAPS™ CAS) 1U (MAPS™ SIP/ MAPS™ MGCP) 1U (Audio Codes Media Gateway) 3U (Channel Bank)
Ports	Quad T1 (4 x T1) 96 Analog Channels
FXO Audio	NB Support
Operation	Fully Independent Ports with control b/w systems
Bulk Call	Yes – Supports

CAS Supported Protocols

- T1 Wink Start (R1 wink)
- T1 Loop Start and T1 Ground Start
- T1 Feature Group D (FGD)
- T1 Immediate Start
- FXO CAMA (Centralized Automated Message Accounting) simulation (analog two-wire and digital T1)
- E1 MFC-R2 (All variants, full / semi compelled) - Defined by the ITU Recommendations Q.421-Q.442 - uses multi-frequency compelled signaling protocol to exchange address information
- E1 European Digital CAS (EUC)
- E1 Digital E & M
- E1 International Wink Start
- E1 Sweden P7
- Any User-Defined CAS Protocol

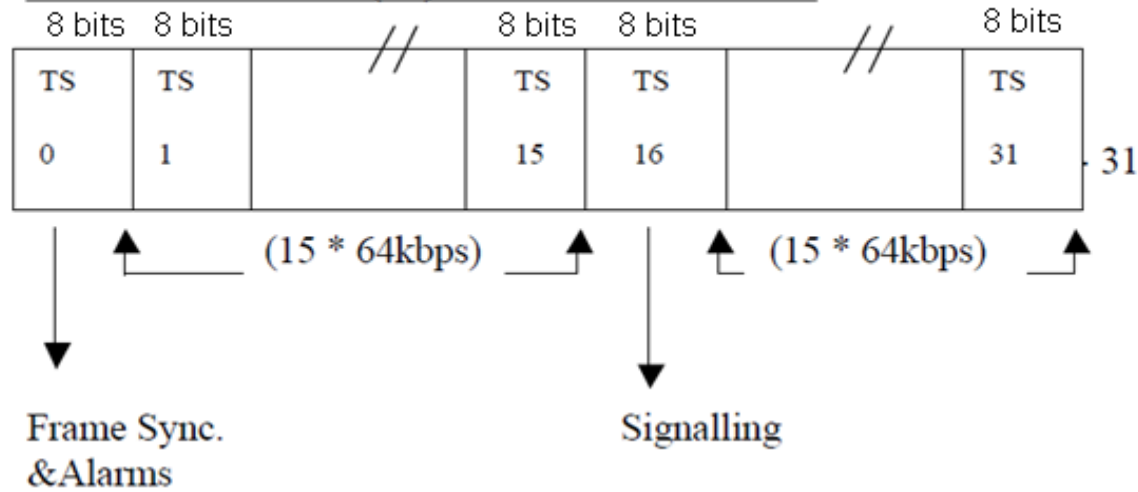
E1 MFC-R2 Call Simulation

What is MFCR2 CAS?

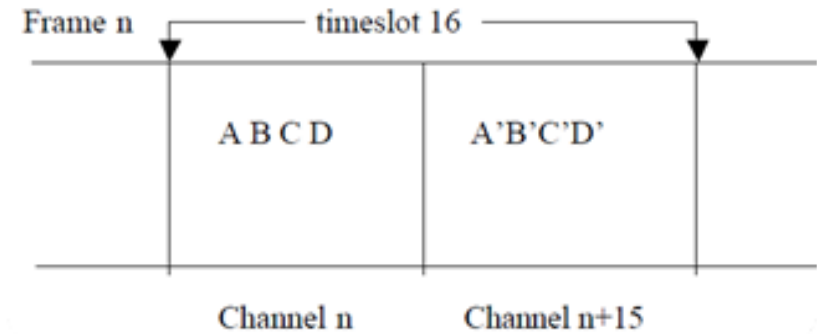
- Multi Frequency Compelled R2 Channel Associated Signaling
- Defined by the ITU Recommendations Q.421-Q.442 - uses multi-frequency compelled signaling protocol to exchange address information
- Used to convey information along a telephone trunk **between two switches** in order to establish a telephone call along that trunk
- Types of signals exchanged between two switches
 - Line Signals - Allows for the possible signaling states used to set up and clear down the call, and various other events
 - Inter Register signals – Allows selection signals and digits. The digits are used primarily to indicate the called number, but can also have other meanings

Line Signals

Frame structure for a (E1) 30-channel connection.



How timeslot 16 is used between the 30 channels



- Within E1 timeslot 16, each traffic channel is allocated 4 bits (ABCD) for signaling once every 16 frame multi frame. The 4 bits allows for 16 possible signaling states

Line Signals – MFCR2

- Although E1 Channel Associated Signaling (CAS) framing supports 4 signaling bits, only 2 of them (per direction) are used for R2 line signaling
- Billing pulses are also handled using these bits
- Af and Bf are the line signaling protocols in the forward direction
- Ab and Bb are the line signaling protocols backward direction

Signaling states of a typical call

State	Outbound AfBf	Direction	Inbound AbBb
Idle	10	← →	10
Seizure	00	→	01
Seizure Acknowledged	00	←	11
Ringing	00	←	11
Answer	00	←	01
Clear forward	10	→	11
Idle	10	←	10
Answer Conversation State	00	←	01
Billing pulses	00	←	11 or 00
Answer – Conversation state	00	←	01
Inbound side hangs up first: Clear back	00	←	11
Clear forward	10	→	11
Answer – Conversation state	00	←	01

Register Signals

- These are 2 out of 6 inband multitone signals sent in both directions to control the switching process
- For example, India uses 2 out of 5 frequencies resulting in a total of 10 different tones for forward and backward signals, respectively
- The below tables summarizes the meanings of each of the tones for forward signals. The meanings can however vary based on country specific implementation

Forward Group I		Forward Group II	
I-1	Digit 1	II-1	Subscriber without priority
I-2	Digit 2	II-2	Subscriber with priority
I-3	Digit 3	II-3	Maintenance equipment
I-4	Digit 4	II-4	Spare
I-5	Digit 5	II-5	Operator
I-6	Digit 6	II-6	Data transmission
I-7	Digit 7	II-7	Subscriber (International)
I-8	Digit 8	II-8	Data transmission
I-9	Digit 9	II-9	Subscriber with priority
I-10	Digit 0	II-10	Operator with forward transfer facility
I-11	-	II-11	Spare for national use
I-12	Request not accepted	II-12	Spare for national use
I-13	Satellite link not included	II-13	Spare for national use

Register Signals (Contd.)

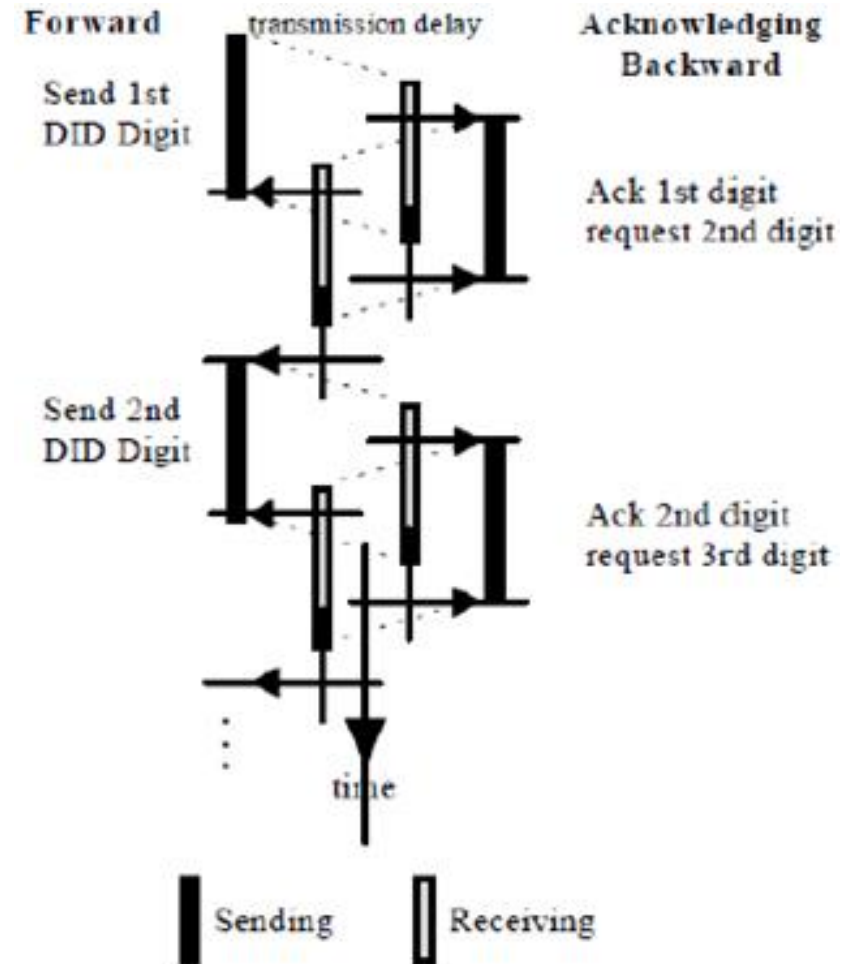
- The below tables summarize the meanings of each of the tones for backward signals. The meanings can however vary based on country specific implementation

Backward Group A		Backward Group B	
A-1	Send next digit (N+1)	B-1	Spare for national use
A-2	Send last digit (N-1)	B-2	Send special information tone
A-3	Address completed, change to reception of Group B	B-3	Subscriber line busy
A-4	Congestion in National network	B-4	Congestion
A-5	Send calling party category	B-5	Unallocated number
A-6	Address complete, charge, setup speech conditions	B-6	Subscriber line free, charge
A-7	Send second to last digit (N-2)	B-7	Subscriber line free, no charge
A-8	Send third from last digit (N-3)	B-8	Subscriber line out of order
A-9	Spare for national use	B-9	Spare for national use
A-10	Spare for national use	B-10	Spare for national use
A-11	-	B-11	Spare for national use
A-12	-	B-12	Spare for national use
A-13	Send nature of circuit	B-13	Spare for national use
A-14	Request info on use of half echo suppression	B-14	Spare for national use
A-15	-	B-15	Spare for national use

Compelled Signaling Operation

The inbound tones are exchanged between two switches in compelled way as shown

- On seizure of a link (or line), the outgoing R2 register automatically starts sending the first forward interregister signal
- As soon as the incoming R2 register recognizes this signal, it starts sending a backward interregister signal which has it's own meaning and at the same time serves as an acknowledgement signal
- As soon as the outgoing R2 register recognizes the acknowledging signal, it stops sending the forward interregister signal
- As soon as the incoming R2 register recognizes the cessation of the forward interregister signal, it stops sending the backward interregister signal
- As soon as the outgoing R2 register recognizes the cessation of the acknowledging backward interregister signal it may, if necessary, start sending the appropriate next forward interregister signal



E1 Analyzer

E1 tProbe - Analyzer

File Config View Monitor IntrusiveTest Special Applications Window Help

Port	Framing	Loopback	Termination	Clock	Cross-port
1	CAS & CRC	No Loopback	Terminate	Recovered	Normal (None)
2	CAS & CRC	No Loopback	Terminate	Recovered	Normal (None)

Set all cards as selected
<- Double-click to change values

T1/E1 Alarms

Reset	All Ports	#1	#2
Sync Loss	✓	✓	✓
HDB3 Violation	✓	✓	✓
Carrier Loss	✓	✓	✓
Frame Error	✓	✓	✓
Remote	✓	✓	✓
Distant MF	✓	✓	✓
AIS	✓	✓	✓
ES Overflow	✓	✓	✓
ES Underflow	✓	✓	✓

T1/E1 Statistics

Frequency (Hz)	2048010	2048009
Level (dBdsx)	-0.568	-0.446
BPV Errors	0	0
CRC Errors	0	0
Frame Errors	0	0
==Bit/Frame Clock Slip==		
Ref to Internal	2068/8	2066/8
Cross Ref to Recovered	2/0	-2/0
Ref to External	n/a	n/a

Graph

Invoke Graph

Start GL Server

Listen Port: 17090

Start GL Server

Exit

Restore Default

Server is Invisible

Messaging

Send / Receive Binary Messages

Send / Receive ASCII Messages

Version

Send / Receive Version 3 Messages

Send / Receive Version 4 Messages

Use These Settings until Further Notice

Start Server Automatically At Analyzer Start-Up

Card 1

VF (Audio)

Tx (VF In)

Gain(dB): 0.0 dB

TS: 1

Insert

Signaling Bits

Speaker

Rx (VF Out)

Gain(dB): 0.0 dB

TS: 1

Drop

Speaker

Set 0-dB

VF imped./Mic: 600

Drop&Insert TSs

Enable

Ready

T1/E1 Sync Info

Test Bed Configuration

The test configuration window allows users to configure

- various CAS signaling types including R1 digit parameters
- flow control parameters
- forward / backward tone parameters
- various other parameters to transmit and receive CAS inbound and outbound signals

Available Test Bed Profiles are

- MFCR2_TestBedDefault_Ccitt.xml
- MFCR2_TestBedDefault_China.xml
- MFCR2_TestBedDefault_India.xml
- MFCR2_TestBedDefault_Mexico.xml
- MFCR2_TestBedDefault_SaudiArabia.xml
- MFCR2_TestBedDefault_Sunrise.xml

The screenshot displays the MAPS configuration interface for a test bed setup. The main window is titled "MAPS (Message Automation Protocol Simulation) (CAS) - [Testbed Setup - MFCR2_TestBedDefault_Ccitt...". The interface is divided into several sections:

- Config Table:** A table with two columns, "Config" and "Value".

