Channel Associated Signaling (CAS) Analysis and Simulation

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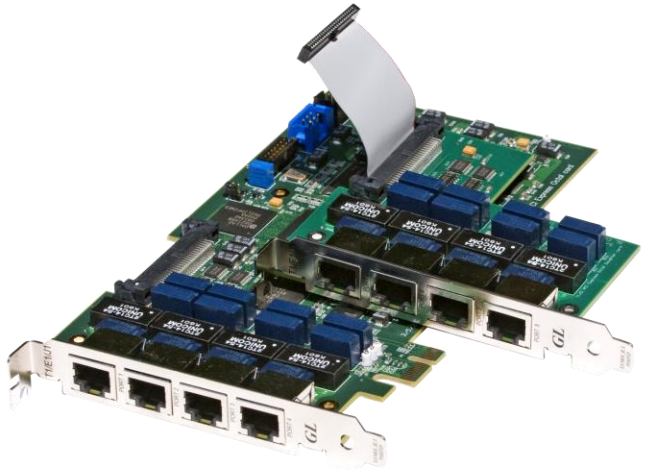
- CAS Protocol Analysis
- CAS Simulator (GUI)
- Bulk CAS Simulation using MAPS™
- CAS Packet Data Analysis (PDA)

T1 E1 Analyzer Hardware Platform

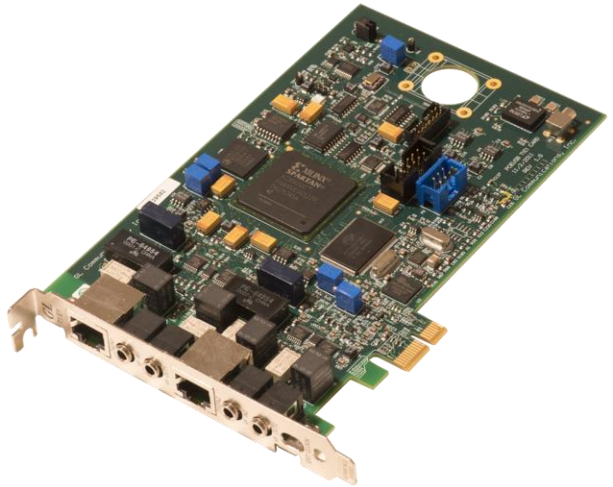
Front Panel

Back Panel

tProbe™ - Portable USB based T1 E1 VF FXO FXS and Serial Datacom Analyzer

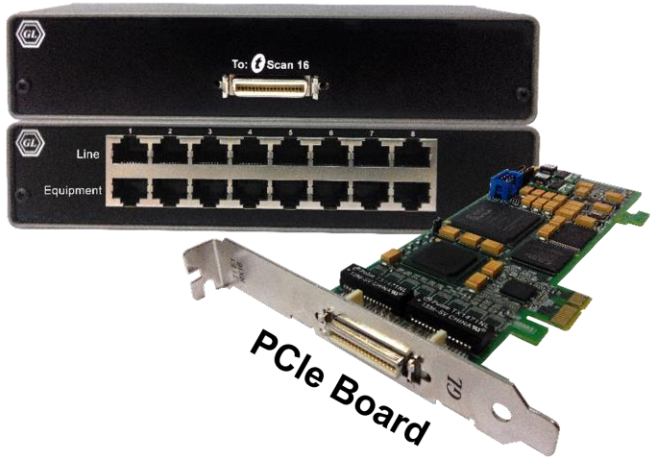


Quad / Octal T1 E1 PCIe Card



Dual T1 E1 Express (PCIe) Board

tScan16™ with 16-port T1 E1 Breakout Box



TDM mTOP™ Solutions

mTOP™ tProbe™ FXO FXS with Dual UTA

1U tProbe™ with FXO and FXS

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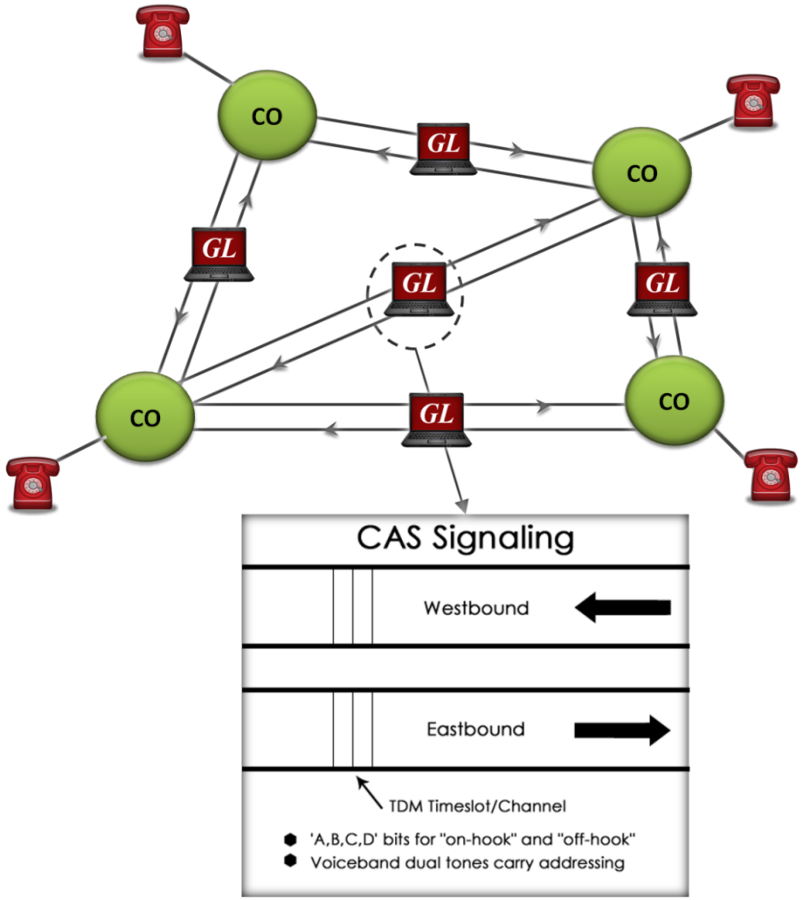
CAS Analyzer Network

