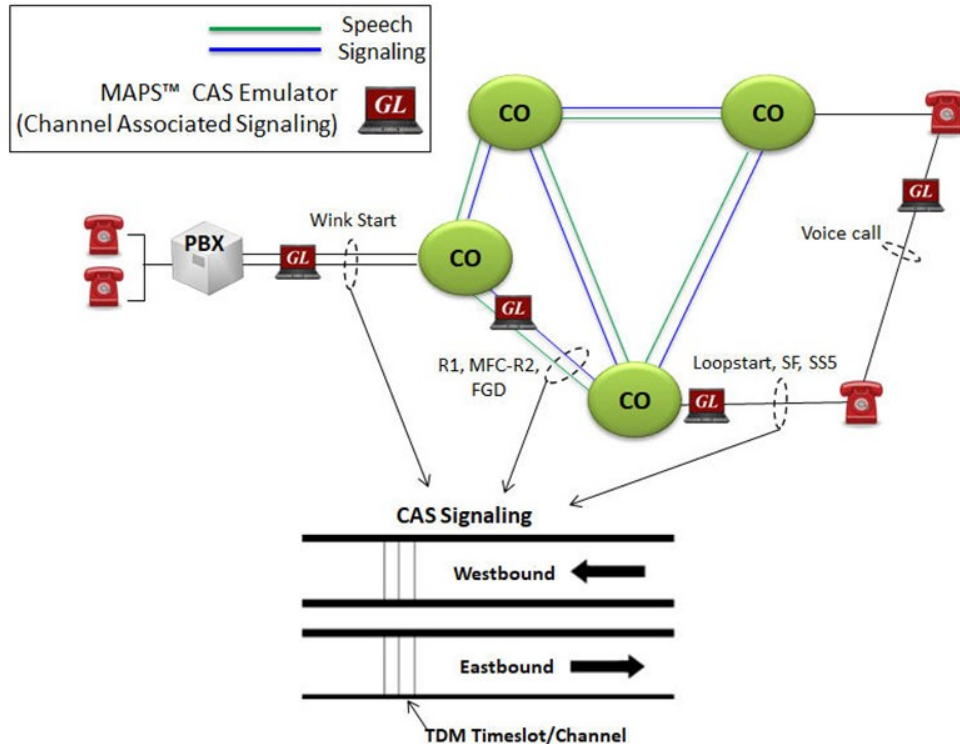# MAPS™ CAS Emulator

(Scripted Channel Associated Signaling Emulation)

Overview

GL's **Message Automation and Protocol Simulation (MAPS™)** platform supports CAS signaling simulation over T1 E1 network. MAPS™ CAS automates the testing procedure allowing the users to place calls on a single or on all timeslots. Calls are established, once the signaling information such as signaling bits, DTMF/MF digits, or Tones are sent/detected. Also MAPS™ CAS Emulator is designed to supports TDM traffic across CAS network.

MAPS™ CAS Emulator supports typical CAS signaling methods including R1, MFC-R2, FGD, and other variants of these methods. MAPS™ CAS also supports simulation of SF, Voice Call and SS5 Signaling over Analog VF interface available on tProbe™ hardware unit.

This simulator provides a complete solution for testing, troubleshooting, and maintaining devices and networks implementing CAS. MAPS™ CAS Emulator supports powerful utilities like Script Editor and Profile Editor which allow new scenarios to be created or existing scenarios to be modified. With the purchase of additional licenses (XX610, XX620, XXFT0) traffic can be simulated over T1/E1 interfaces. Supported traffic includes transmission and detection of TDM digits, Voice files, Single tone, Dual tone, Speech and FAX.

GL offers two solutions for high density 2-wire emulation using MAPS™ CAS with additional Channel Bank (APSCB-24 or APSCB-48):

- High density G.711 NB solution (supports up to 96 Analog Channels) using MAPS™ CAS
- Testing Hybrid networks using MAPS™ CAS

MAPS™ CAS also supports simulation of CAMA trunks connected to the 911 selective router (SR). CAMA type signaling trunks are used to provide the calling party's Automatic Number Identification (ANI) to the selective router. The selective router then routes the call to the appropriate Public Safety Answering Point (PSAP) based on the calling party's location. Both Analog and Digital (T1) CAMA simulations are supported. Analog simulation requires an additional channel bank specially configured for CAMA.

MAPS™ application supports a Command Line Interface (CLI) such as the Python and Java scripting tools, to provide the capability of remote operation, automation, and multi-site connectivity.

For more information, refer to MAPS™ CAS Emulator webpage.

Main 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

Protocols

- T1 Wink Start (R1 wink)
- T1 Feature Group D (FGD)
- T1 CAMA (Centralized Automated Message Accounting)
- T1 Voice Call Signaling (Analog VF)
- E1 MFC-R2 (All variants, full /semi compelled)
- E1 International Wink Start
- T1/E1 SF Signaling (Analog VF)
- T1/E1 SS5 Signaling (Analog VF)
- Analog MFC-R2
- Any User-Defined CAS Protocol

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
- Voice feature testing application for Next Generation Networks (NGNs)
- Supports ANI and DID identification

Solutions

- High density G.711 NB solution (supports up to 96 Analog Channels) using MAPS™ CAS
- Testing Hybrid networks using MAPS™ CAS

CLI Capabilities

- TCP/IP based Client Server application
- API available for Python and Java
- Capability of remote operation, automation, and multi-site connectivity with Command Line Interface (CLI) support.