Config	Value
Country	CCITT
GL Server Configuration	
Interface	E1
WCS Listener Port	17090
Server IP Address	127.0.0.1
Ring Signal Parameters	
Ring Frequency 1	425
Ring Frequency 2	0
Ring On Time in ms	1000
Ring Off Time 1 in ms	4000
Ring Off Time 2 in ms	0
RingSignal Power Level	-10.000000
Flow Control Parameters	
Expected Number of DID	7
Expected Number Of ANI	7
Number Of DIDs Before ANI	1
GRP2CatPresentation	0
ANIPresentation	0
Calling Party Category	0
Maximum Duration of ANI and DID digits	5000
Power level of ANI and DID Digits	-10.000000
Signaling Flags	
D	1
C	0
Compelled Or Flow Control Timers	
Compelled Timers in Secs	
Inbound Compelled Cycle Timer	10
Forward Tone Maximum On Time	15
Forward Tone Maximum Off Time	27
Compelled Tones	
Backward Group A Tones	
Send Next DID	1
Send Group I Category	5
Send Next ANI	5
Send Group II Tone	3
Congestion detected	4
Subscriber Line Busy	3
Call Accepted Group B No charge	7
Call Accepted in Group B Charge	6
Forward Tones	
End Of DID	2
Request Or Indication Tones	
Outbound Tone in Group 2	1
End User Configurations	CAS_Profiles.xml
- CountrySettings:** A dropdown menu labeled "Select Option" with "CCITT" selected.
- Buttons:** "Start" and "Edit" buttons are located at the bottom right.
- Status Bar:** Shows "Error Events", "Captured Errors", and "Link Status Up=0".

MFCR2 Call Simulation using MAPS™ CAS

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

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Ev...	Result	Total Iterations	Completed Iterations
1	MFCR2_PlaceCall.gls	Card1TS01	1,1	Stop	File Recorded	OutboundReleaseCall		Pass	1	0
2	MFCR2_AnswerCall.gls	Card2TS01	2,1	Stop	File Recorded	InboundReleaseCall		Pass	1	0
3	MFCR2_Reset Timeslots.gls	Card2TS01		Start						

MFR2F/0 ← 15:14:31.029000
 MFR2B/1 → 15:14:31.168000
 MFR2F/0 ← 15:14:31.307000
 MFR2B/1 → 15:14:31.437000
 MFR2F/2 ← 15:14:31.572000
 MFR2B/3 → 15:14:31.707000
 MFR2F/1 ← 15:14:31.835000
 MFR2B/6 → 15:14:31.967000
 CONNECTED_OUTBOUND :: 0, 1, 0, 1 → 15:14:39.865000
 SendFile :: a-law samples\count10.pcm ← 15:14:59.932000
 RecordFile :: MAPS\Recv Files\CAS\0_0_May6_00101_0.pcm → 15:15:09.899000

Capture Events to file

MAPS (Message Automation Protocol Simulation) (CAS) - [Events]

Configurations Emulator Reports Editor Windows Help

Event Log | Error Events | Captured Errors

Date/Time	Captured Events	Call Trace Id	Script Name	Script Id
2015-5-6 15:14:30.304000	Backward Group A-1	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:14:30.497000	Forward Group I.6	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:14:30.561000	Backward Group A-1	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:14:30.752000	Forward Group I.0	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:14:30.825000	Backward Group A-1	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:14:31.029000	Forward Group I.0	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:14:31.096000	Backward Group A-1	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:14:31.306000	Forward Group I.0	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:14:31.373000	Backward Group A-1	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:14:31.571000	Forward Group I.2	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:14:31.642000	Backward Group A-3	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:14:31.834000	Forward Group II.1	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:14:31.903000	CalledNum = 666000	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:14:31.903000	CallingNum = 595000	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:14:31.903000	Backward Group B-6	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:14:32.092000	Subscriber's line free, charge	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:14:32.823000	A: Alerting	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:14:39.865000	P: CASDetectedSignals at 2015-05-06 15:14:39.865000 = 0, 1, 0, 1	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:14:39.865000	P: Remote User Answered Call	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:14:39.865000	P: Remote User Answered Call	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:14:39.865000	Card and Timeslot = Card1TS01	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:14:39.865000	Loaded Traffic Profile: Card1TS01	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:14:39.976000	TdmToneLabel = Burst	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:14:40.064000	P: Remote User Answered Call	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:14:40.064000	Card and Timeslot = Card2TS01	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:14:40.065000	Loaded Traffic Profile: Card2TS01	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:14:40.194000	TdmToneLabel = Burst	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:14:59.932000	File Sending Complete	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:14:59.959000	TdmToneLabel = burst	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:15:00.158000	File Sending Complete	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:15:00.183000	TdmToneLabel = burst	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:15:29.895000	P: Call Released due to user event to release detected	1,1	MFCR2_PlaceCall.gls	CGProtScriptId_5_13797788-1972-4600
2015-5-6 15:15:29.909000	CASDetectedSignals = 1, 0, 0, 1	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600
2015-5-6 15:15:29.909000	A: Call Released as idle code detected in invalid state	2,1	MFCR2_AnswerCall.gls	CGProtScriptId_4_13796615-1971-4600

Capture Events to file

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

FGD Call Simulation

State	Outbound AfBf	Direction	Inbound AbBb
Idle	0 0	<----->	0 0
Seizure	1 1	----->	
Seizure acknowledged		<-----	1 1 – 0 0 (Wink)
The outbound side starts to send the address information using MF tones. Feature group D can transfer more than one digit field to speed up long distance calls. Every field starts with a KP tone (start of pulsing) and ends with ST tone (end of pulsing). After each digits field the inbound side acknowledges the reception with a signaling bit wink.			
Register signaling first field digit spill	MF tones Start KP	----->	
	Called Number	----->	
	MF tones End ST	----->	
	MF tones Start KP	----->	
	Calling Number	----->	
	MF tones End ST	----->	
Acknowledgment of Digits Reception		<-----	1 1 – 0 0 (Wink)
Once all the address information has been transferred, the inbound side accepts the call by sending the off-hook signaling code or rejects the call sending Idle signaling code			
If the call is rejected, the outbound side switches back to signaling AB = 00 (idle), clearing the line.			
Clear forward	0 0	<----->	0 0
If the call is accepted, the inbound side answers the call by flipping both backward bits to 1.			
Answer		<-----	1 1
Call Active - Conversation State			
Clear	0 0	<----->	0 0
Idle	0 0	<----->	0 0

FGD Call Simulation using MAPS™ CAS

MAPS (Message Automation Protocol Simulation) (CAS) - [Call Generation - Default-FGD]

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Ev...	Result	Total Iterations	Completed Iterations
1	T1_FGD_Place Call.gls	Card1TS01	1,1	Stop	File Recorded	OutboundReleaseCall		Pass	1	0
2	T1_FGD_Answer Call.gls	Card2TS01	2,1	Stop	File Recorded	InboundReleaseCall		Pass	1	0
3	T1_FGD_Reset Timeslots.gls			Start		None		Unknown	1	0

Buttons: Add, Delete, Insert, Refresh, Start, Start All, Stop, Stop All, Abort, Abort All