- Channel Associated Signaling (CAS) is a method of signaling in telephone networks where each channel or timeslot carrying speech also carries with it the signaling and addressing to set up and tear down that same channel



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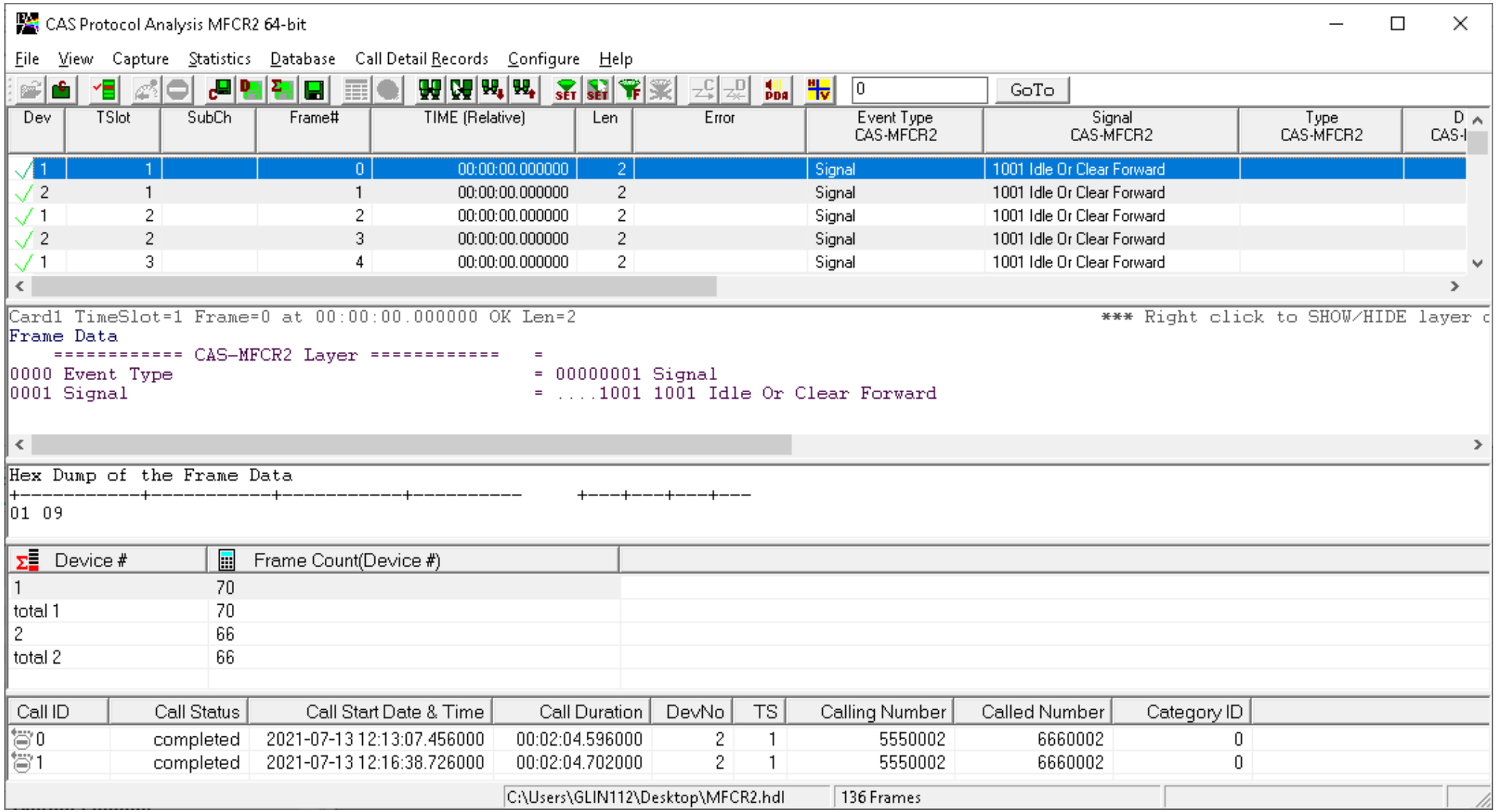
CAS Protocol Analyzer (XX092)

Key Features

- Displays Summary, Detail, Hex Dump, Statistics, and Call Detail views
- Supports Loopstart, Groundstart, Feature Group D (FGD), Winkstart, and MFC-R2 protocols
- Detailed View
  - ➢ Displays decodes of user-selected frames from the Summary View
  - ➢ Provides options to display or hide the required protocol layers
  - ➢ Contents of this view can also be copied to clipboard
- Statistics View displays statistics based on frame count, byte count, frames/sec, bytes/sec etc for the entire capture data
- Any protocol field can be added to the summary view, filtering, and search features providing users more flexibility to monitor required protocol fields
- Hex dump View displays the frame information in HEX and ASCII format, the contents of this view can also be copied to clipboard
- Advanced filtering and search based on any user selected protocol fields
- Option to create multiple aggregate column groups and prioritize the groups as per the requirement to display the summary results efficiently
- Allows the user to create search/filter criteria automatically from the current screen selection