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

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Solution 1: High Density G.711 NB solution with MAPS™ CAS and Channel Bank

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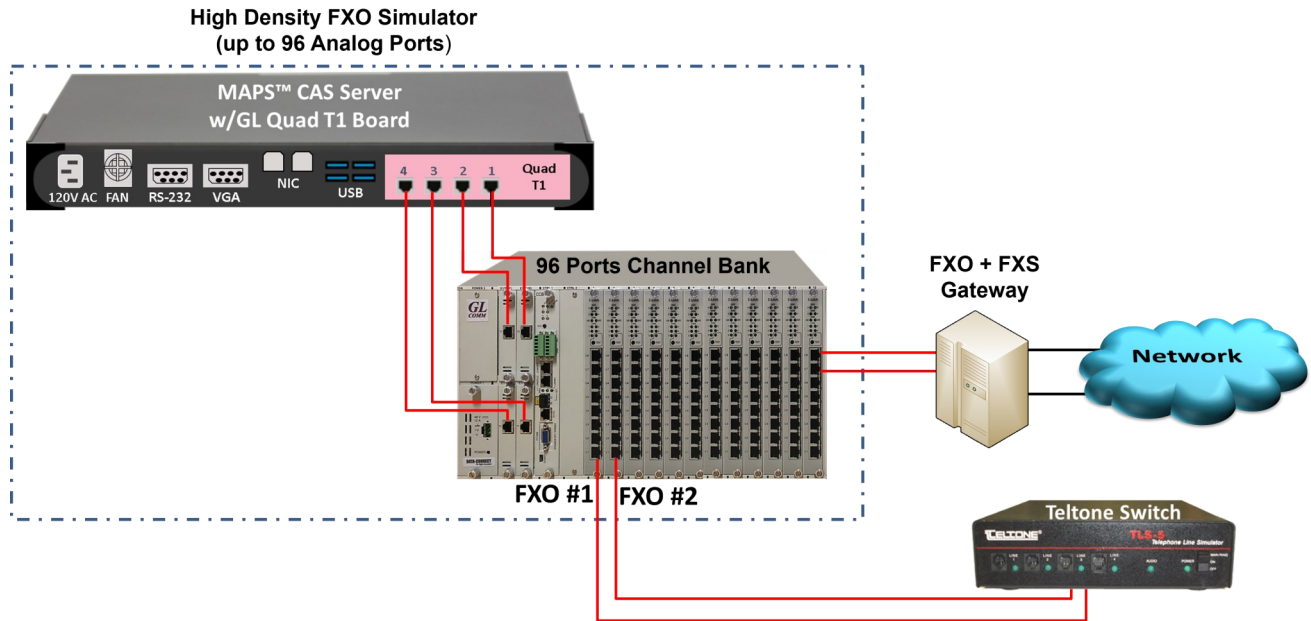
Features	High Density NB Solution MAPS™ CAS
Space Considerations	1U (MAPS™ CAS); 3U (Channel Bank)
Ports	Quad T1 (4 x T1); 96 Analog Channels
FXO Audio	NB Support
Operation	Fully Independent Ports with control b/w systems
Bulk Call	Yes – Supports

Solution 2: End-to-end Hybrid Network Testing using High Density MAPS™ CAS and Channel Bank

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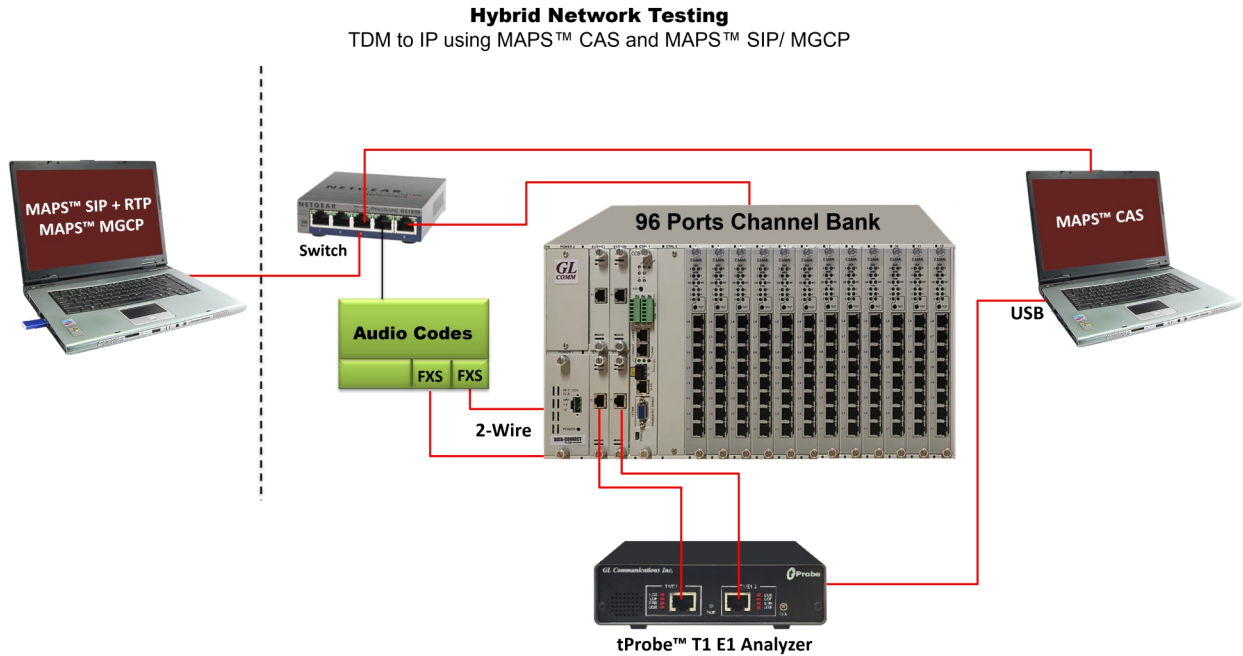
Features	Hybrid Network Test Solution - MAPS™ CAS
Space Considerations	1U (MAPS™ CAS) 1U (MAPS™ SIP/ MAPS™ MGCP) 1U (Audio Codes Media Gateway)
Ports	Quad T1 (4 x T1) 96 Analog Channels
FXO Audio	NB Support
Operation	Fully Independent Ports with control b/w systems
Bulk Call	Yes – Supports