Save Column Width

MAPS DUT

State :: Placing

Signaling Bits :: 1, 1, 1, 1

Transmitting On Card :: 1 Timeslot :: 1

Scripts Message Sequence Event Config Script Flow

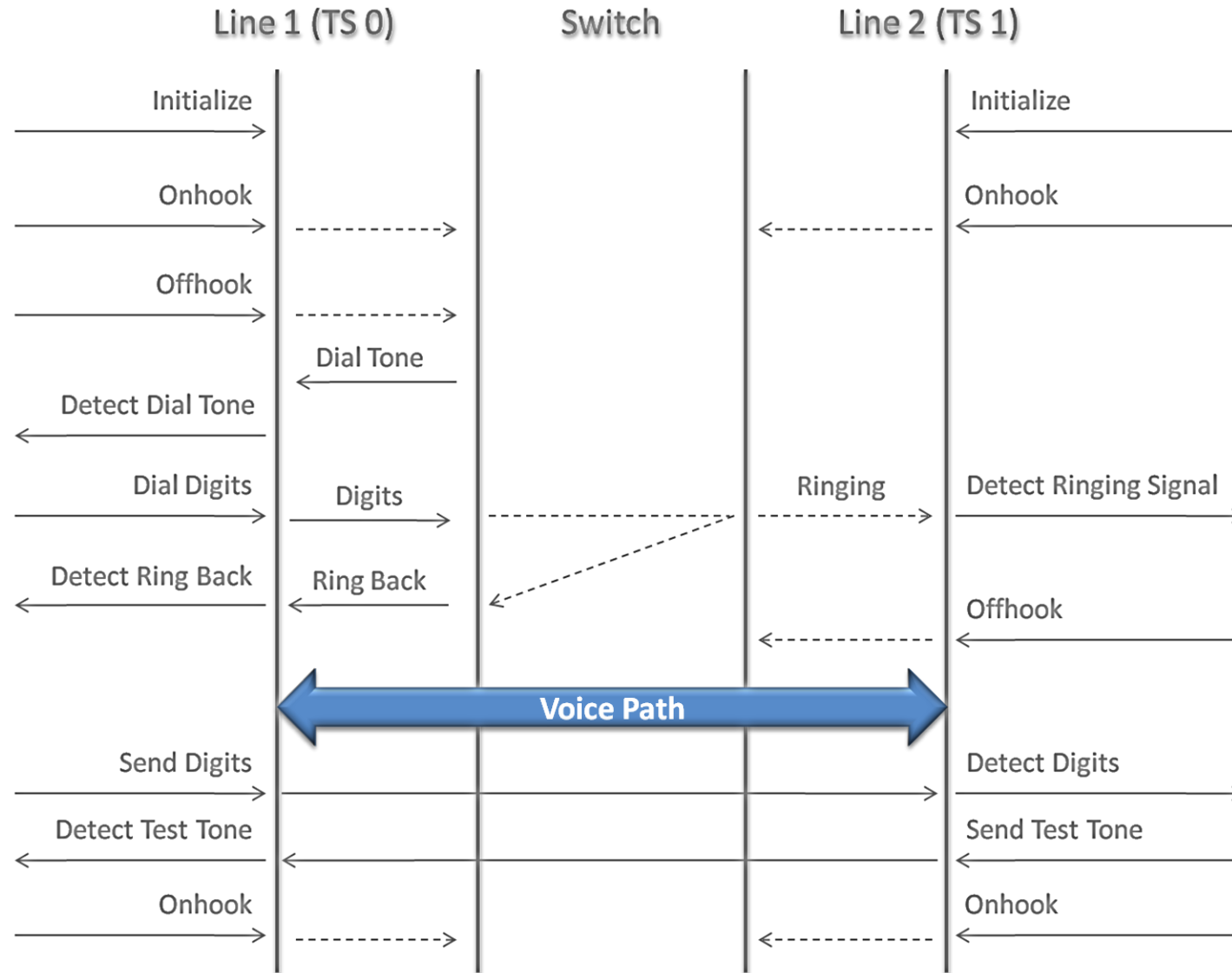
Events

Date/Time	Captured Events	Call Trace Id	Script Name	Script Id
2015-5-6 14:20:02.740000	P: CASDetectedSignals at 2015-05-06 14:20:02.740000 = 0, 0, 0, 0	2,1	T1_FGD_Answer Call.gls	CGProtScriptId_11_10537779-491-3424
2015-5-6 14:20:04.793000	P: Placing Call...	1,1	T1_FGD_Place Call.gls	CGProtScriptId_12_10539857-492-3424
2015-5-6 14:20:04.820000	P: CASDetectedSignals at 2015-05-06 14:20:04.820000 = 0, 0, 0, 0	1,1	T1_FGD_Place Call.gls	CGProtScriptId_12_10539857-492-3424
2015-5-6 14:20:04.835000	P: CASDetectedSignals at 2015-05-06 14:20:04.835000 = 1, 1, 1, 1	2,1	T1_FGD_Answer Call.gls	CGProtScriptId_11_10537779-491-3424
2015-5-6 14:20:04.835000	A: Seizure Detected	2,1	T1_FGD_Answer Call.gls	CGProtScriptId_11_10537779-491-3424
2015-5-6 14:20:04.858000	P: CASDetectedSignals at 2015-05-06 14:20:04.858000 = 1, 1, 1, 1	2,1	T1_FGD_Place Call.gls	CGProtScriptId_12_10539857-492-3424
2015-5-6 14:20:05.053000	A: Seizure Acknowledged	2,1	T1_FGD_Answer Call.gls	CGProtScriptId_11_10537779-491-3424
2015-5-6 14:20:05.075000	P: CASDetectedSignals at 2015-05-06 14:20:05.075000 = 0, 0, 0, 0	1,1	T1_FGD_Place Call.gls	CGProtScriptId_12_10539857-492-3424
2015-5-6 14:20:05.075000	P: Seizure Acknowledged	1,1	T1_FGD_Place Call.gls	CGProtScriptId_12_10539857-492-3424
2015-5-6 14:20:05.075000	P: Dialing	1,1	T1_FGD_Place Call.gls	CGProtScriptId_12_10539857-492-3424
2015-5-6 14:20:10.953000	A: Alerting	2,1	T1_FGD_Answer Call.gls	CGProtScriptId_11_10537779-491-3424
2015-5-6 14:20:10.974000	P: CASDetectedSignals at 2015-05-06 14:20:10.974000 = 1, 1, 1, 1	1,1	T1_FGD_Place Call.gls	CGProtScriptId_12_10539857-492-3424
2015-5-6 14:20:11.185000	P: CASDetectedSignals at 2015-05-06 14:20:11.185000 = 0, 0, 0, 0	1,1	T1_FGD_Place Call.gls	CGProtScriptId_12_10539857-492-3424
2015-5-6 14:20:18.193000	P: Remote User Answered Call	2,1	T1_FGD_Answer Call.gls	CGProtScriptId_11_10537779-491-3424
2015-5-6 14:20:18.193000	Card and Timeslot = Card2TS01	2,1	T1_FGD_Answer Call.gls	CGProtScriptId_11_10537779-491-3424
2015-5-6 14:20:18.194000	Loaded Traffic Profile: Card2TS01	2,1	T1_FGD_Answer Call.gls	CGProtScriptId_11_10537779-491-3424
2015-5-6 14:20:18.258000	P: CASDetectedSignals at 2015-05-06 14:20:18.258000 = 1, 1, 1, 1	1,1	T1_FGD_Place Call.gls	CGProtScriptId_12_10539857-492-3424
2015-5-6 14:20:18.258000	P: Remote User Answered Call	1,1	T1_FGD_Place Call.gls	CGProtScriptId_12_10539857-492-3424
2015-5-6 14:20:18.258000	Card and Timeslot = Card1TS01	1,1	T1_FGD_Place Call.gls	CGProtScriptId_12_10539857-492-3424
2015-5-6 14:20:18.258000	Loaded Traffic Profile: Card1TS01	1,1	T1_FGD_Place Call.gls	CGProtScriptId_12_10539857-492-3424
2015-5-6 14:20:38.282000	File Sending Complete	2,1	T1_FGD_Answer Call.gls	CGProtScriptId_11_10537779-491-3424
2015-5-6 14:20:38.324000	File Sending Complete	1,1	T1_FGD_Place Call.gls	CGProtScriptId_12_10539857-492-3424
2015-5-6 14:21:08.275000	P: Call Released	1,1	T1_FGD_Place Call.gls	CGProtScriptId_12_10539857-492-3424
2015-5-6 14:21:08.300000	P: CASDetectedSignals at 2015-05-06 14:21:08.300000 = 0, 0, 0, 0	2,1	T1_FGD_Answer Call.gls	CGProtScriptId_11_10537779-491-3424

Save Events

Capture Events to file

T1 Wink Start (R1 wink) Call Simulation



R1 Wink Call Simulation using MAPS™ CAS

MAPS (Message Automation Protocol Simulation) (CAS) - [Call Generation - Default-R1]

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Ev...	Result	Total Iterations
1	T1_R1_Place Call.gls	Card1TS00	1.0	Stop	Image_Transmit_Start	OutboundReleaseCall		Pass	1
2	T1_R1_Answer Call.gls	Card2TS00	2.0	Stop	Image_Receive_Start	InboundReleaseCall		Pass	1
3	T1_R1_Reset Timeslots.gls			Start		None		Unknown	1

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

Save Column Width

FaxTransmissionStarted Card::1 TS::0 Time::17:1:54 17:01:54.950000

CSI(Called_Subscriber_Identification) 17:02:00.084000

DIS(Digital_Identification_Signal) 17:02:00.590000

12000_Rate_of_v17_selected_in_DCS 17:02:00.590000

ECM_mode_Selected_in_DCS 17:02:00.591000

MMR_Encoding_selected_in_DCS 17:02:00.591000

204x98_Resolution_selected_in_the_DCS 17:02:00.592000

A4_pagesize_selected_in_the_DCS 17:02:00.593000

TSI(Transmitting_Subscriber_Identification) 17:02:00.593000

DCS(Digital_Command_Signal) 17:02:00.594000

V21_Signal_Done 17:02:02.729000

Transmitter_Started_To_Train 17:02:03.035000

Transmitter_Train_Successfull 17:02:06.040000

CFR(Confirmation_To_Receive) 17:02:07.697000

Image_Transmit_Start 17:02:08.043000

Image_Transmit_End 17:02:35.762000

PPS_EDP(Partial_Page_Signal_End_Of_Procedure) 17:02:35.762000

V21_Signal_Done 17:02:37.186000

MCF(Message_Confirmation) 17:02:38.914000

DCN(Disconnect) 17:02:38.966000

V21_Signal_Done 17:02:40.240000

Successful 17:02:40.492000

FaxSessionCompleted Card::1 TS::0 Time::17:2:40 17:02:40.493000

Scripts Message Sequence Event Config Script Flow

Error Events

Fax Event:: FaxTransmissionStarted

Card :: 1

Time Slot :: 0

Transmit Start Time :: 17:1:54

MAPS (Message Automation Protocol Simulation) (CAS) - [Events]

Configurations Emulator Reports Editor Windows Help

Event Log Error Events Captured Errors

Date/Time	Call Trace Id	Script Name	Script Id
2015-5-6 17:01:54.810000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:01:54.811000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:01:54.938000	2.0	T1_R1_Answer Call.gls	CGProtScriptId_4_20237160-453-4684
2015-5-6 17:01:54.950000	2.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:00.383000	1.0	T1_R1_Answer Call.gls	CGProtScriptId_4_20237160-453-4684
2015-5-6 17:02:00.590000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:00.591000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:00.592000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:00.593000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:00.594000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:02.729000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:02.976000	2.0	T1_R1_Answer Call.gls	CGProtScriptId_4_20237160-453-4684
2015-5-6 17:02:02.976000	2.0	T1_R1_Answer Call.gls	CGProtScriptId_4_20237160-453-4684
2015-5-6 17:02:02.977000	2.0	T1_R1_Answer Call.gls	CGProtScriptId_4_20237160-453-4684
2015-5-6 17:02:02.977000	2.0	T1_R1_Answer Call.gls	CGProtScriptId_4_20237160-453-4684
2015-5-6 17:02:03.035000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:03.383000	2.0	T1_R1_Answer Call.gls	CGProtScriptId_4_20237160-453-4684
2015-5-6 17:02:06.040000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:06.222000	2.0	T1_R1_Answer Call.gls	CGProtScriptId_4_20237160-453-4684
2015-5-6 17:02:07.697000	2.0	T1_R1_Answer Call.gls	CGProtScriptId_4_20237160-453-4684
2015-5-6 17:02:08.043000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:08.046000	2.0	T1_R1_Answer Call.gls	CGProtScriptId_4_20237160-453-4684
2015-5-6 17:02:35.762000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:36.039000	2.0	T1_R1_Answer Call.gls	CGProtScriptId_4_20237160-453-4684
2015-5-6 17:02:37.186000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:38.742000	2.0	T1_R1_Answer Call.gls	CGProtScriptId_4_20237160-453-4684
2015-5-6 17:02:40.240000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:40.492000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:40.493000	2.0	T1_R1_Answer Call.gls	CGProtScriptId_4_20237160-453-4684
2015-5-6 17:02:40.726000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:40.727000	2.0	T1_R1_Answer Call.gls	CGProtScriptId_4_20237160-453-4684
2015-5-6 17:02:44.831000	1.0	T1_R1_Place Call.gls	CGProtScriptId_3_20230505-452-4684
2015-5-6 17:02:44.859000	2.0	T1_R1_Answer Call.gls	CGProtScriptId_4_20237160-453-4684

Save Events

Clear Capture Events to file

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

European Sweden P7 Call Simulation

CAS Signaling PABX (tProbe™) to Multiplexer (Subscriber)

Signal or state	ASB 501 a b c d	Multiplexer a b c d
Idle	1 0 0 1	1 0 0 1
Seizure (Ringing)	1 0 0 1 Line 0 1 0 1 Signal ----->	1 0 0 1
Answer (Off Hook)	0 1 0 1 Line 0 1 0 1 Signal -----<	1 0 0 1 0 0 0 1
Stop ringing	0 1 0 1 Line 0 0 0 1 Signal ----->	0 0 0 1
Register recall	0 0 0 1 Line 0 0 0 1 Signal -----<	0 0 0 1 1 0 0 1 0 0 0 1
Clear backward	1 0 0 1 tone 1 0 0 1 Signal >>>>>>	X 0 0 1
On Hook (clear forward)	1 0 0 1 Line 1 0 0 1 Signal -----<	0 0 0 1 1 0 0 1

Sweden P7 Call Simulation using MAPS™ CAS

Call Generation - Default SwedenP7

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Ev...	Result
1	SwedenP7_Network_AnswerCall.gls	Card1TS01	1,1	Start	Call Released	None		Pass
2	SwedenP7_Terminal_PlaceCall.gls	Card2TS01	2,1	Start	Call Released	None		Pass
3	SwedenP7_Terminal_AnswerCall.gls	Card1TS02	1,2	Stop	File Recorded	InboundReleaseCall		Pass
4	SwedenP7_Network_PlaceCall.gls	Card2TS02	2,2	Stop	File Recorded	OutboundReleaseCall		Pass
5	SwedenP7_Reset_Timeslot...			Start		None		Unknown

Column Width

MAPS (Left) DUT (Right)

IDLE :: 1, 0, 0, 1 → 16:02:46.115000

PLACING :: 0, 1, 0, 1 → 16:02:51.121000

← OFFHOOK :: 0, 0, 0, 1 16:02:58.164000

← OFFHOOK_ACK :: 0, 0, 0, 1 16:02:58.164000

SendFile :: a-law samples\count10.pcm → 16:03:18.259000

← RecordFile :: MAPS\Recv Files\CAS\0_0_May6_00202_0.pcm 16:03:28.224000

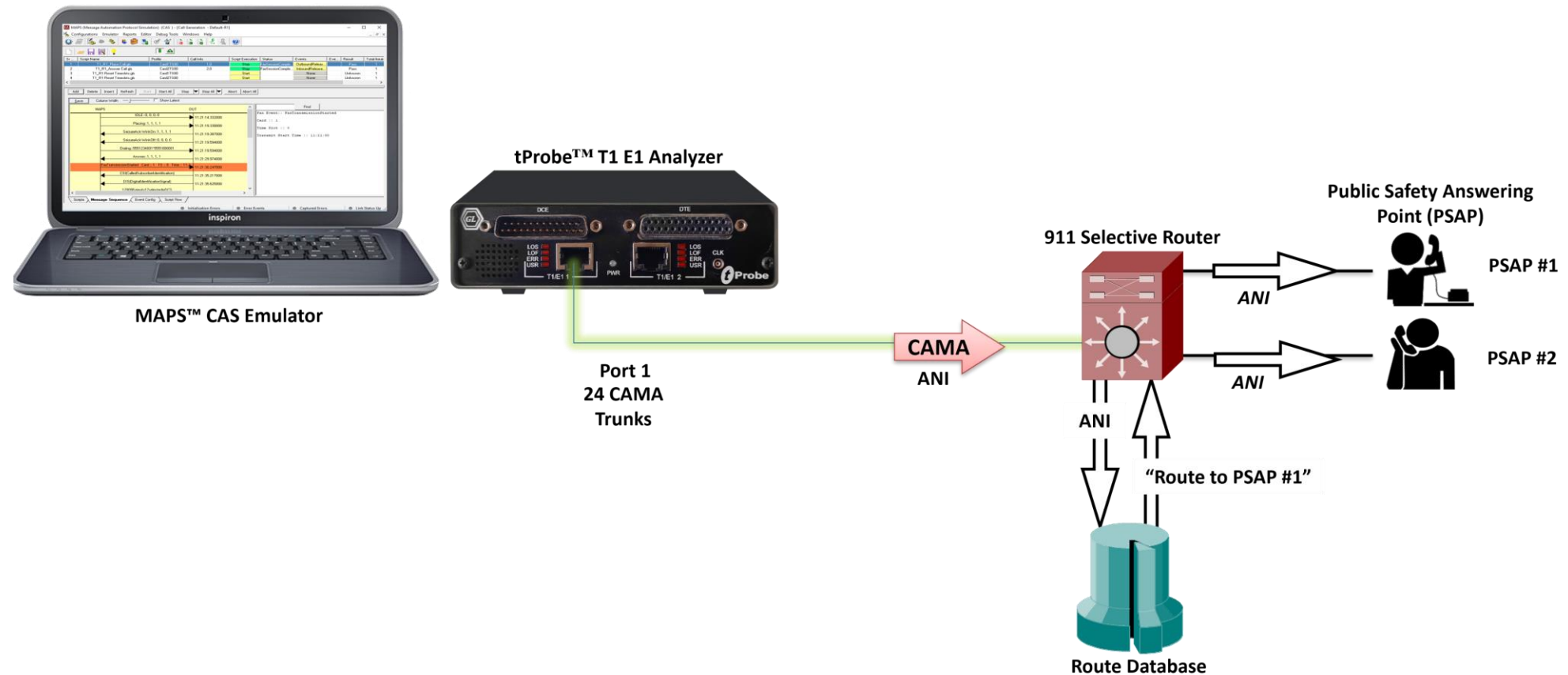
Event Log | Error Events | Captured Errors