CAS Protocol Analyzer



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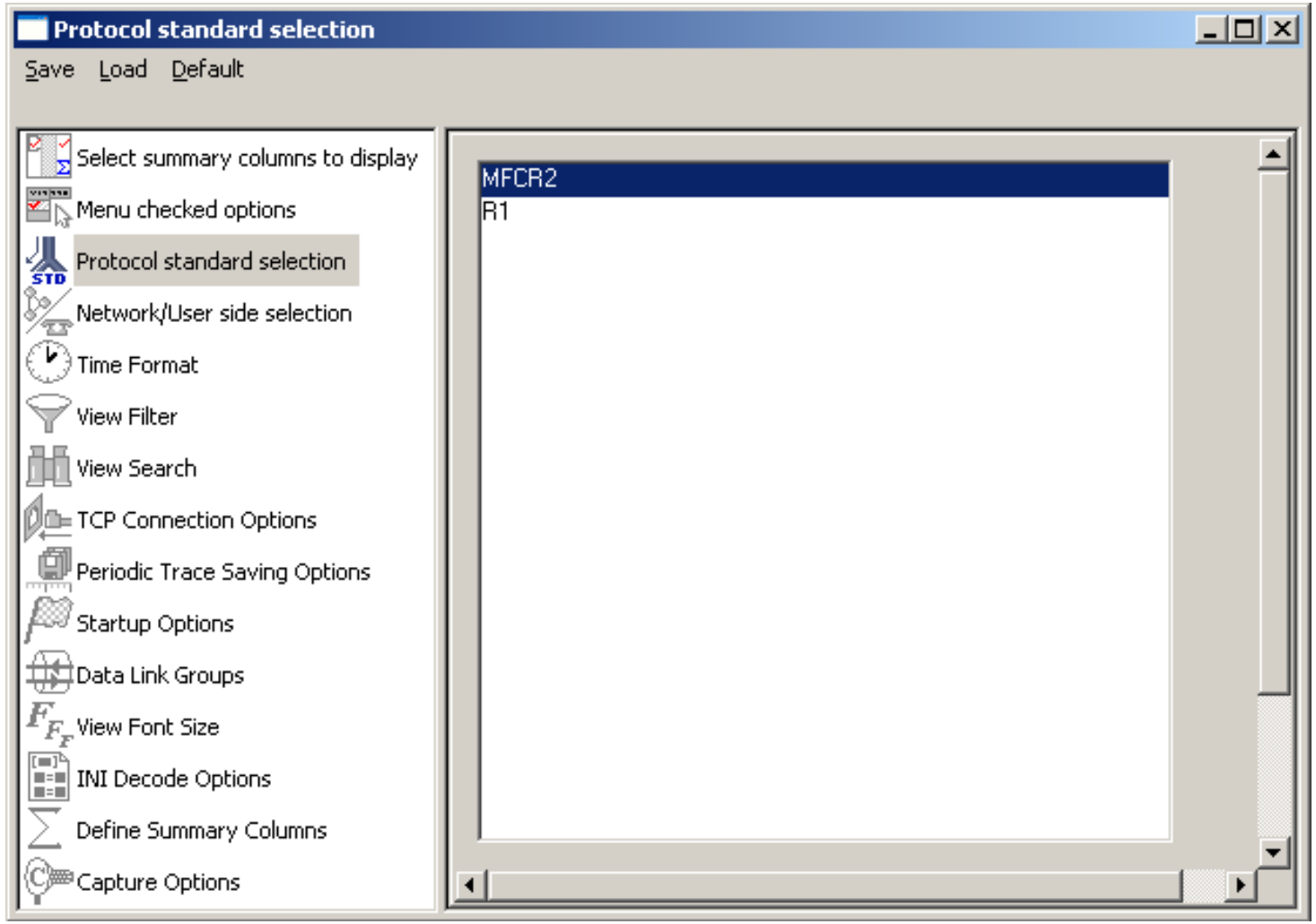
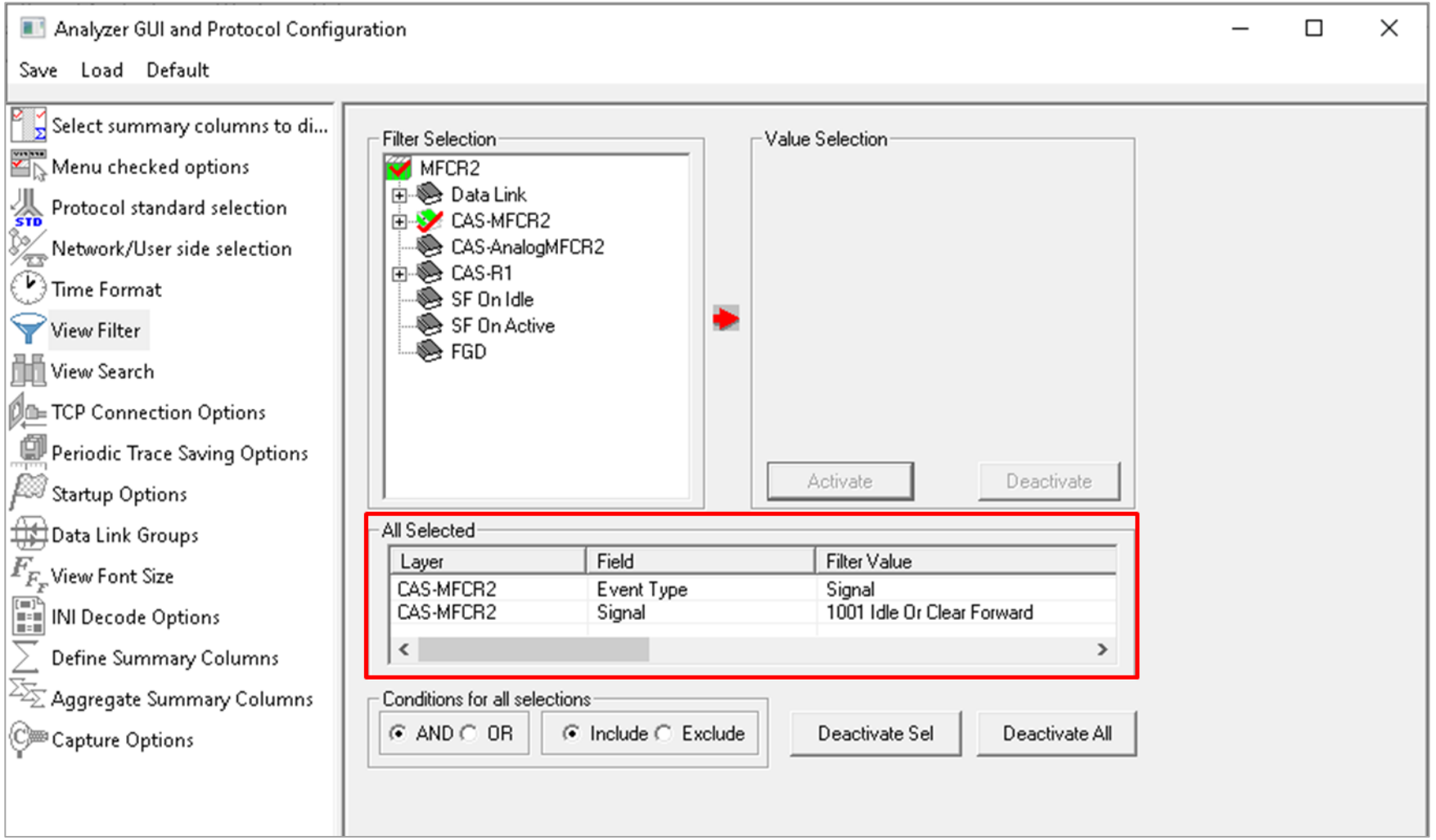
Protocol Standard