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Testbed Setup Configuration

Test Bed setup is provided to establish communication between MAPS™ CAS and the DUT. It includes parameters for configuring T1/E1 (GL) server, CAS protocol specific Signaling Bits parameter, Dial Digit Parameters and Wink parameter, SF, Voice Call and SS5 Signaling Parameter settings to simulate CAS Signaling and traffic over T1/ E1. Default CAS_Profiles.xml file is used to configure end-user parameters.
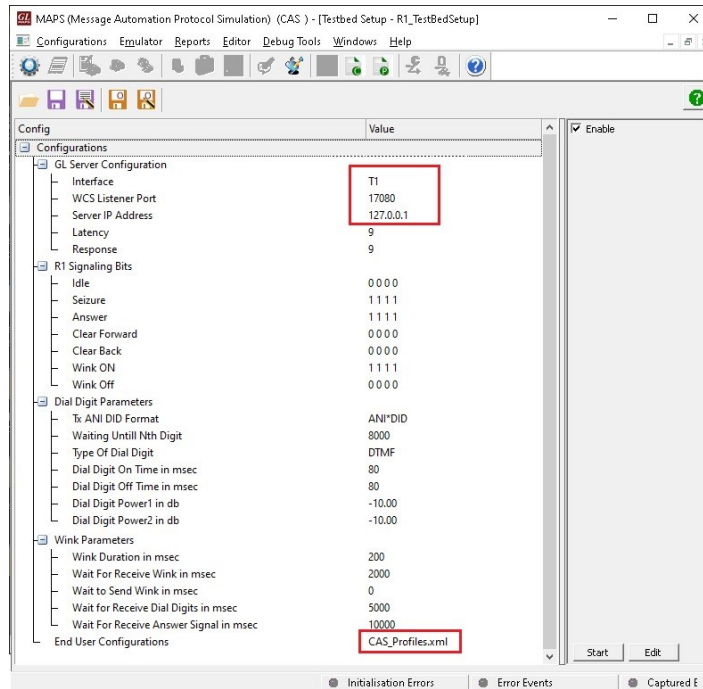
Figure: Testbed Setup Configuration

Event Log

MAPS™ provides Events, Error Events, and Captured Errors log encountered during the progress of the call. The events are saved in the database which can be accessed via web interface. Protocol specific signaling events and the traffic events are logged along with the Call Trace ID, Script Name, Script ID, and the Timestamp of the occurred event.

Figure: Events Log

◈ **GL Communications Inc.**
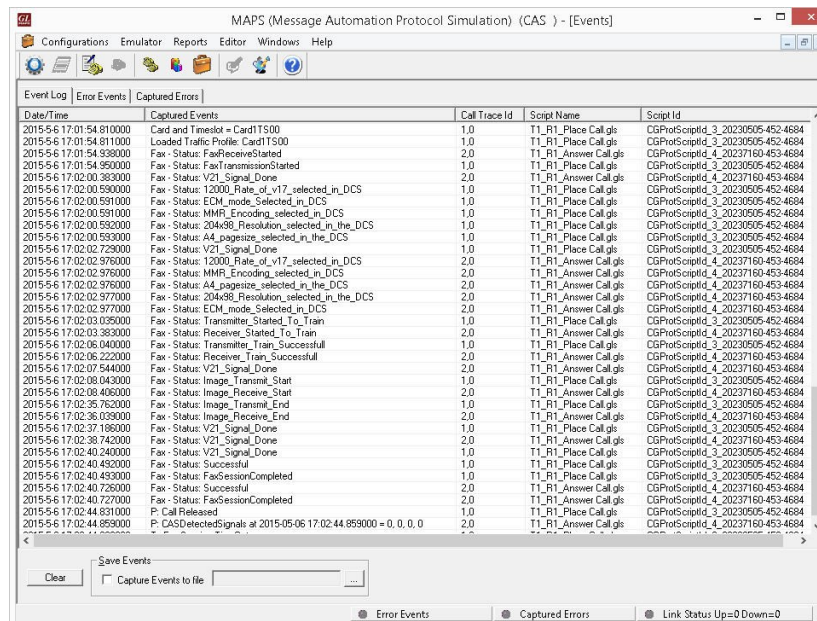
Pre-processing Tools

Script Editor

GL's MAPS™ CAS script editor is based on a self-describable language that can define the behavior of CAS Signaling procedure. Functions such as inbound, outbound, signaling digits detection and transmission are all defined within the script. Additionally, more advanced script may also be defined in the script editor. Definitions for Tx traffic such as Tx File, Tx Tones, Tx digits, call duration, stop traffic are user-definable within each script.
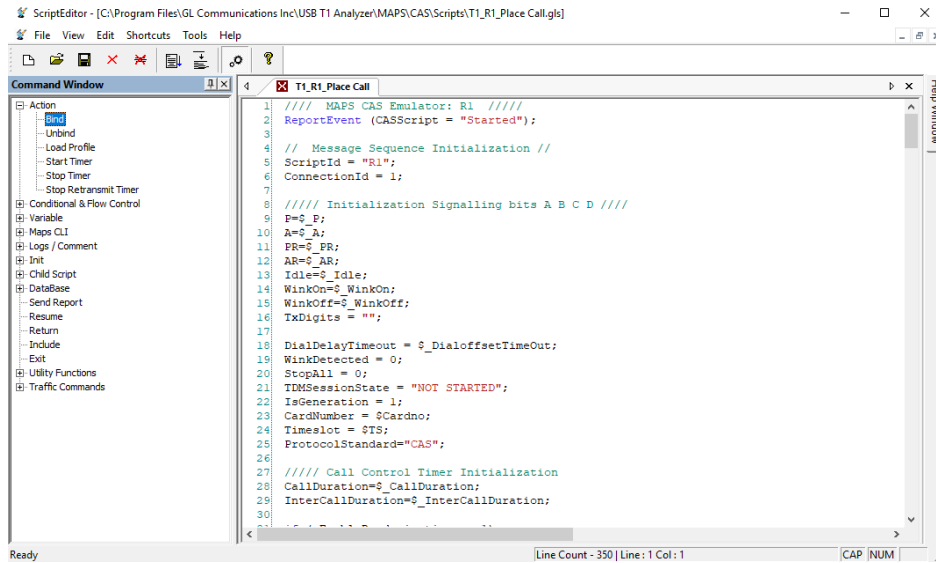
Figure: Script Editor