Date/Time	Captured Events	Call Trace Id	Script Name	Script Id
2015-5-6 16:02:01.016000	A: Seizure Detected	1,1	SwedenP7_Network_AnswerCall.gls	CGProtScriptId_6_16648741-1973-4600
2015-5-6 16:02:01.601000	dtmfDetected = true	1,1	SwedenP7_Network_AnswerCall.gls	CGProtScriptId_6_16648741-1973-4600
2015-5-6 16:02:01.601000	A: Digits Received	1,1	SwedenP7_Network_AnswerCall.gls	CGProtScriptId_6_16648741-1973-4600
2015-5-6 16:02:01.601000	A: TdmToneLabel = DTMF4	1,1	SwedenP7_Network_AnswerCall.gls	CGProtScriptId_6_16648741-1973-4600
2015-5-6 16:02:12.283000	Answered Call	1,1	SwedenP7_Network_AnswerCall.gls	CGProtScriptId_6_16648741-1973-4600
2015-5-6 16:02:12.283000	P: Remote User Answered Call	1,1	SwedenP7_Network_AnswerCall.gls	CGProtScriptId_6_16648741-1973-4600
2015-5-6 16:02:12.283000	Card and Timeslot = Card1TS01	1,1	SwedenP7_Network_AnswerCall.gls	CGProtScriptId_6_16648741-1973-4600
2015-5-6 16:02:12.283000	Loaded Traffic Profile: Card1TS01	1,1	SwedenP7_Network_AnswerCall.gls	CGProtScriptId_6_16648741-1973-4600
2015-5-6 16:02:12.369000	P: Call Answered	2,1	SwedenP7_Terminal_PlaceCall.gls	CGProtScriptId_7_16650721-1974-4600
2015-5-6 16:02:12.369000	P: Remote User Answered Call	2,1	SwedenP7_Terminal_PlaceCall.gls	CGProtScriptId_7_16650721-1974-4600
2015-5-6 16:02:12.369000	Card and Timeslot = Card2TS01	2,1	SwedenP7_Terminal_PlaceCall.gls	CGProtScriptId_7_16650721-1974-4600
2015-5-6 16:02:12.369000	Loaded Traffic Profile: Card2TS01	2,1	SwedenP7_Terminal_PlaceCall.gls	CGProtScriptId_7_16650721-1974-4600
2015-5-6 16:02:12.474000	TdmToneLabel = Burst	1,1	SwedenP7_Network_AnswerCall.gls	CGProtScriptId_6_16648741-1973-4600
2015-5-6 16:02:12.615000	TdmToneLabel = Burst	2,1	SwedenP7_Terminal_PlaceCall.gls	CGProtScriptId_7_16650721-1974-4600
2015-5-6 16:02:16.021000	Digits not detected	1,1	SwedenP7_Network_AnswerCall.gls	CGProtScriptId_6_16648741-1973-4600
2015-5-6 16:02:16.032000	P: Call Released as the other party disconnected	2,1	SwedenP7_Terminal_PlaceCall.gls	CGProtScriptId_7_16650721-1974-4600
2015-5-6 16:02:46.114000	P: CallDuration = 52000		SwedenP7_Network_PlaceCall.gls	CGProtScriptId_9_16700857-1976-4600
2015-5-6 16:02:51.137000	A: Incoming Call	1,2	SwedenP7_Terminal_AnswerCall.gls	CGProtScriptId_8_16698981-1975-4600
2015-5-6 16:02:58.164000	P: Seizure Acknowledged	2,2	SwedenP7_Network_PlaceCall.gls	CGProtScriptId_9_16700857-1976-4600
2015-5-6 16:02:58.164000	P: Remote User Answered Call	2,2	SwedenP7_Network_PlaceCall.gls	CGProtScriptId_9_16700857-1976-4600
2015-5-6 16:02:58.164000	Card and Timeslot = Card2TS02	2,2	SwedenP7_Network_PlaceCall.gls	CGProtScriptId_9_16700857-1976-4600
2015-5-6 16:02:58.165000	Loaded Traffic Profile: Card2TS02	2,2	SwedenP7_Network_PlaceCall.gls	CGProtScriptId_9_16700857-1976-4600
2015-5-6 16:02:58.240000	P: Remote User Answered Call	1,2	SwedenP7_Terminal_AnswerCall.gls	CGProtScriptId_8_16698981-1975-4600
2015-5-6 16:02:58.240000	Card and Timeslot = Card1TS02	1,2	SwedenP7_Terminal_AnswerCall.gls	CGProtScriptId_8_16698981-1975-4600
2015-5-6 16:02:58.240000	Loaded Traffic Profile: Card1TS02	1,2	SwedenP7_Terminal_AnswerCall.gls	CGProtScriptId_8_16698981-1975-4600
2015-5-6 16:02:58.478000	TdmToneLabel = Burst	1,2	SwedenP7_Terminal_AnswerCall.gls	CGProtScriptId_8_16698981-1975-4600
2015-5-6 16:03:18.259000	File Sending Complete	2,2	SwedenP7_Network_PlaceCall.gls	CGProtScriptId_9_16700857-1976-4600
2015-5-6 16:03:18.309000	File Sending Complete	1,2	SwedenP7_Terminal_AnswerCall.gls	CGProtScriptId_8_16698981-1975-4600
2015-5-6 16:03:50.181000	Call Released, due to Call duration expiry	2,2	SwedenP7_Network_PlaceCall.gls	CGProtScriptId_9_16700857-1976-4600
2015-5-6 16:03:50.205000	A: Call Released as idle code detected in invalid state	1,2	SwedenP7_Terminal_AnswerCall.gls	CGProtScriptId_8_16698981-1975-4600