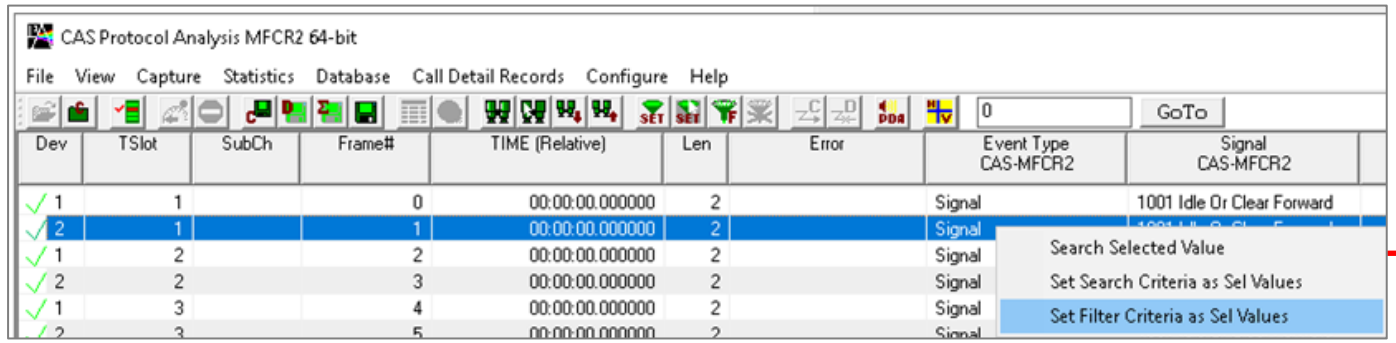
Filtering Criteria

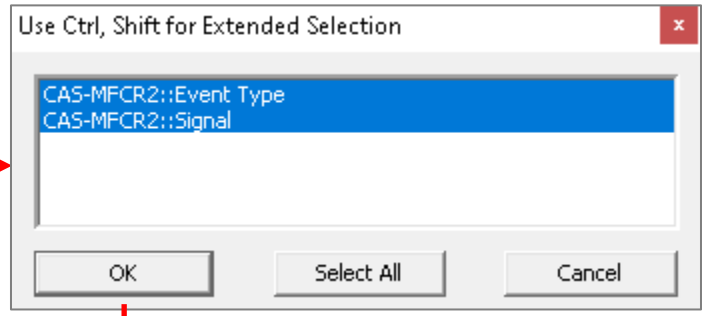
- Search and Filter features provide very fast search/filter for finding the required frames

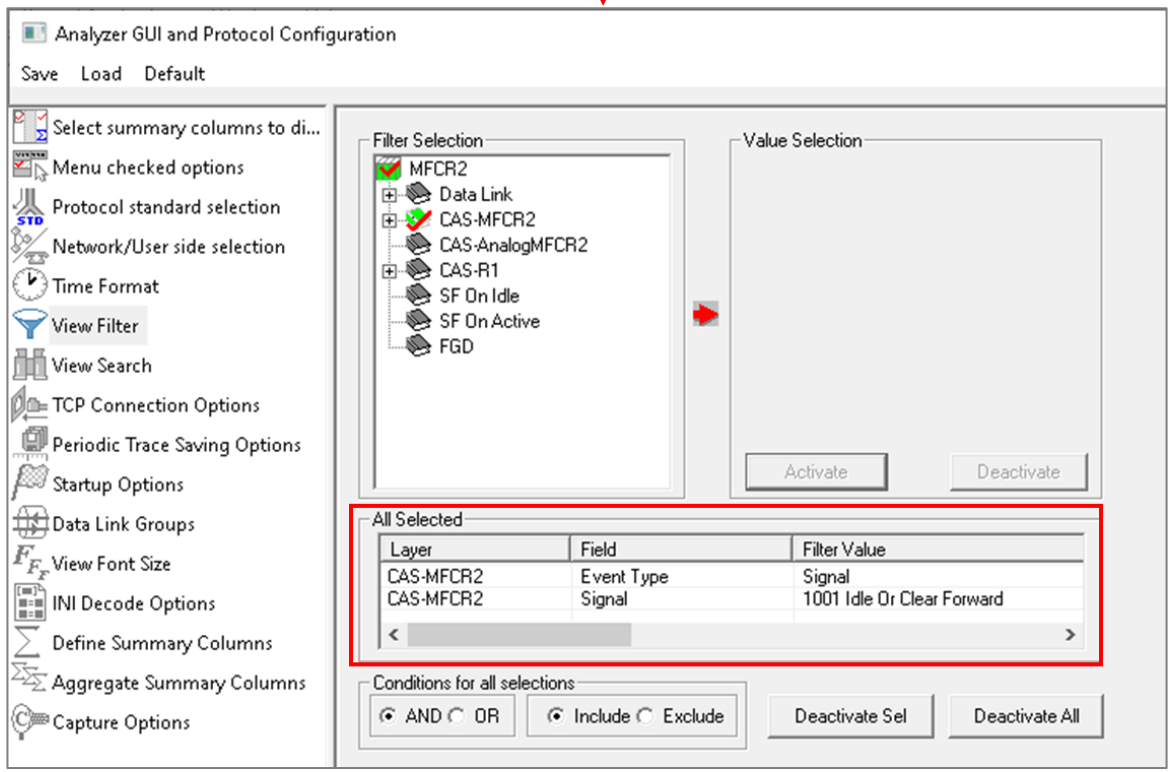


Filtering Criteria From Screen Selection

- Allows the user to create filter criteria automatically from the current screen selection