Profile Editor

This feature allows loading profile to edit the values of the variables using GUI, replacing the original value of the variables in the message template. An XML file defines a set of multiple profiles with varying parameter values that allow users to configure call instances in call generation and to receive calls. Users can configure the traffic options for Auto traffic type or User-defined traffic type. Supported traffic configuration includes Send/Receive file, DTMF/MF digits, and Single/Dual tones.
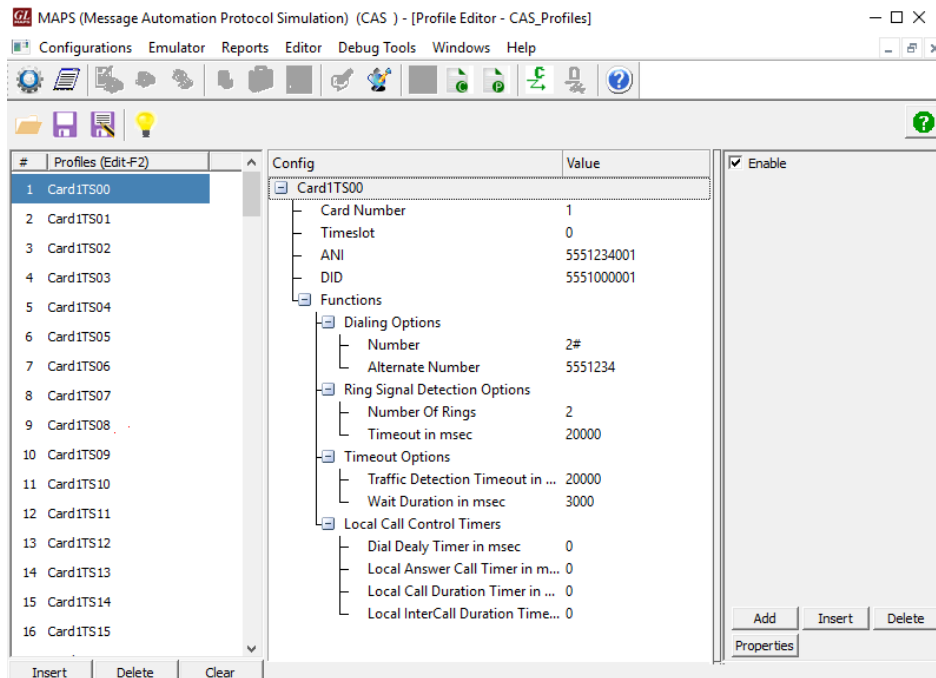
Figure: Profile Editor

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Typical Call Flow Scenario
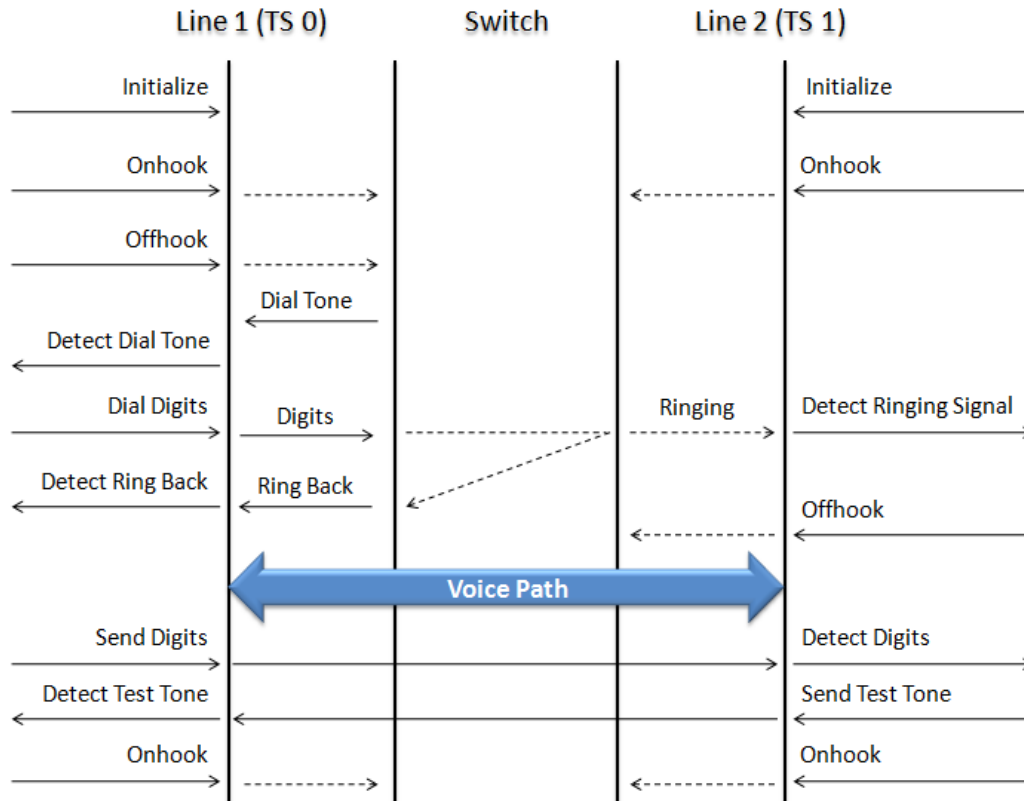
Figure: Typical CAS Call from Side A to Side B