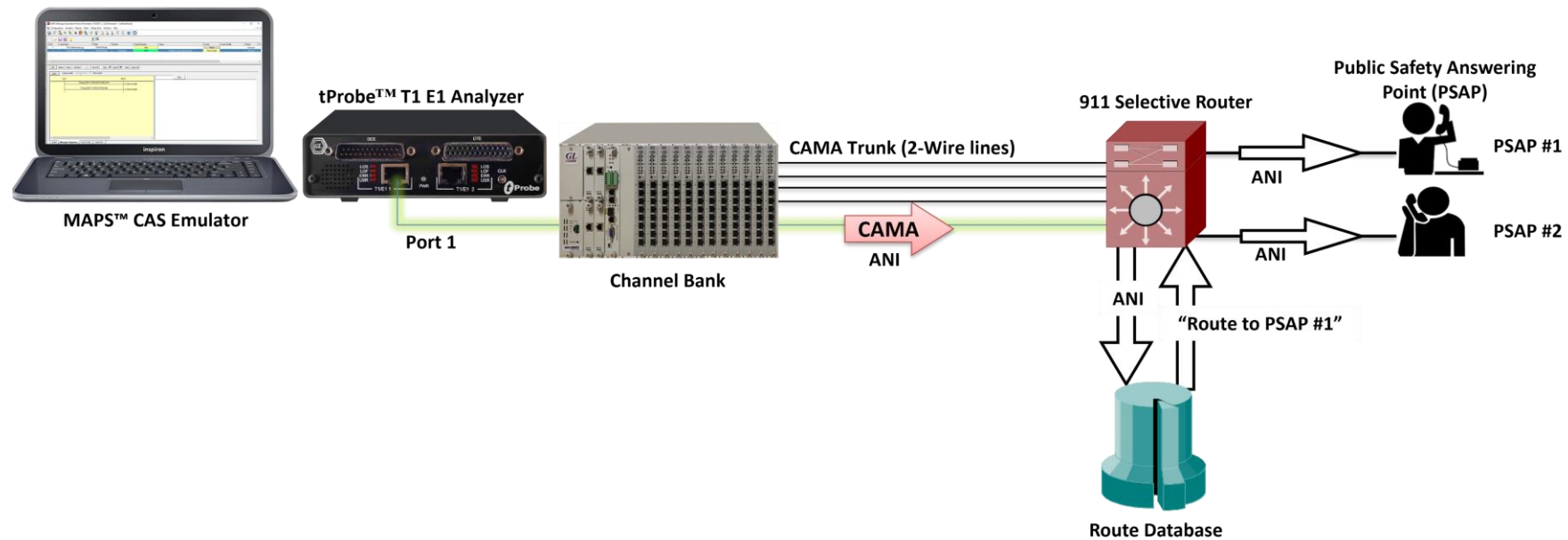
22

CAMA signaling Simulation for 911 Systems

Digital CAMA Simulation



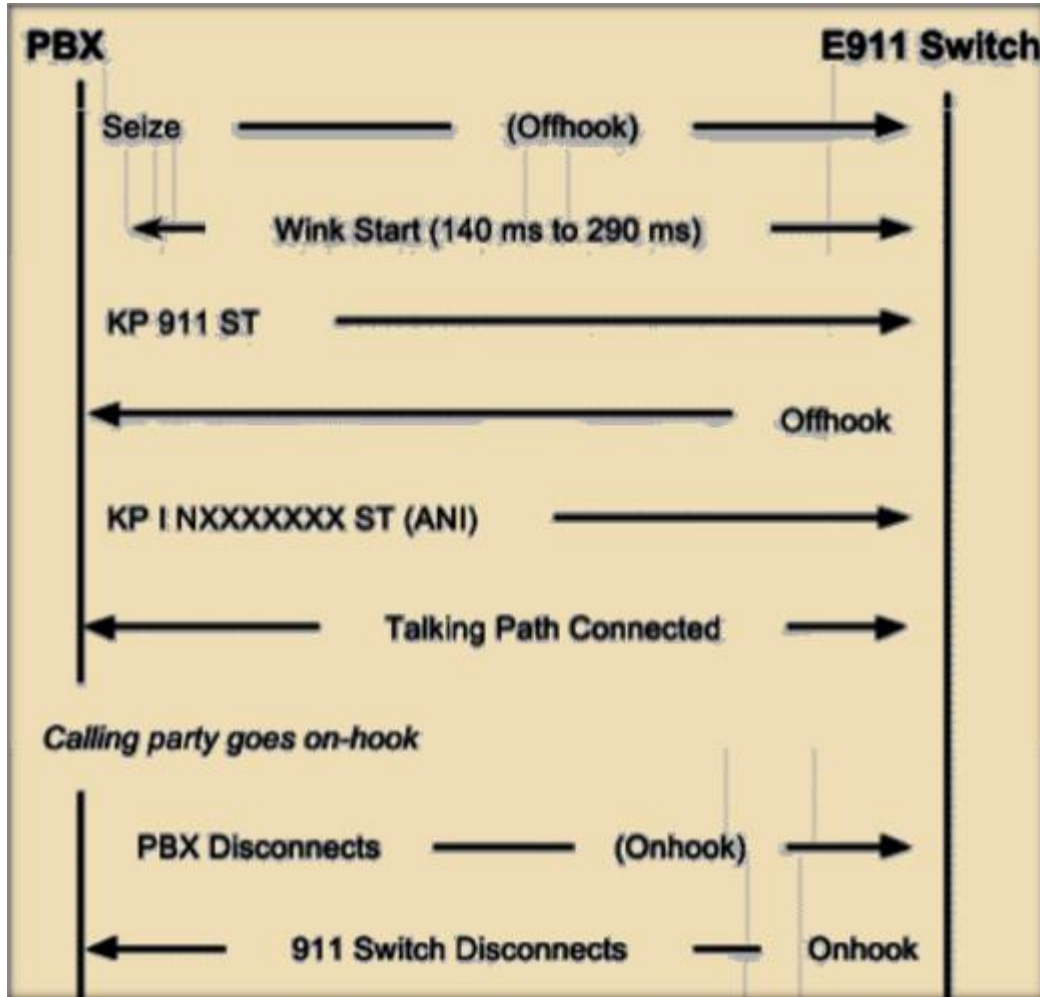
Analog CAMA Simulation via Channel Bank



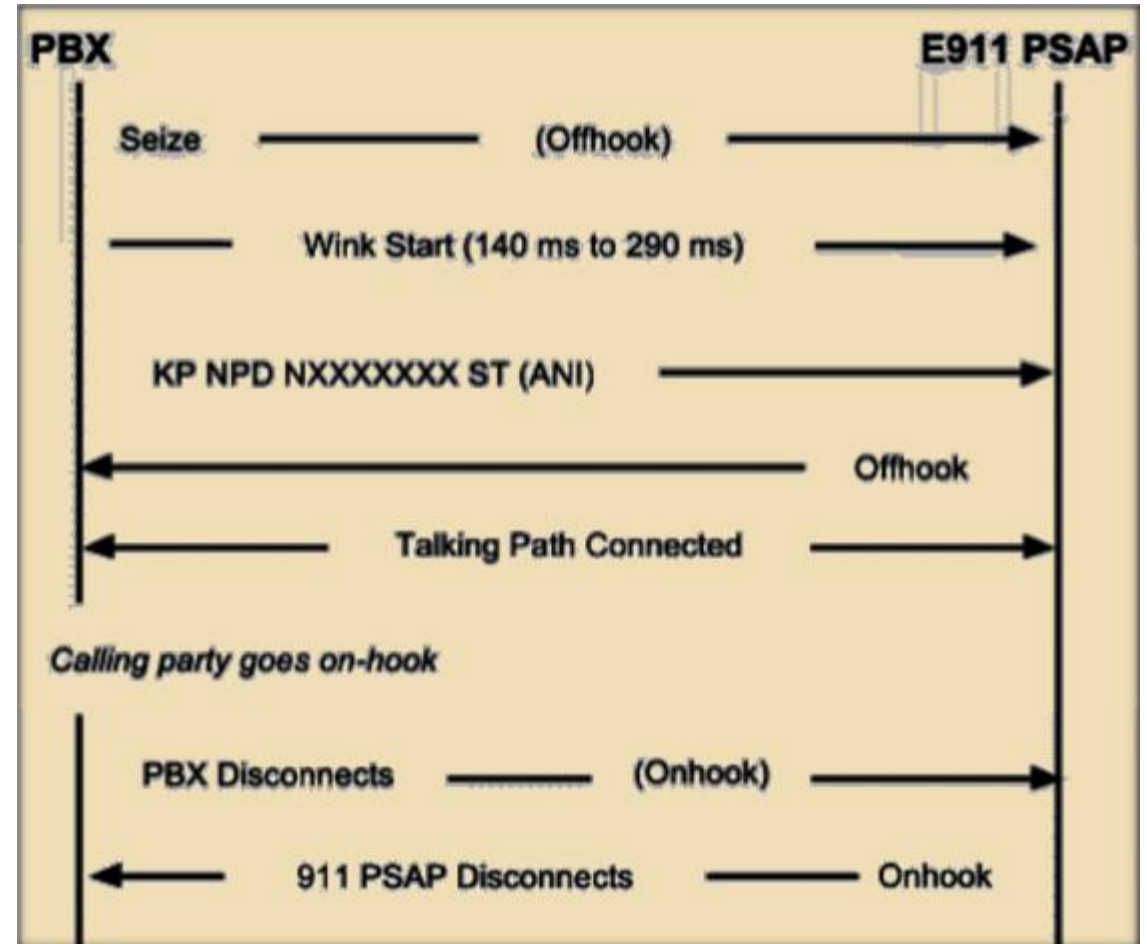
- MAPS™ CAS with Channel Bank can be used to simulate High density FXO supporting up to 96 Analog Channels
- For this simulation, MAPS™ CAS requires additional Channel Bank specially configured for CAMA. The tProbe™ T1 line is connected to Channel Bank with FXO cards for interfacing to 2-wire equipment (911 selective router)
- Single FXO board within the channel bank can convert one digital T1 line into 8 Analog lines

CAS CAMA signaling Sequence

CAMA Type Trunk Connected to 911 Switch



CAMA Type Trunk Connected to the PSAP



CAS CAMA Testbed Configuration

MAPS (Message Automation Protocol Simulation) (CAS) - [Testbed Setup - CAMA_Analog]

Configurations Emulator Reports Editor Debug Tools Windows Help

Config	Value
Configurations	
GL Server Configuration	
Interface	T1
WCS Listener Port	17080
Server IP Address	127.0.0.1
CAMA Signaling Bits	
CAMA Offhook	1 1 1 1
CAMA Onhook	0 0 0 0
PSAP Offhook	0 0 0 0
PSAP Onhook	1 1 1 1
Ringing Parameters	
Ring On Duration	2000.00
Ring Off Duration	4000.00
Wink Parameters	
Wink Time	250.00
Hook Flash Parameters	
Flash Period	500.00
Dial Tone Parameters	
Dial Tone Frequencies	350
Dial Tone Duration in msec	20000
End User Configurations	CAMA_Profiles.xml

_Interface
Select Option
T1

Start Edit

Initialisation Errors Error Events Captured Error

CAS CAMA Profile Configuration

MAPS (Message Automation Protocol Simulation) (CAS) - [Profile Editor - CAMA_Profiles]

Configurations Emulator Reports Editor Debug Tools Windows Help

#	Profiles [Edit-F]	Config	Value
1	Line01	Line01	
2	Line02	Card Number	1
3	Line03	Timeslot	0
4	Line04	ANI	4242130000
5	Line05	Traffic Options	
6	Line06	Digit Parameters	
7	Line07	DTMF Digits	123456789
8	Line08	MF Digits	12345
9	Line09	Tone Parameters	
10	Line10	Frequency 1 in Hz	1004
11	Line11	Frequency 2 in Hz	2004
12	Line12	Tx Tone Duration in msec	3000
13	Line13	File Parameters	
14	Line14	Tx File Locations	Mu-Law Samples\tone_speech.pcm
		Tx File Duration in msec	0
		Rx File Location	C:\card1_ts01.pcm
		Rx File Duration in msec	999999
		VQT Parameters	
		Reference File	C:\VQT_Reference\VQuad_Auto\u-law\fem1ula.pcm
		Degraded File Folder	C:\VQT_Degraded\1u\

TS

Enter Integer

0

Add Insert Delete

Properties

Initialisation Errors Error Events Captured Errors Link Status L

CAS CAMA Call Generation

CAMA Simulation for Enhanced 9-1-1 Systems using MAPS™ CAS

The screenshot displays the MAPS (Message Automation Protocol Simulation) (CAS) software interface. The window title is "MAPS (Message Automation Protocol Simulation) (CAS) - [Call Generation - CallGenDefault]". The menu bar includes "Configurations", "Emulator", "Reports", "Editor", "Debug Tools", "Windows", and "Help". The toolbar contains various icons for file operations and simulation control.

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Eve...	Result	Total Iterations	Completed Iterations
1	CAMA_Reset.gls	Line01		Start		None		Unknown	1	0
2	CAMA_Trunk.gls	Line01		Stop	Idle	Place Call		Unknown	1	0

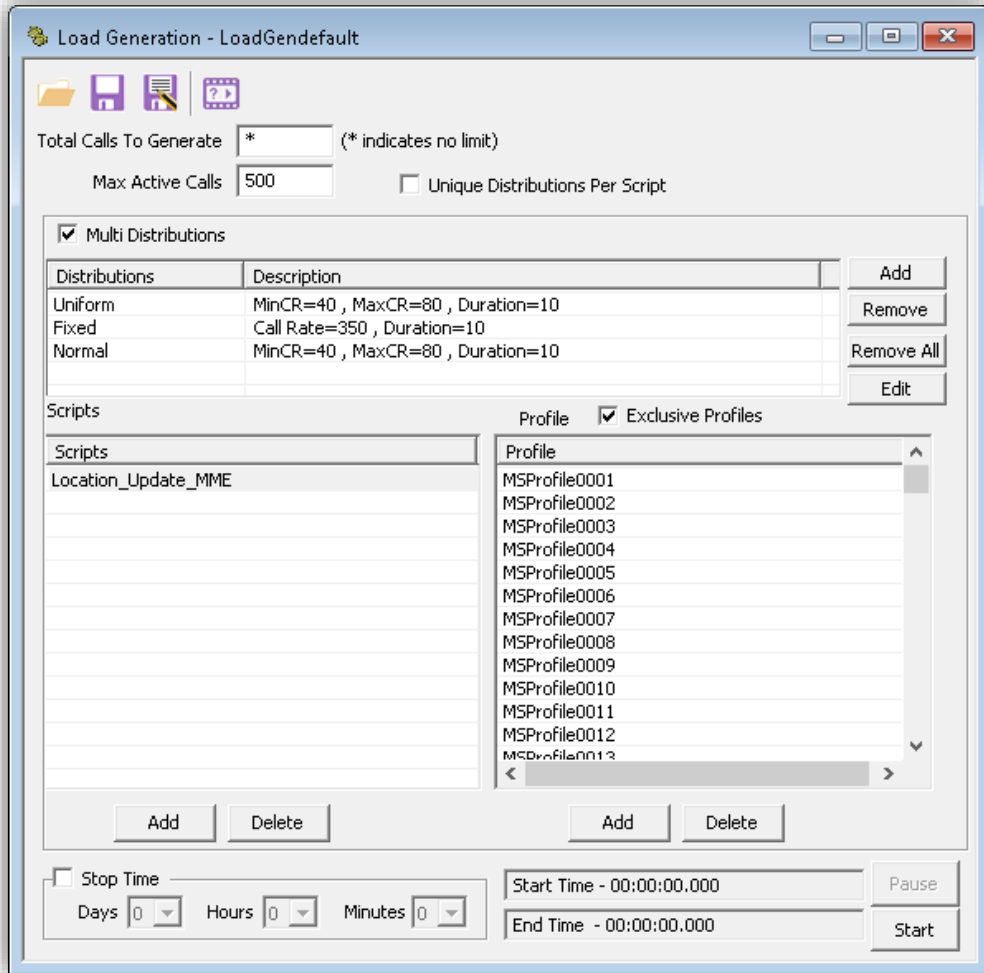
Below the table is a control panel with buttons: "Add", "Delete", "Insert", "Refresh", "Start", "Start All", "Stop", "Stop All", "Abort", and "Abort All". There is also a "Save" button and a "Column Width" slider.

The "Message Sequence" tab is active, showing a sequence diagram between MAPS and DUT:

- Seize: MAPS to DUT at 15:26:50.313000
- Wink Start: DUT to MAPS at 15:26:50.935000
- Sending ANI: MAPS to DUT at 15:26:50.935000
- Offhook: DUT to MAPS at 15:26:53.301000

At the bottom, there are status indicators: "Initialisation Errors", "Error Events", "Captured Errors", and "Link Status Up=0 Down".

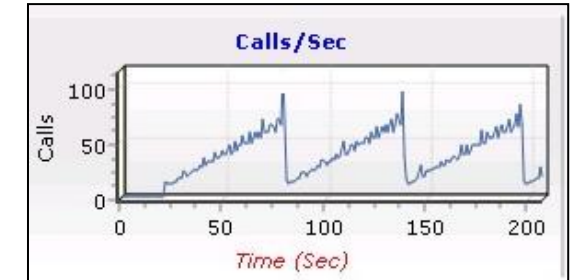
Load Generation



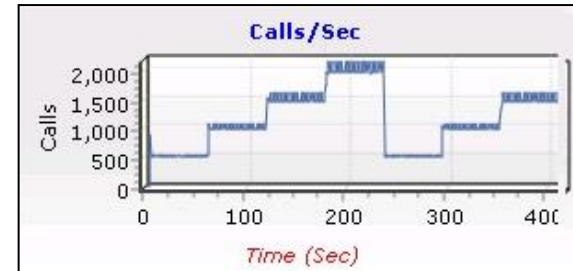
Saw-tooth Statistical Distribution



Ramp Statistical Distribution



Step Statistical Distribution



- Stability/Stress and Performance testing using Load Generation
- Different types of Load patterns to distribute load
- User can load multiple patterns for selected script
- User configurable Test Duration, CPS, Maximum and Minimum Call Rate, etc.