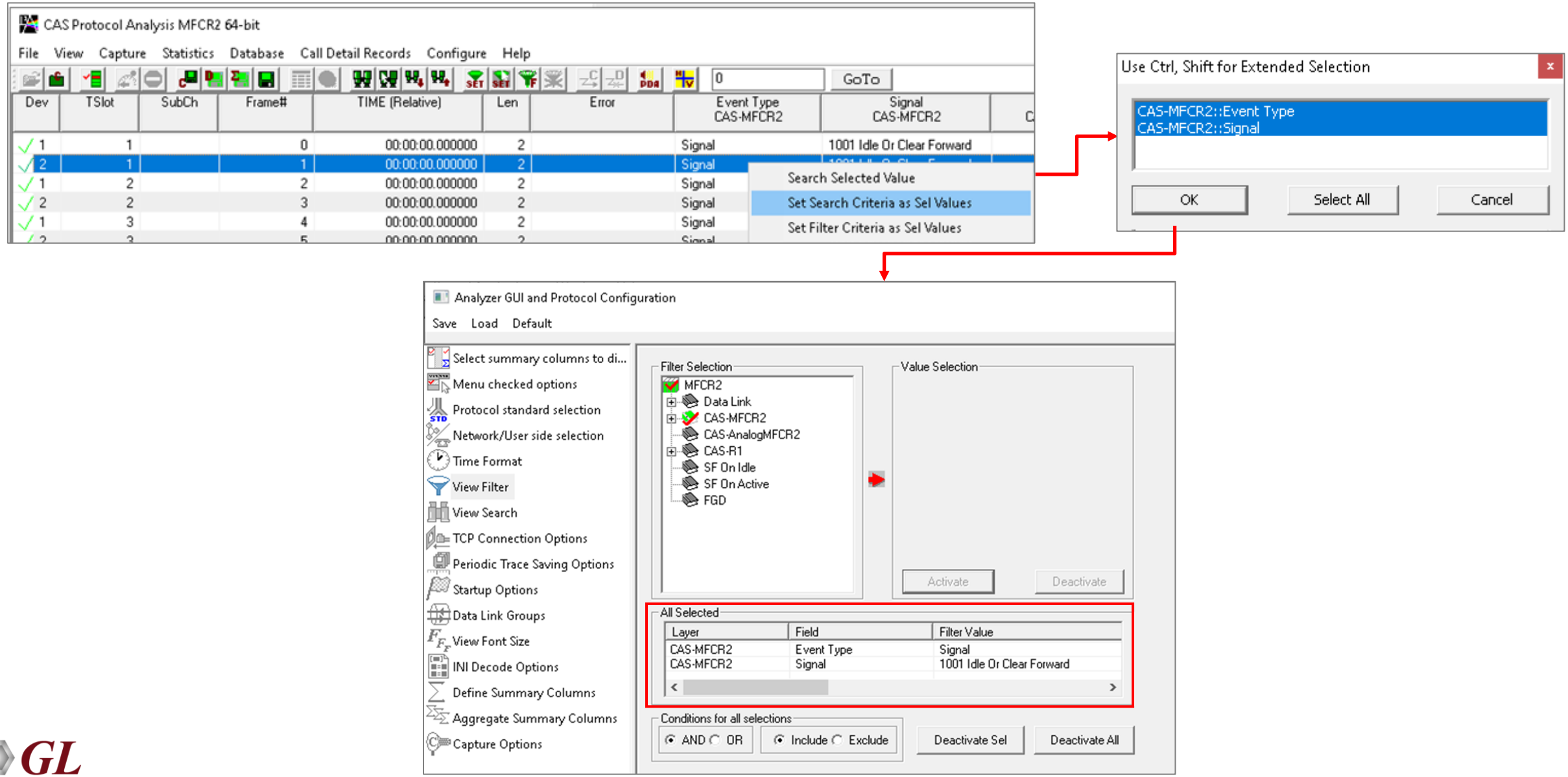






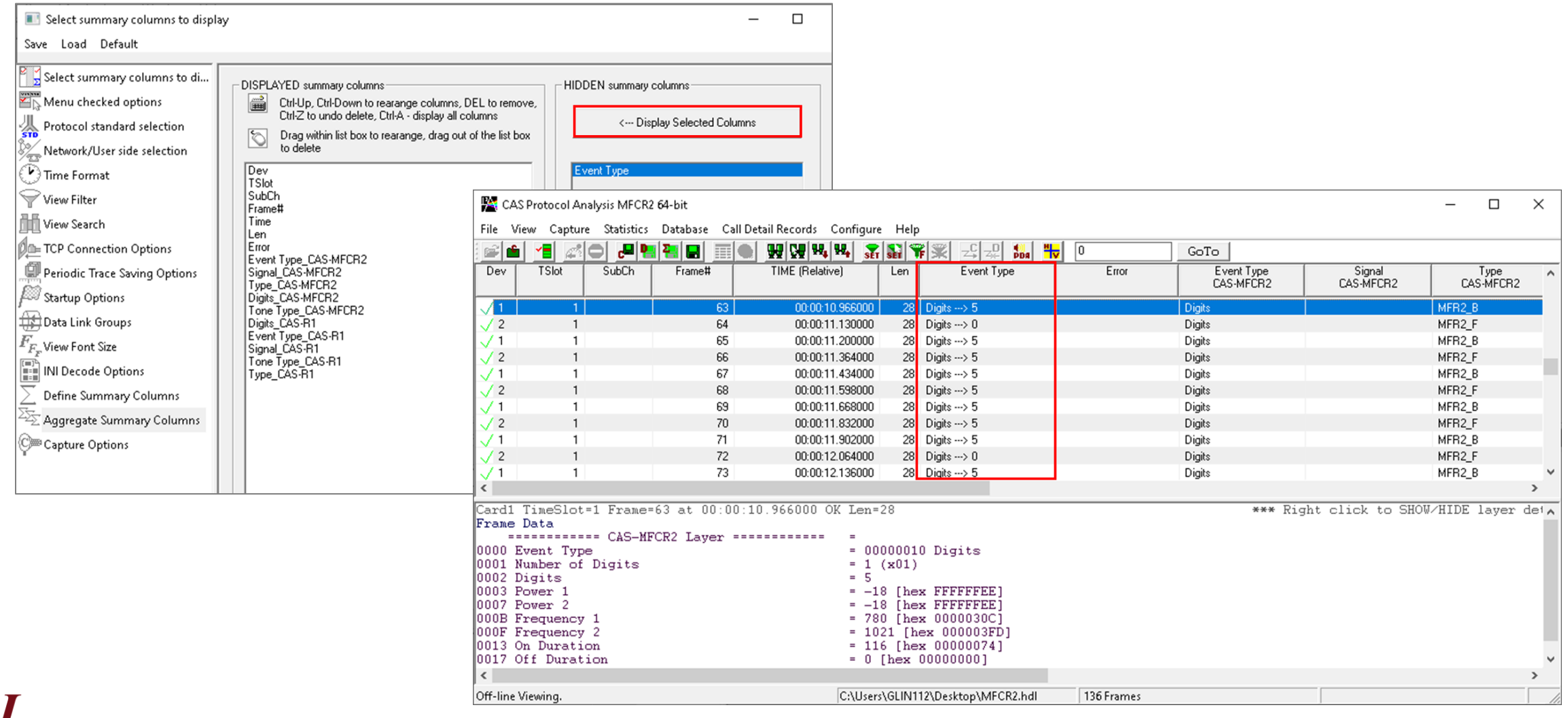
Search Criteria From Screen Selection

- Allows the user to create search criteria automatically from the current screen selection