The following are the typical CAS signaling procedures supported by MAPS™ CAS -

- E1 MFC-R2 Signaling - Defined by the ITU Recommendations Q.421-Q.442, uses a multi-frequency compelled signaling protocol to exchange address information. Sends MFC-R2 forward and backward tones per CCITT specifications. Currently, MAPS™ CAS includes ready profiles for India, China, and Mexico. Different country specific implementations will be supported in future.
- E1 International Wink Start
- T1 Wink Start (R1 wink) - The R1 wink protocol uses one-bit signaling, and the wink (brief presence of current or variation of the signaling bit) that the inbound side uses to indicate readiness to receive address signaling.
- T1 Feature Group D (FGD)
- T1 CAMA (Centralized Automated Message Accounting)

Supported Analog Legacy Protocols Simulation

- Single Frequency (SF) Signaling
- Voice Call Signaling
- SS1/SS4 Signaling
- SS5 Signaling
- Analog MFCR2
- Any User-Defined CAS Protocol

Outbound and Inbound CAS Signaling

In call generation, MAPS™ is configured for the out going messages, while in call receive mode, it is configured to respond to incoming messages. Tests can be configured to run once, multiple iterations and continuously. Also, allows users to create multiple entries using quick configuration feature. The editor allows to run the added scripts sequentially (order in which the scripts are added in the window) or randomly (any script from the list of added script as per the call flow requirements).
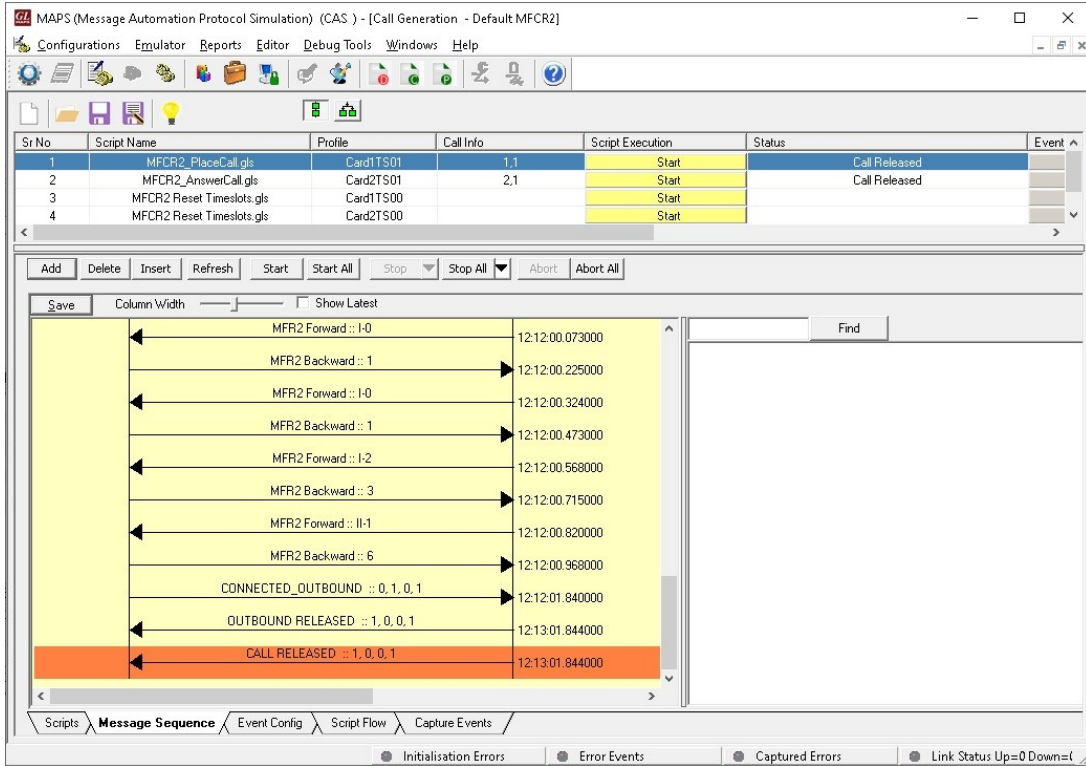
Figure: MFC-R2 Call Simulation
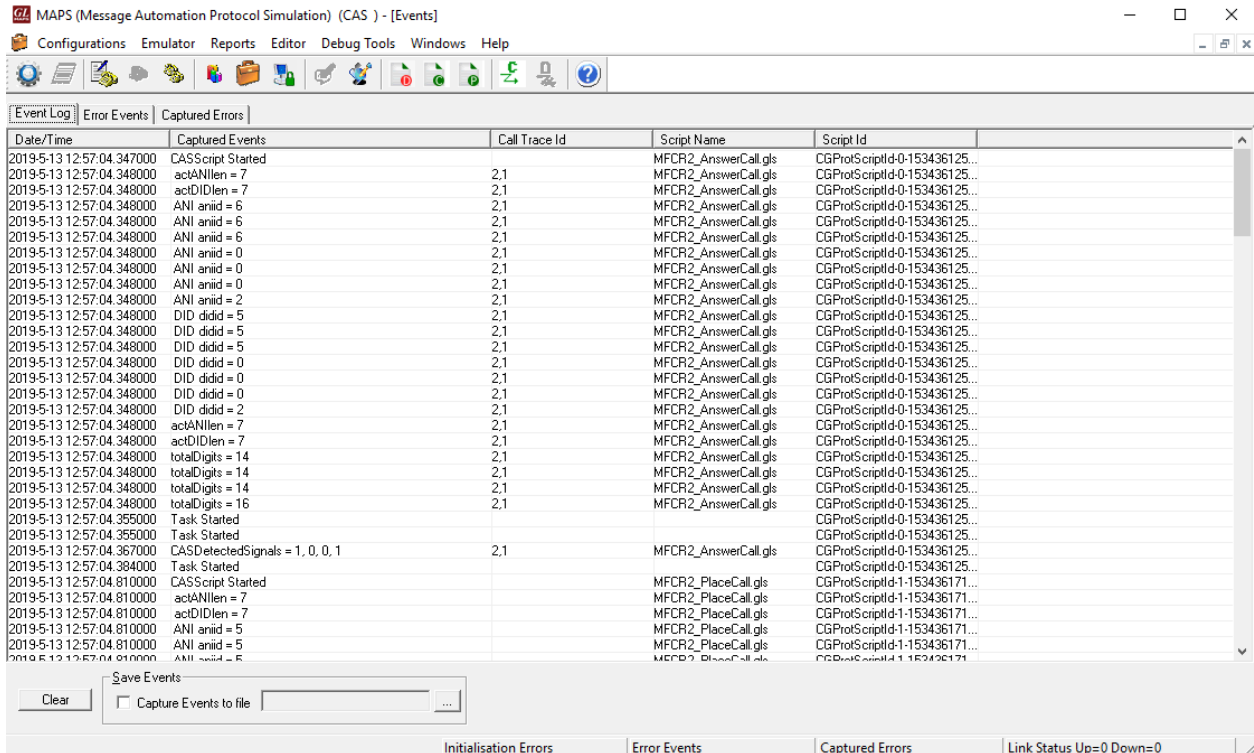
Figure: MFCR2 Call Events Log