Bulk Call Generation

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

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Ev...	Result	Total Iterations	Completed Iterations
1	T1_R1_Place Call.gls	Card1TS01		Start		None		Unknown	10	0
2	T1_R1_Place Call.gls	Card1TS02		Start		None		Unknown	10	0
3	T1_R1_Place Call.gls	Card1TS03		Start		None		Unknown	10	0
4	T1_R1_Place Call.gls	Card1TS04		Start		None		Unknown	10	0
5	T1_R1_Place Call.gls	Card1TS05		Start		None		Unknown	10	0
6	T1_R1_Answer Call.gls	Card2TS01		Start		None		Unknown	10	0
7	T1_R1_Answer Call.gls	Card2TS02		Start		None		Unknown	10	0
8	T1_R1_Answer Call.gls	Card2TS03		Start		None		Unknown	10	0
9	T1_R1_Answer Call.gls	Card2TS04		Start		None		Unknown	10	0
10	T1_R1_Answer Call.gls	Card2TS05		Start		None		Unknown	10	0

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

View Executing Line

Script Contents

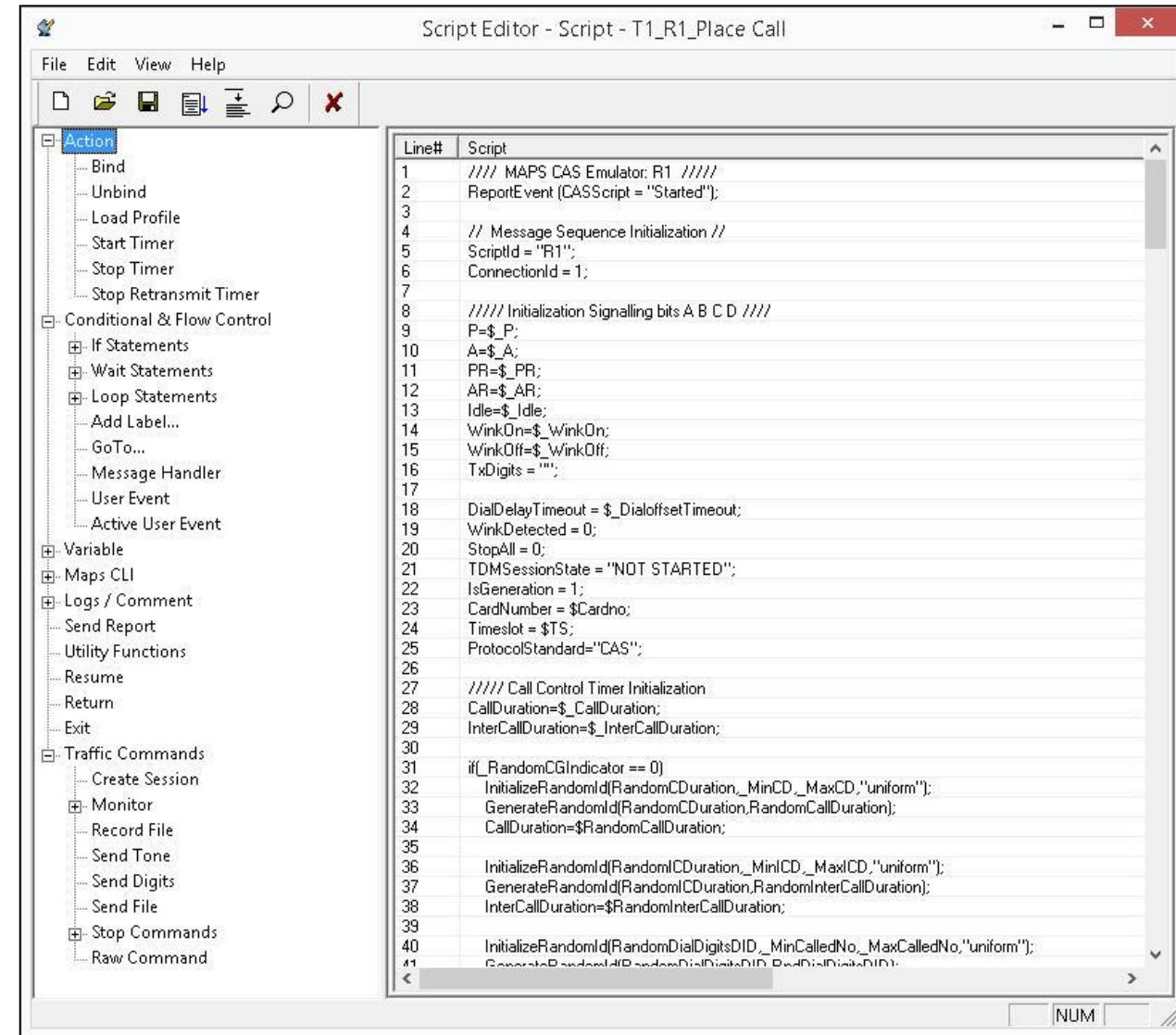
```
//// MAPS CAS Emulator: R1 ////  
ReportEvent (CASScript = "Started");  
  
// Message Sequence Initialization //  
ScriptId = "R1";  
ConnectionId = 1;  
  
///// Initialization Signalling bits A B C D ////  
P=$_P;  
A=$_A;  
PR=$_PR;  
AR=$_AR;  
Idle=$_Idle;  
WinkOn=$_ WinkOn;  
<
```

Scripts Message Sequence Event Config Script Flow

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

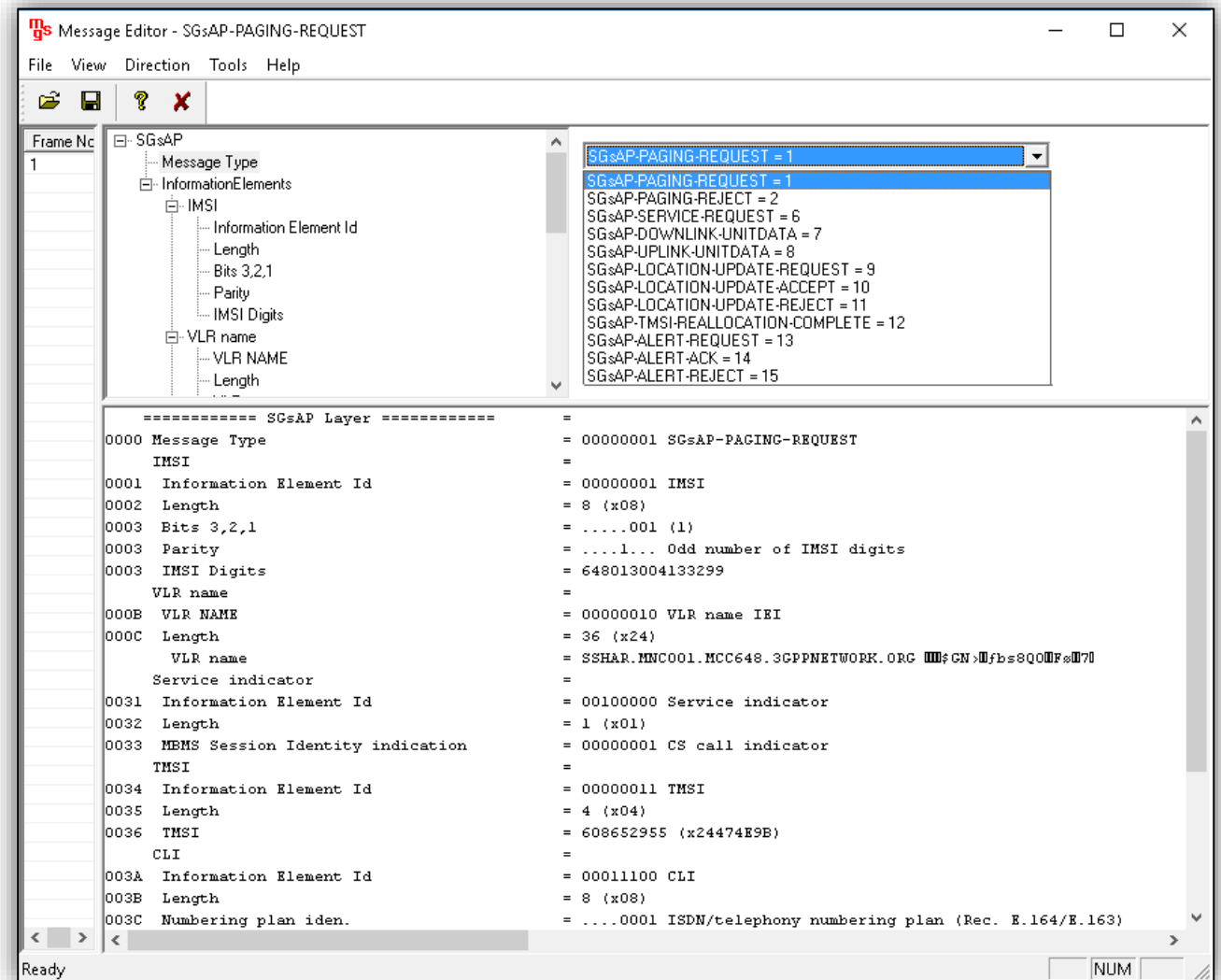


The screenshot shows a 'Script Editor' window titled 'Script - T1_R1_Place Call'. The window has a menu bar (File, Edit, View, Help) and a toolbar. On the left is a tree view of script actions, including 'Action', 'Conditional & Flow Control', 'Variable', 'Maps CLI', 'Logs / Comment', 'Traffic Commands', and 'Stop Commands'. The main area displays a script with the following content:

```
Line#  Script
1      //// MAPS CAS Emulator: R1 ////
2      ReportEvent (CASScript = "Started");
3
4      // Message Sequence Initialization //
5      ScriptId = "R1";
6      ConnectionId = 1;
7
8      //// Initialization Signalling bits A B C D ////
9      P=$_P;
10     A=$_A;
11     PR=$_PR;
12     AR=$_AR;
13     Idle=$_Idle;
14     WinkOn=$_WinkOn;
15     WinkOff=$_WinkOff;
16     TxDigits = "";
17
18     DialDelayTimeout = $_DialoffsetTimeout;
19     WinkDetected = 0;
20     StopAll = 0;
21     TDMSessionState = "NOT STARTED";
22     IsGeneration = 1;
23     CardNumber = $Cardno;
24     Timeslot = $TS;
25     ProtocolStandard="CAS";
26
27     //// Call Control Timer Initialization
28     CallDuration=$_CallDuration;
29     InterCallDuration=$_InterCallDuration;
30
31     if(_RandomCGIndicator == 0)
32         InitializeRandomd(RandomCDuration,_MinCD,_MaxCD,"uniform");
33         GenerateRandomId(RandomCDuration,RandomCallDuration);
34         CallDuration=$_RandomCallDuration;
35
36         InitializeRandomd(RandomCDuration,_MinCD,_MaxCD,"uniform");
37         GenerateRandomId(RandomCDuration,RandomInterCallDuration);
38         InterCallDuration=$_RandomInterCallDuration;
39
40         InitializeRandomd(RandomDialDigitsDID,_MinCalledNo,_MaxCalledNo,"uniform");
41         GenerateRandomd(RandomDialDigitsDID,RandomDialDigitsDID);
```