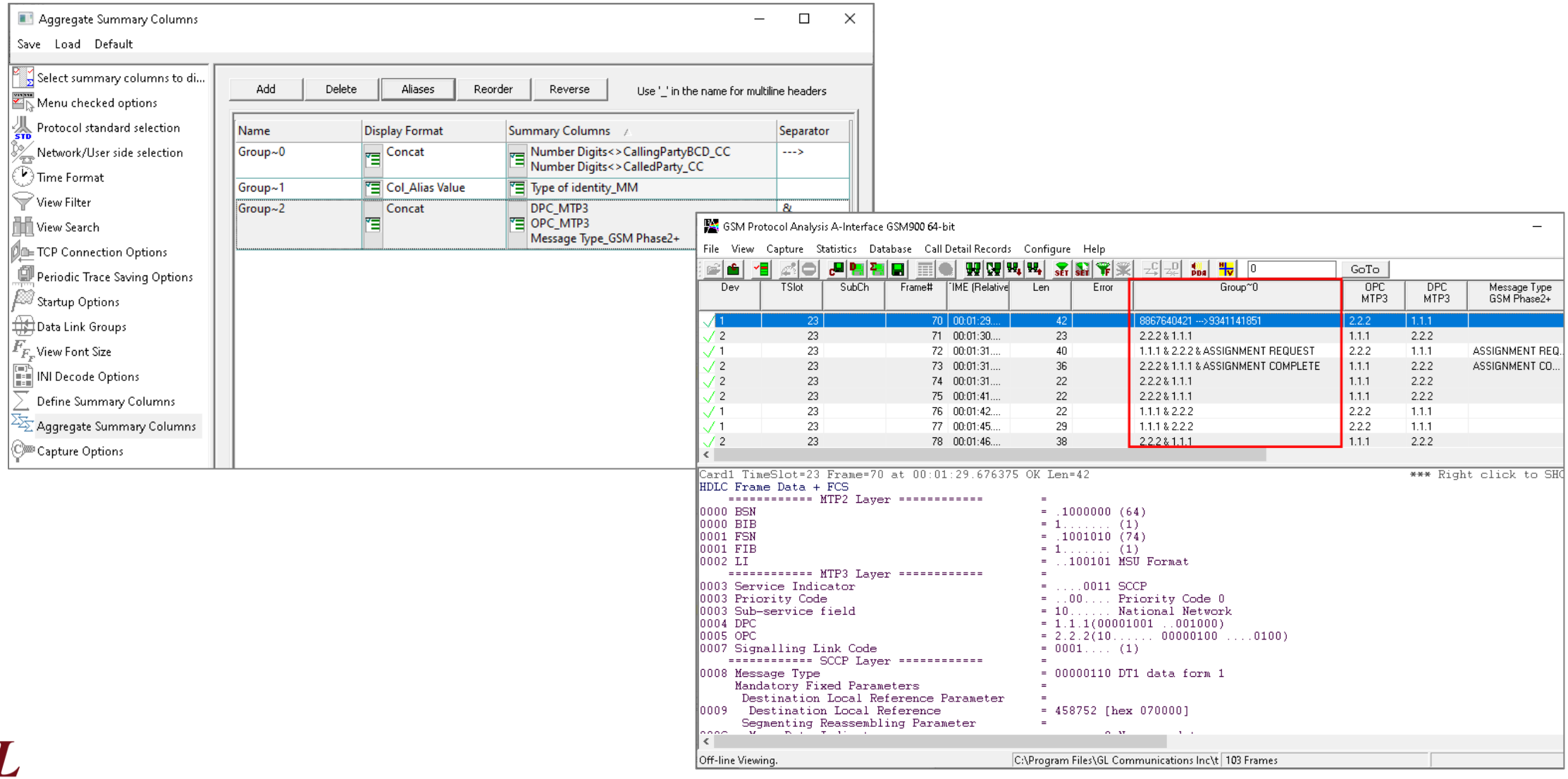
Define Summary Columns

- Required protocol fields can be added through Define summary column option
- User can remove the protocol field which is not required