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CAMA Signaling Simulation for 911 Systems

The below illustrates a typical FXO CAMA signaling scenario where MAPS™ CAS simulates the CAMA trunk connected to the 911 selective router.
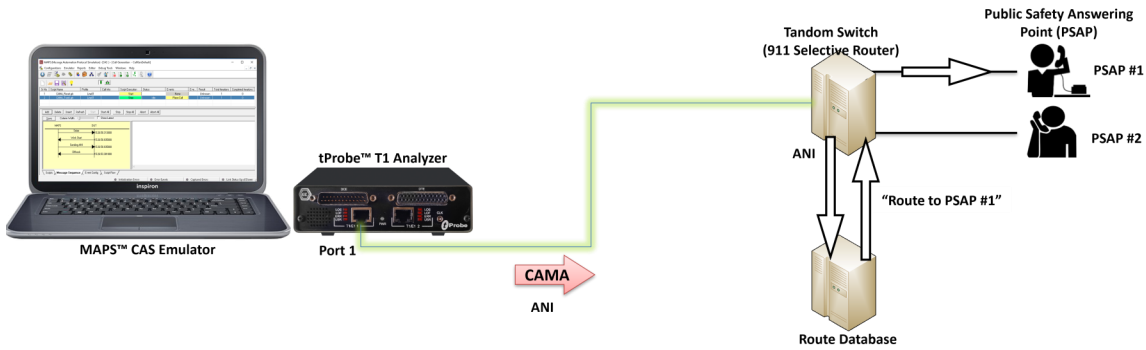
Figure: Digital CAMA Simulation
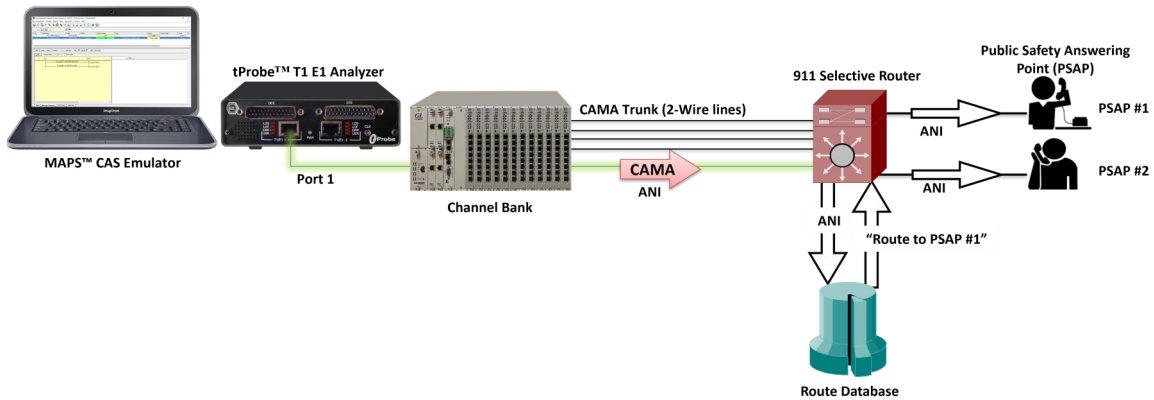
Figure: Analog CAMA Simulation