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 - Statistics and Reports

MOS, R-Factor

Packet Loss

Packets Discarded

Duplicate Packets

Out-Of-Sequence

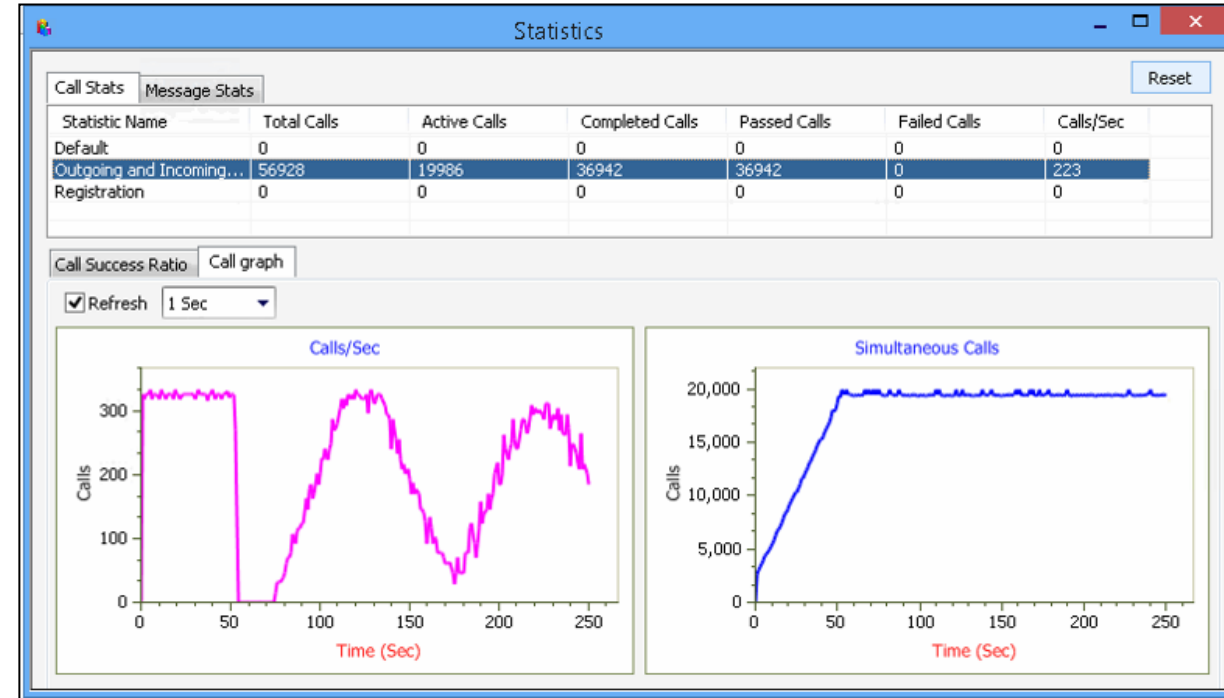
Packets

Jitter Statistics

User Defined Statistics - VoiceQualityStats

Packet Stats

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%]



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

Sample Call Scenarios

3 Way Call



Sample Call Scenarios – 3 Way Call Simulation

GL MAPS (Message Automation Protocol Simulation) (CAS) - [Call Generation - CAS_Three-Way-Call]

Configurations Emulator Reports Editor Windows Help

MS G PG S ? X

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Profile	Result	Total Iterations	Completed Iterations
1	CAS_Onhook.gls	Line-1		Start		None	...	Unknown	2	0
2	CAS_Onhook.gls	Line-2		Start		None	...	Unknown	2	0
3	CAS_Offhook.gls	Line-1		Start		None	...	Unknown	2	0
4	CAS_Detect_Dial_Tone.gls	Line-1		Start		None	...	Unknown	2	0
5	CAS_Dial.gls	Line-1		Start		None	...	Unknown	2	0
6	CAS_Detect_Ringing_Signal.gls	Line-2		Start		None	...	Unknown	2	0
7	CAS_Offhook.gls	Line-2		Start		None	...	Unknown	2	0
8	CAS_Send_Test_Tone.gls	Line-1		Start		None	...	Unknown	2	0
9	CAS_Detect_Test_Tone.gls	Line-2		Start		None	...	Unknown	2	0
10	CAS_Stop_Task.gls	Line-1		Start		None	...	Unknown	2	0
11	CAS_Flash.gls	Line-1		Start		None	...	Unknown	2	0
12	CAS_Detect_Dial_Tone.gls	Line-1		Start		None	...	Unknown	2	0
13	CAS_Dial_2.gls	Line-1		Start		None	...	Unknown	2	0
14	CAS_Detect_Ringing_Signal.gls	Line-3		Start		None	...	Unknown	2	0
15	CAS_Offhook.gls	Line-3		Start		None	...	Unknown	2	0
16	CAS_Flash.gls	Line-1		Start		None	...	Unknown	2	0
17	CAS_Send_Test_Tone.gls	Line-2		Start		None	...	Unknown	2	0
18	CAS_Detect_Test_Tone.gls	Line-3		Start		None	...	Unknown	2	0
19	CAS_Stop_Task.gls	Line-2		Start		None	...	Unknown	2	0
20	CAS_Onhook.gls	Line-1		Start		None	...	Unknown	2	0
21	CAS_Onhook.gls	Line-2		Start		None	...	Unknown	2	0
22	CAS_Onhook.gls	Line-3		Start		None	...	Unknown	2	0

Add Delete Insert Start Abort Refresh Start All Abort All

View Executing Line

Script Contents

Scripts Message Sequence Event Config Script Flow

Sample Call Scenarios - Caller ID with Call Waiting (CIDCW)



Sample Call Scenarios - Caller ID with Call Waiting (CIDCW) Simulation

GL MAPS (Message Automation Protocol Simulation) (CAS) - [Call Generation - CAS_CIDCW]

Configurations Emulator Reports Editor Windows Help

MS G PG S ? X

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Profile	Result	Total Iterations	Completed Iterations
1	CAS_Onhook.gls	Line-1		Start		None		Unknown	2	0
2	CAS_Onhook.gls	Line-2		Start		None		Unknown	2	0
3	CAS_Onhook.gls	Line-3		Start		None		Unknown	2	0
4	CAS_Offhook.gls	Line-1		Start		None		Unknown	2	0
5	CAS_Detect_Dial_Tone.gls	Line-1		Start		None		Unknown	2	0
6	CAS_Dial.gls	Line-1		Start		None		Unknown	2	0
7	CAS_Detect_Ringing_Signal.gls	Line-2		Start		None		Unknown	2	0
8	CAS_Offhook.gls	Line-2		Start		None		Unknown	2	0
9	CAS_Send_Test_Tone.gls	Line-2		Start		None		Unknown	2	0
10	CAS_Detect_Test_Tone.gls	Line-1		Start		None		Unknown	2	0
11	CAS_Stop_Task.gls	Line-2		Start		None		Unknown	2	0
12	CAS_Offhook.gls	Line-3		Start		None		Unknown	2	0
13	CAS_Detect_Dial_Tone.gls	Line-3		Start		None		Unknown	2	0
14	CAS_Dial.gls	Line-3		Start		None		Unknown	2	0
15	CAS_Detect_Call_Waiting_Tone.gls	Line-2		Start		None		Unknown	2	0
16	CAS_Onhook.gls	Line-1		Start		None		Unknown	2	0
17	CAS_Onhook.gls	Line-2		Start		None		Unknown	2	0
18	CAS_Onhook.gls	Line-3		Start		None		Unknown	2	0

Add Delete Insert Start Abort Refresh Start All Abort All

View Executing Line

Script Contents

Scripts Message Sequence Event Config Script Flow

Sample Call Scenarios - Playback Record

Line 1	Line 2
CAS_Onhook.gls	
CAS_Originate_Call.gls	
	CAS_Detect_Ringing_Signal.gls
	CAS_Offhook.gls
CAS_Send_File.gls	
	CAS_Receive_File.gls
CAS_Stop_Task.gls	
CAS_Onhook.gls	CAS_Onhook.gls

Sample Call Scenarios - Playback Record Simulation

GL MAPS (Message Automation Protocol Simulation) (CAS) - [Call Generation - CAS_Basic_Call]

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	CAS_Onhook.gls	Line-1		Start	Onhook	None		Pass	1	1
2	CAS_Onhook.gls	Line-1		Start	Onhook	None		Pass	1	1
3	CAS_Originate_Call.gls	Line-1		Start	Call Originated	None		Pass	1	1
4	CAS_Detect_Ringing_Signal.gls	Line-2		Start	ANDERSON ALLEN 101	None		Pass	1	1
5	CAS_Offhook.gls	Line-2		Start	Offhook	None		Pass	1	1
6	CAS_Send_File.gls	Line-1		Start	File Sent	None		Pass	1	1
7	CAS_Receive_File.gls	Line-2		Start	File Received	None		Pass	1	1
8	CAS_Stop_Task.gls	Line-1		Start	Task Stopped	None		Pass	1	1
9	CAS_Onhook.gls	Line-1		Start	Onhook	None		Pass	1	1
10	CAS_Onhook.gls	Line-2		Start	Onhook	None		Pass	1	1

Add Delete Insert Start Abort Refresh Start All Abort All

View Executing Line

Script Contents

```
// CAS_Onhook.gls
//

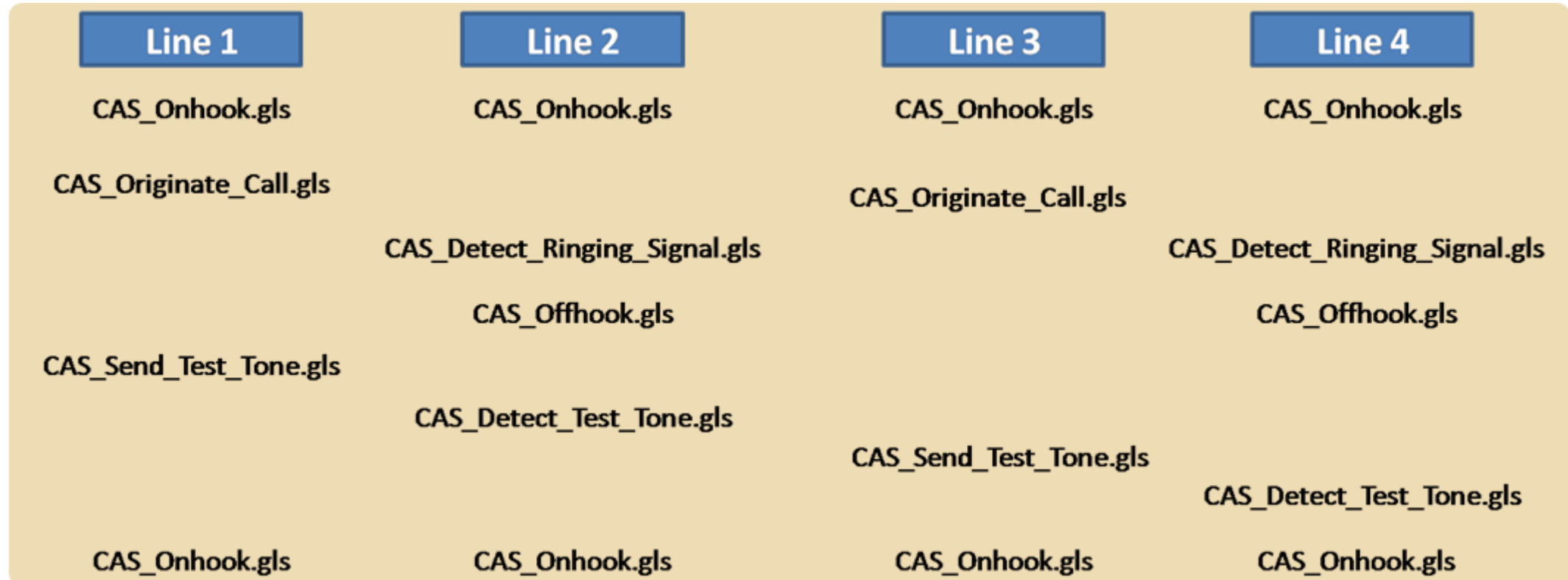
ONHOOK = "0, 1, 0, 1";

TxRx:create_tdmession(Cardno, TS);

TxRx:rawcommand "go $ONHOOK # $Cardno : $TS ";
Result = "Pass";
Status = "Onhook";
wait (1000 msec);
EventLog("Onhook on TS ", TS);
```

Scripts Message Sequence Event Config Script Flow

Sample Call Scenarios - Simultaneous Calls



Sample Call Scenarios - Simultaneous Calls Simulation

GL MAPS (Message Automation Protocol Simulation) (CAS) - [Call Generation - Untitled]