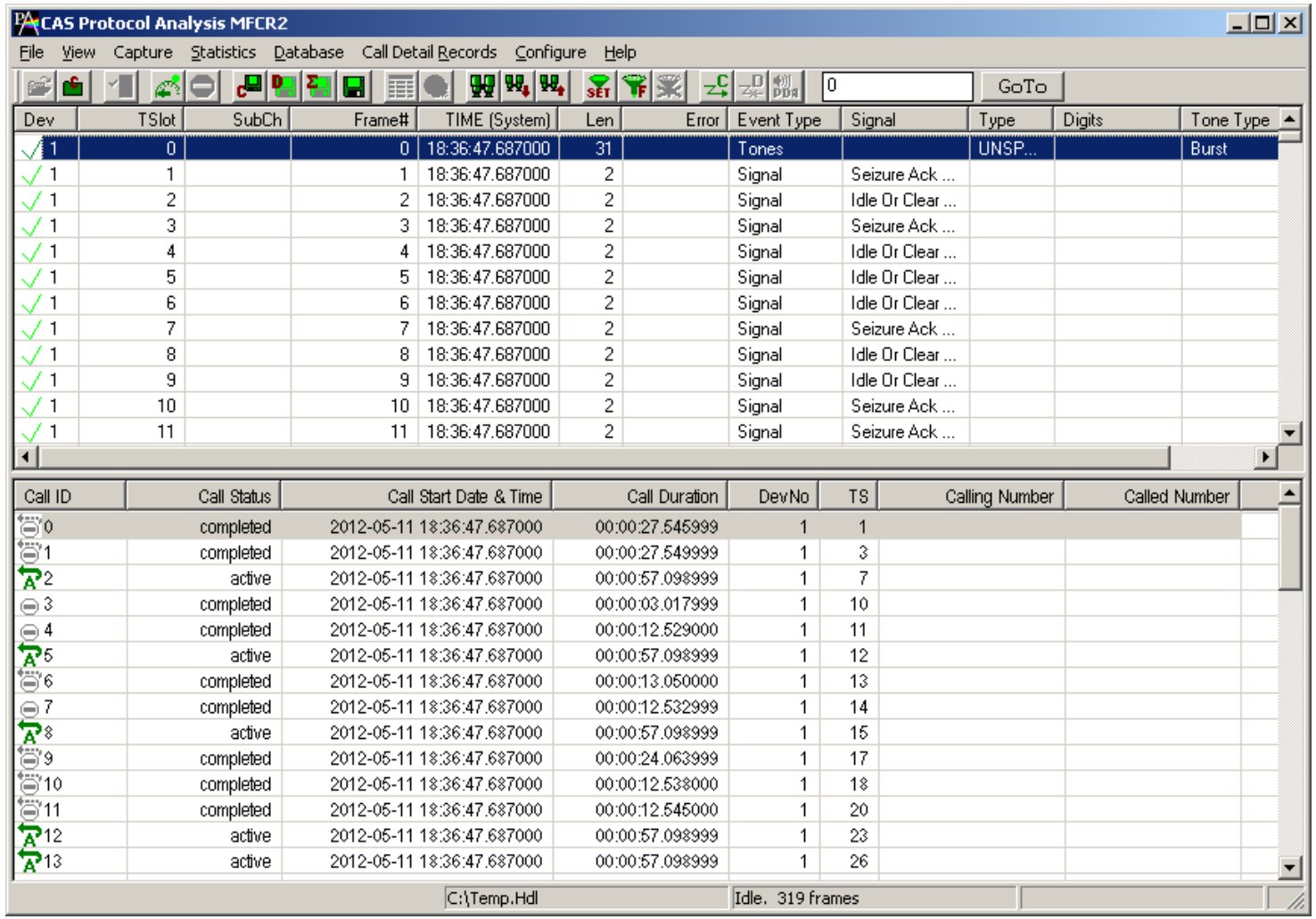


Aggregate Group Column

- The user can create multiple aggregate column groups and prioritize the groups as per the requirement to display the summary results efficiently



Call Detail Records



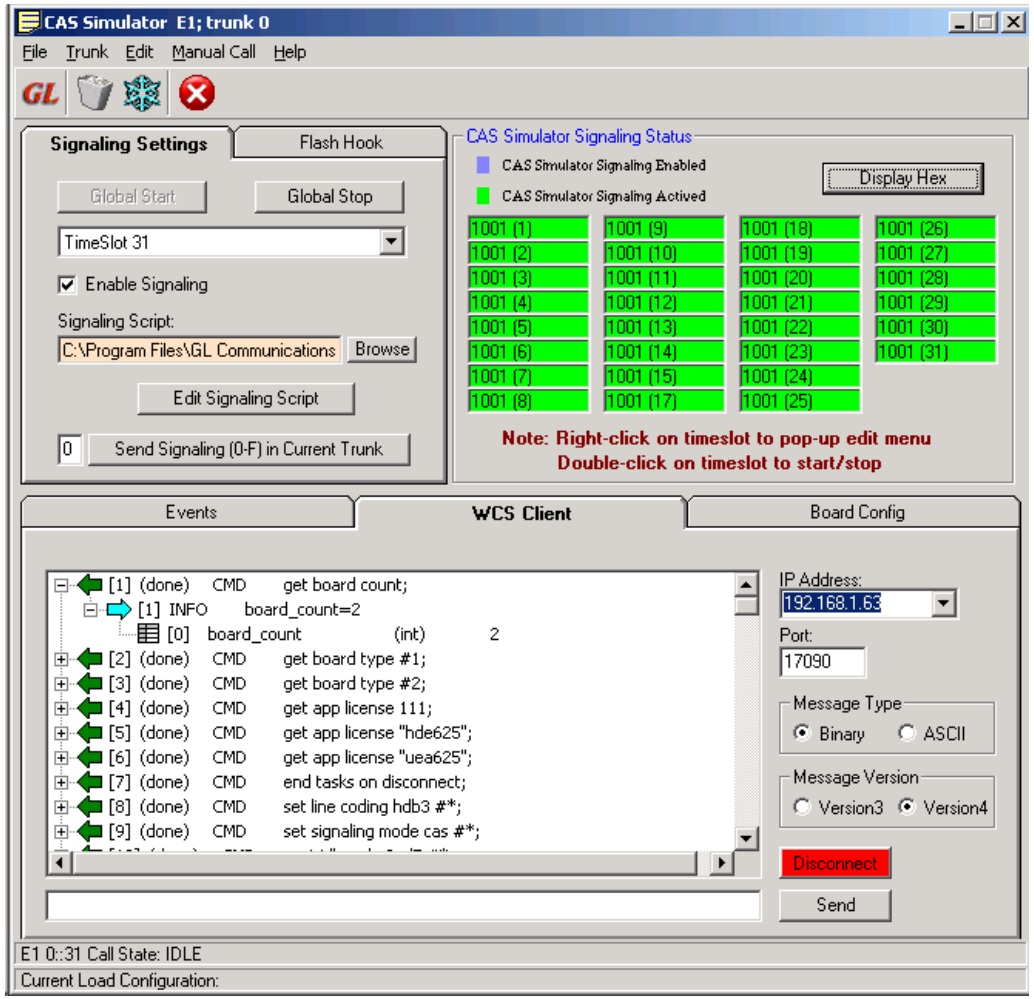
CAS Simulator (XX625)