MAPS™ CAS Emulator application displaying a real-time signaling sequence of the CAMA type trunk connected to the 911 selective router.
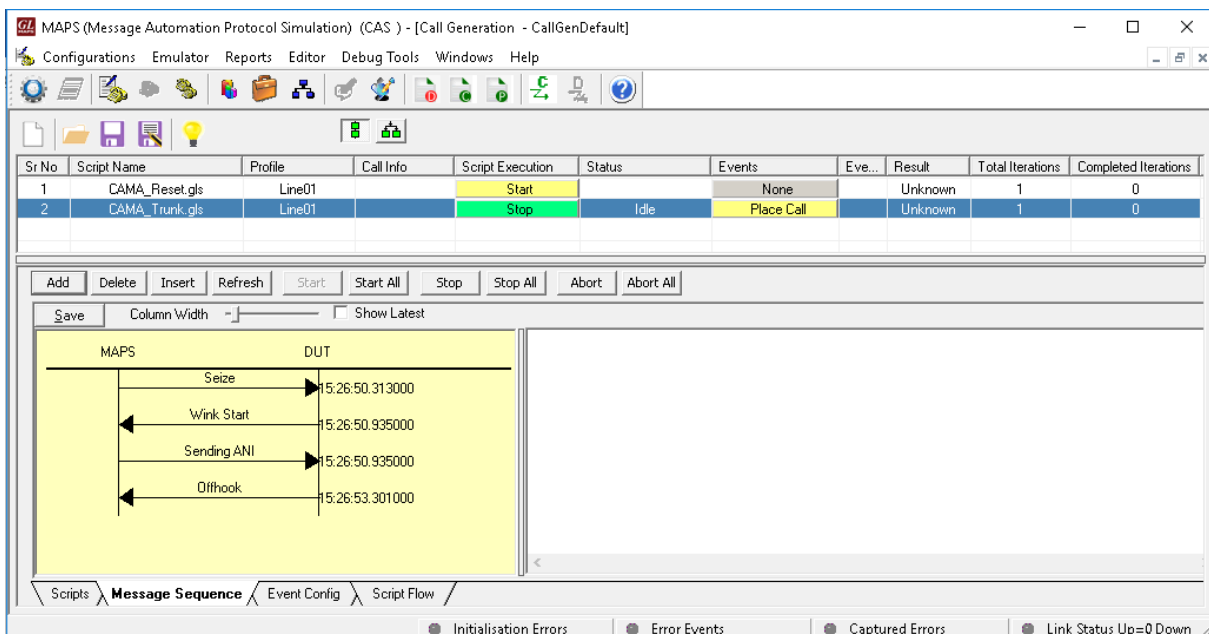
Figure: MAPS™ CAS simulating CAMA trunks

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CAS T1 Wink Start (R1 wink) Call Simulation

Call Generation feature allows the user to simulate incoming and outgoing communications in CAS network, where signaling transitions occurs between switches, using proper scripts and profiles. The profile allows necessary parameters of call controls to be changed during runtime.
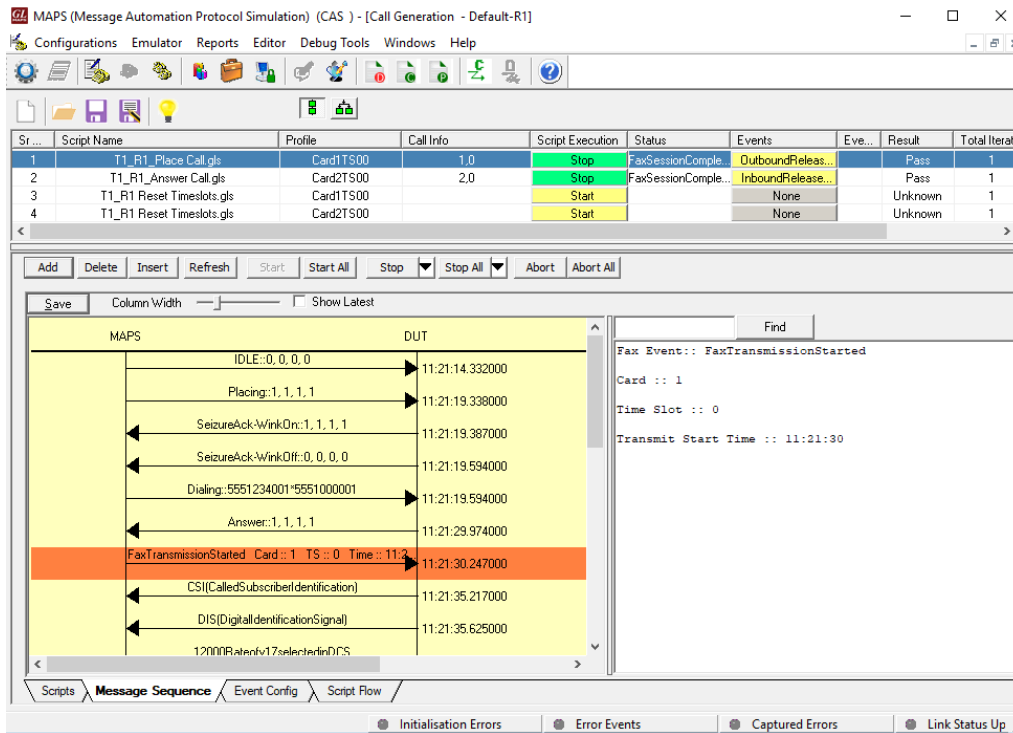
Figure: R1 Script Execution