Configurations Emulator Reports Editor Windows Help

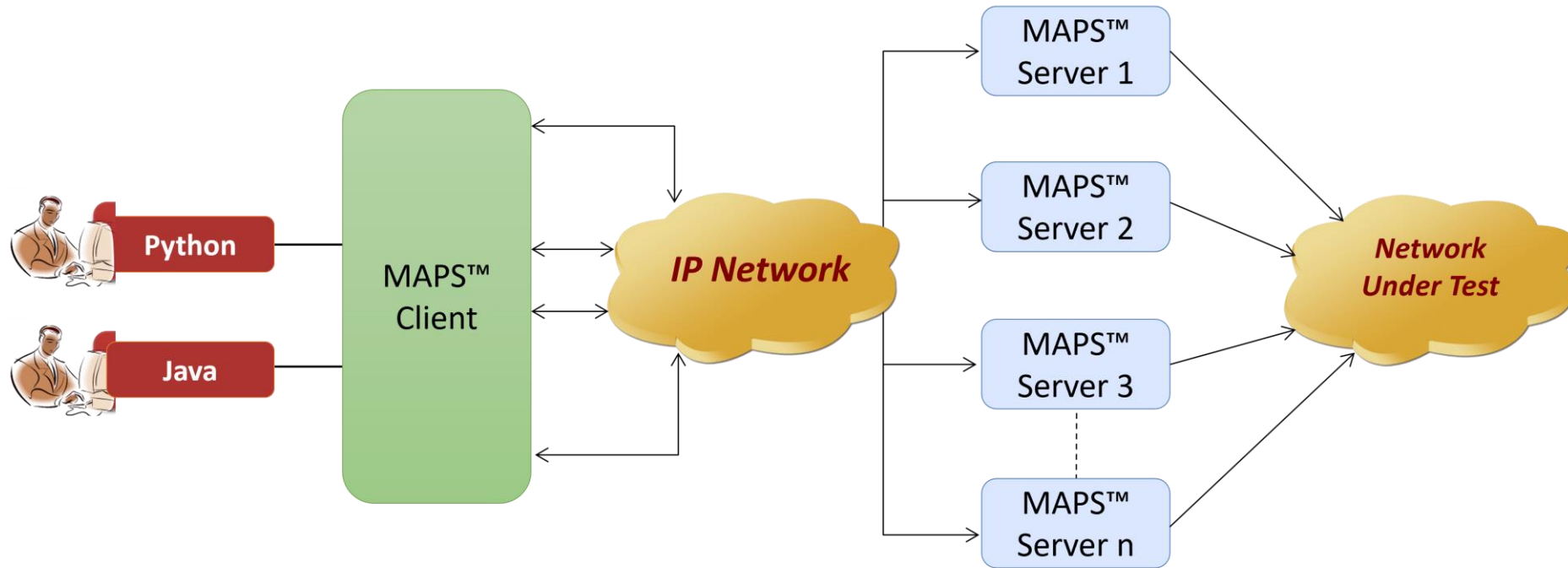
MS PG S

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Profile	Result	Total Iterations	Completed Ite
1	CAS_Onhook.gls	Line-1		Start	Onhook	None	...	Pass	1	
2	CAS_Onhook.gls	Line-2		Start	Onhook	None	...	Pass	1	
3	CAS_Onhook.gls	Line-3		Start	Onhook	None	...	Pass	1	
4	CAS_Onhook.gls	Line-4		Start	Onhook	None	...	Pass	1	
5	CAS_Originate_Call.gls	Line-1		Start	Call Originated	None	...	Pass	1	
6	CAS_Originate_Call.gls	Line-3		Start	Call Originated	None	...	Pass	1	
7	CAS_Detect_Ringing_Signal.gls	Line-2		Start	ANDERSON ALLEN 101	None	...	Pass	1	
8	CAS_Detect_Ringing_Signal.gls	Line-4		Start	SMITH SHARON 103	None	...	Pass	1	
9	CAS_Offhook.gls	Line-4		Start	Offhook	None	...	Pass	1	
10	CAS_Offhook.gls	Line-2		Start	Offhook	None	...	Pass	1	
11	CAS_Send_Test_Tone.gls	Line-1		Start	Test Tone Sent	None	...	Pass	1	
12	CAS_Detect_Test_Tone.gls	Line-2		Start	Test Tone Detected	None	...	Pass	1	
13	CAS_Send_Test_Tone.gls	Line-3		Start	Test Tone Sent	None	...	Pass	1	
14	CAS_Detect_Test_Tone.gls	Line-4		Start	Test Tone Detected	None	...	Pass	1	
15	CAS_Onhook.gls	Line-1		Start	Onhook	None	...	Pass	1	
16	CAS_Onhook.gls	Line-2		Start	Onhook	None	...	Pass	1	
17	CAS_Onhook.gls	Line-3		Start	Onhook	None	...	Pass	1	
18	CAS_Onhook.gls	Line-4		Start	Onhook	None	...	Pass	1	

View Executing Line

Script Contents

MAPS™ API Architecture

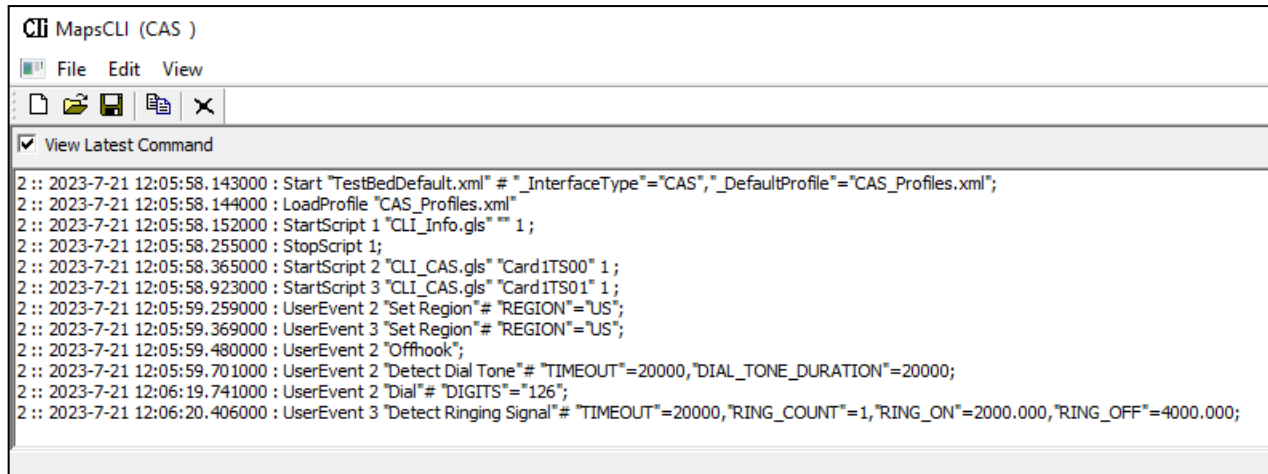


- API wraps our proprietary scripting language in standard languages familiar to the user:
 - Python
 - Java
- Clients and Servers support a “Many-to-Many” relationship, making it very easy for users to develop complex test cases involving multiple signaling protocols

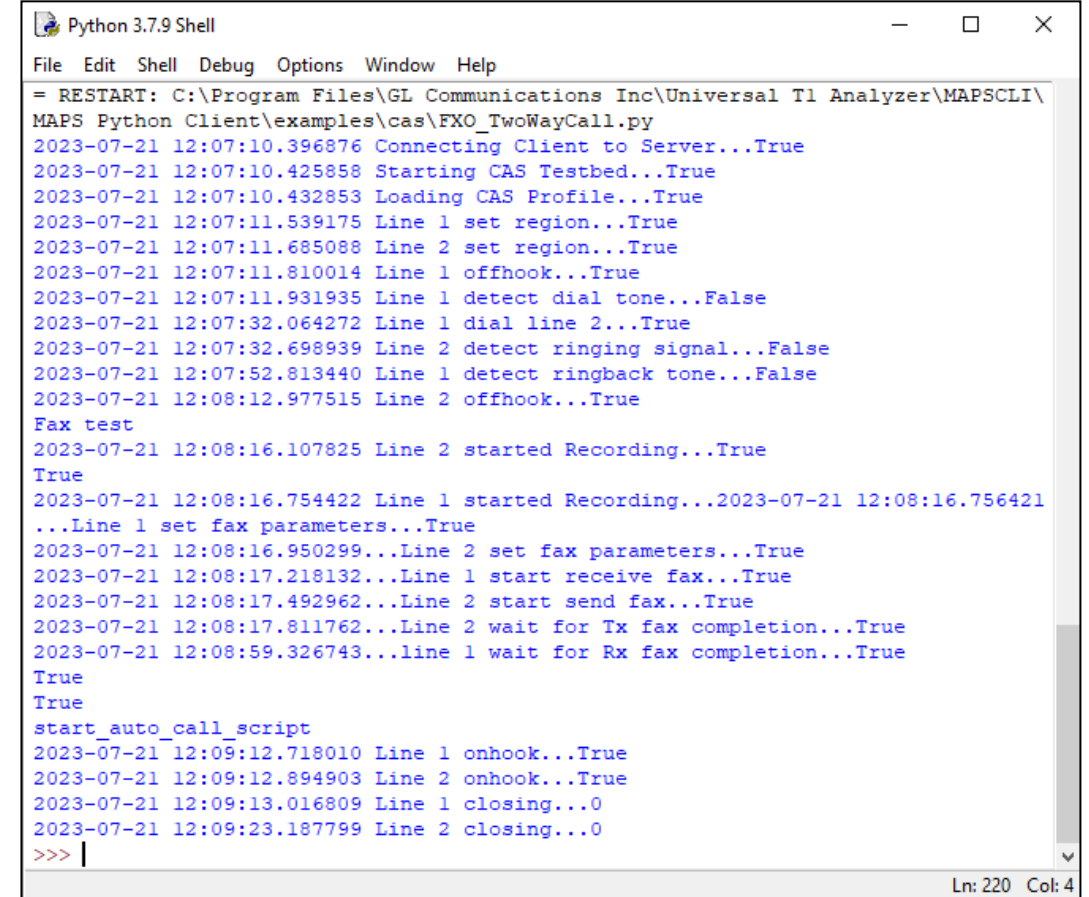
CLI Support

Sample Python Client Script

MAPS™ CLI Server



```
CLI MapsCLI (CAS )
File Edit View
View Latest Command
2 :: 2023-7-21 12:05:58.143000 : Start "TestBedDefault.xml" # "_InterfaceType"="CAS", "_DefaultProfile"="CAS_Profiles.xml";
2 :: 2023-7-21 12:05:58.144000 : LoadProfile "CAS_Profiles.xml"
2 :: 2023-7-21 12:05:58.152000 : StartScript 1 "CLI_Info.gls" "" 1;
2 :: 2023-7-21 12:05:58.255000 : StopScript 1;
2 :: 2023-7-21 12:05:58.365000 : StartScript 2 "CLI_CAS.gls" "Card1TS00" 1;
2 :: 2023-7-21 12:05:58.923000 : StartScript 3 "CLI_CAS.gls" "Card1TS01" 1;
2 :: 2023-7-21 12:05:59.259000 : UserEvent 2 "Set Region" # "REGION"="US";
2 :: 2023-7-21 12:05:59.369000 : UserEvent 3 "Set Region" # "REGION"="US";
2 :: 2023-7-21 12:05:59.480000 : UserEvent 2 "Offhook";
2 :: 2023-7-21 12:05:59.701000 : UserEvent 2 "Detect Dial Tone" # "TIMEOUT"=20000, "DIAL_TONE_DURATION"=20000;
2 :: 2023-7-21 12:06:19.741000 : UserEvent 2 "Dial" # "DIGITS"="126";
2 :: 2023-7-21 12:06:20.406000 : UserEvent 3 "Detect Ringing Signal" # "TIMEOUT"=20000, "RING_COUNT"=1, "RING_ON"=2000.000, "RING_OFF"=4000.000;
```



```
Python 3.7.9 Shell
File Edit Shell Debug Options Window Help
= RESTART: C:\Program Files\GL Communications Inc\Universal T1 Analyzer\MAPSCLI\
MAPS Python Client\examples\cas\FXO_TwoWayCall.py
2023-07-21 12:07:10.396876 Connecting Client to Server...True
2023-07-21 12:07:10.425858 Starting CAS Testbed...True
2023-07-21 12:07:10.432853 Loading CAS Profile...True
2023-07-21 12:07:11.539175 Line 1 set region...True
2023-07-21 12:07:11.685088 Line 2 set region...True
2023-07-21 12:07:11.810014 Line 1 offhook...True
2023-07-21 12:07:11.931935 Line 1 detect dial tone...False
2023-07-21 12:07:32.064272 Line 1 dial line 2...True
2023-07-21 12:07:32.698939 Line 2 detect ringing signal...False
2023-07-21 12:07:52.813440 Line 1 detect ringback tone...False
2023-07-21 12:08:12.977515 Line 2 offhook...True
Fax test
2023-07-21 12:08:16.107825 Line 2 started Recording...True
True
2023-07-21 12:08:16.754422 Line 1 started Recording...2023-07-21 12:08:16.756421
...Line 1 set fax parameters...True
2023-07-21 12:08:16.950299...Line 2 set fax parameters...True
2023-07-21 12:08:17.218132...Line 1 start receive fax...True
2023-07-21 12:08:17.492962...Line 2 start send fax...True
2023-07-21 12:08:17.811762...Line 2 wait for Tx fax completion...True
2023-07-21 12:08:59.326743...line 1 wait for Rx fax completion...True
True
True
start_auto_call_script
2023-07-21 12:09:12.718010 Line 1 onhook...True
2023-07-21 12:09:12.894903 Line 2 onhook...True
2023-07-21 12:09:13.016809 Line 1 closing...0
2023-07-21 12:09:23.187799 Line 2 closing...0
>>> |
Ln: 220 Col: 4
```

Thank you