Analog Voice Call Signaling

MAPS™ CAS supports Voice Call Signaling by providing voice activated circuitry (VOX) to control voice connectivity and ensure immediate activation of the circuit upon receipt of incoming voice. During out-going call, it seizes (open) any circuit designated by the Government as a voice call line and transmits the voice into the circuit, whenever the circuit is activated.
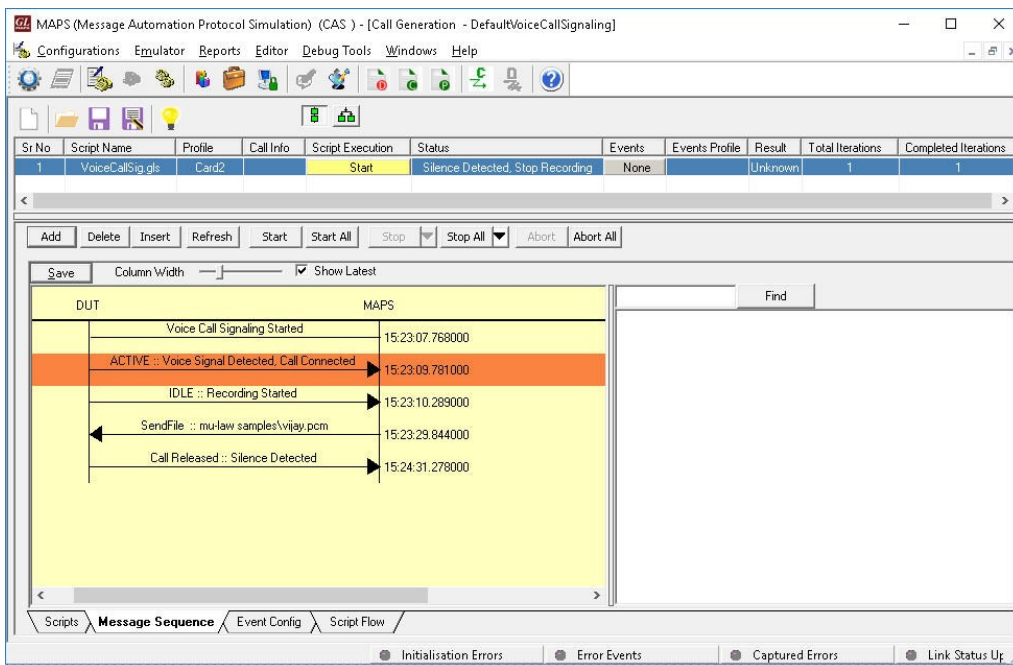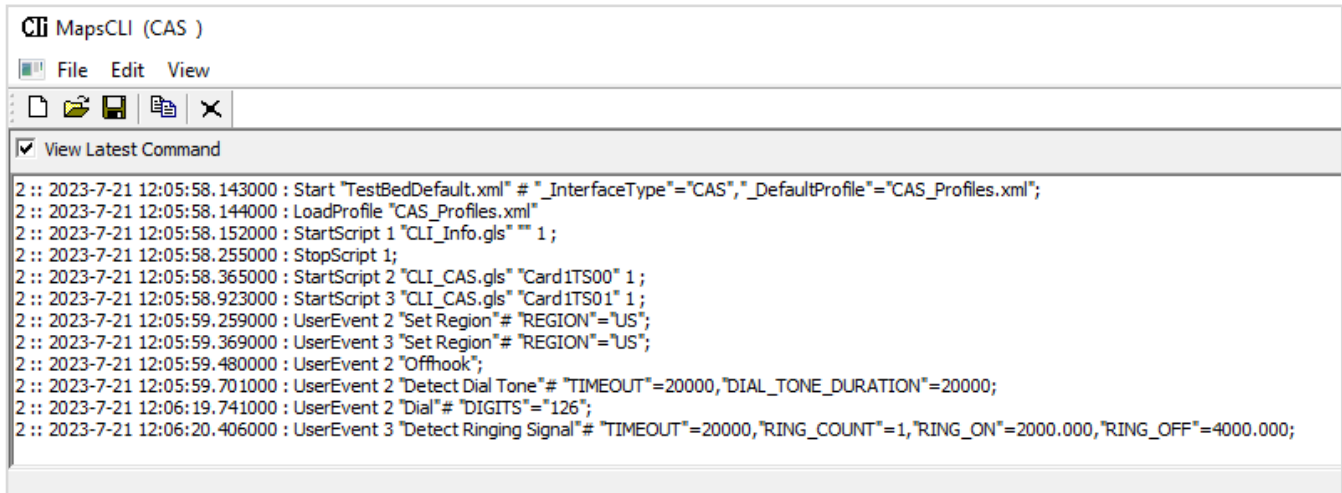
Figure: Voice Call Recording

Command Line Interface

MAPS™ can be configured as server-side application, to enable remote controlling of the application through multiple command-line based clients. Supported clients include Python and Java. Clients can remotely perform all functions such as start testbed setup, load scripts, and profiles, apply user events such as send digits/file/tones, detect digits/file/tones, dial, originate call, terminate call, start and stop traffic and so on. User can also generate and receive calls through commands. This client application is distributed along with MAPS™ Server application.

Figure: MAPS™ CLI Server

Figure: MAPS™ CLI Sample Python Client Script

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Buyer's Guide

Item No	Product Description
XX651	MAPS™ CAS Protocol Emulator
XX610	Transmit and Receive File Capability
XX620	Client Server Transmit/Detect digits (Place Call/ Answer Call)
XX630	Client Server DSP operations

Item No	Related Software
XX625	T1 or E1 CAS Simulator (Client-Server Based) * * Requires XX610, XX620, XX630
XX031	Enhanced T1 / E1 Call Capture/Analysis Software
XX092	T1/E1 Channel Associated Signaling Analyzer
XX647	MAPS™ ISUP Conformance Test Suite (Test Scripts)
XX648	MAPS™ ISDN Emulator
XX649	MAPS™ ISUP Emulator
XX652	MAPS™ MC-MLPPP Emulator
PKS140	MAPS™ Central Office Switch Simulator

Item No	Related Hardware
PTE001	tProbe™ Dual T1 E1 Laptop Analyzer with Basic Analyzer Software
XTE001	Dual T1 E1 Express (PCIe) Boards (requires additional licenses)
FTE001	QuadXpress T1E1 Main Board (Quad Port– requires additional licenses)
ETE001	OctalXpress T1E1 Main Board plus Daughter Board (Octal Port– requires additional licenses)

For more information, refer to MAPS™ CAS Emulator webpage.