Channel Associated Signaling Simulators

- GL offers following CAS Simulators:
- A client-side application that works along with GL's T1 E1 Analyzer Cards and Windows Client/Server software – includes a GUI as well as script editor to easily create CAS scripts
- Command-line scripts to perform CAS Simulation with GL's T1 E1 Analyzer Cards and Windows Client/Server software
- Script-based CAS Simulation using MAPS™ with GL's T1 E1 Analyzer Cards and Windows Client/Server software

CAS Simulator (GUI)

- With GL's CAS Simulators, simulate any user-defined CAS protocol by providing signaling bit transitions and forward/backward frequency tones/digits
- Uses client-server technique and provides GUI as well as scripted CAS protocol simulation platform
- Network (NT) and Terminal (TE) - Side Support
- Implements ITU-T Signaling
- Called number and calling number identification
- Customized signaling for each channel through scripts

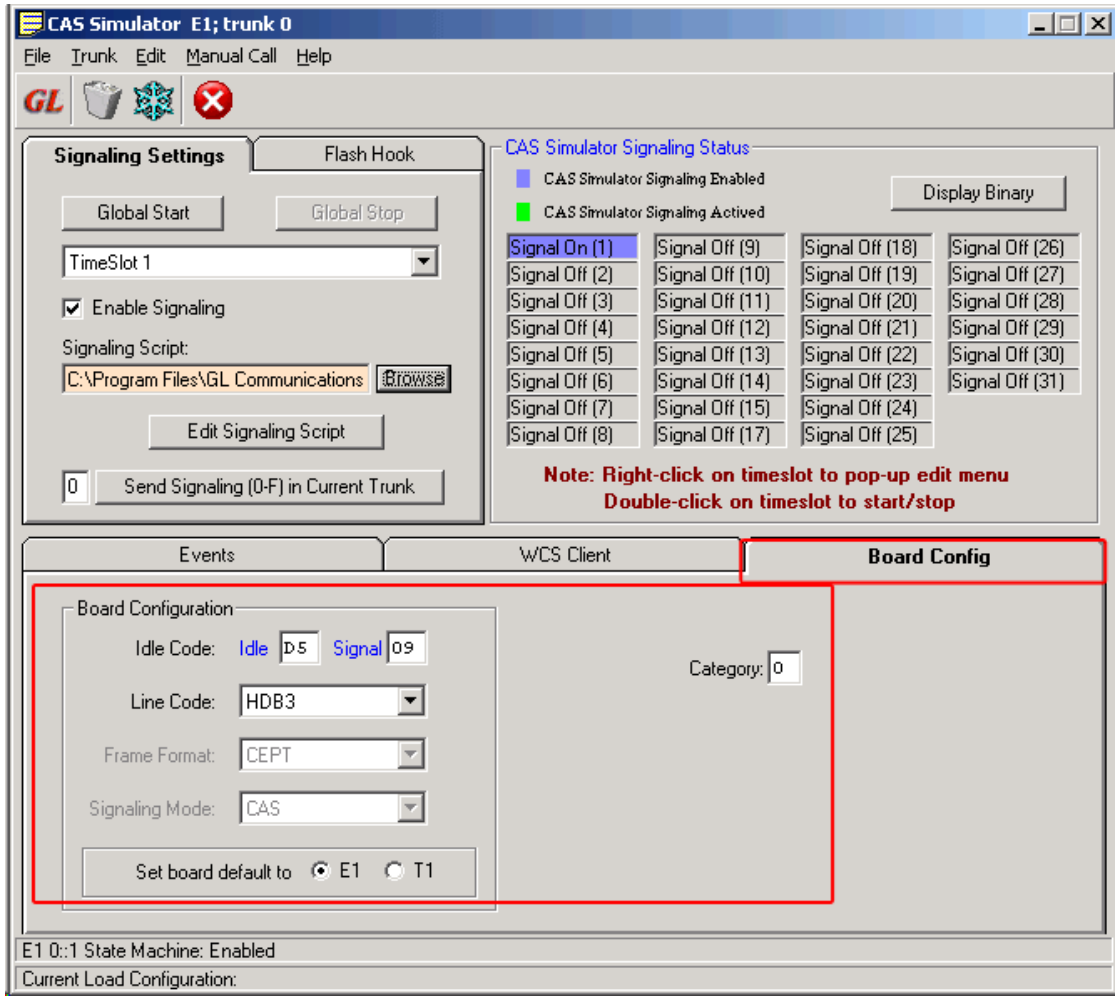


Supported Protocols

- E1 MFC-R2 (All variants, full / semi compelled)
- T1 Winkstart (R1 wink)
- Multi-frequency compelled protocols based on the R2 standard (MFCR2)
- T1 Loopstart and T1 Groundstart
- E1 European Digital CAS (EUC)
- Any User-Defined CAS Protocol

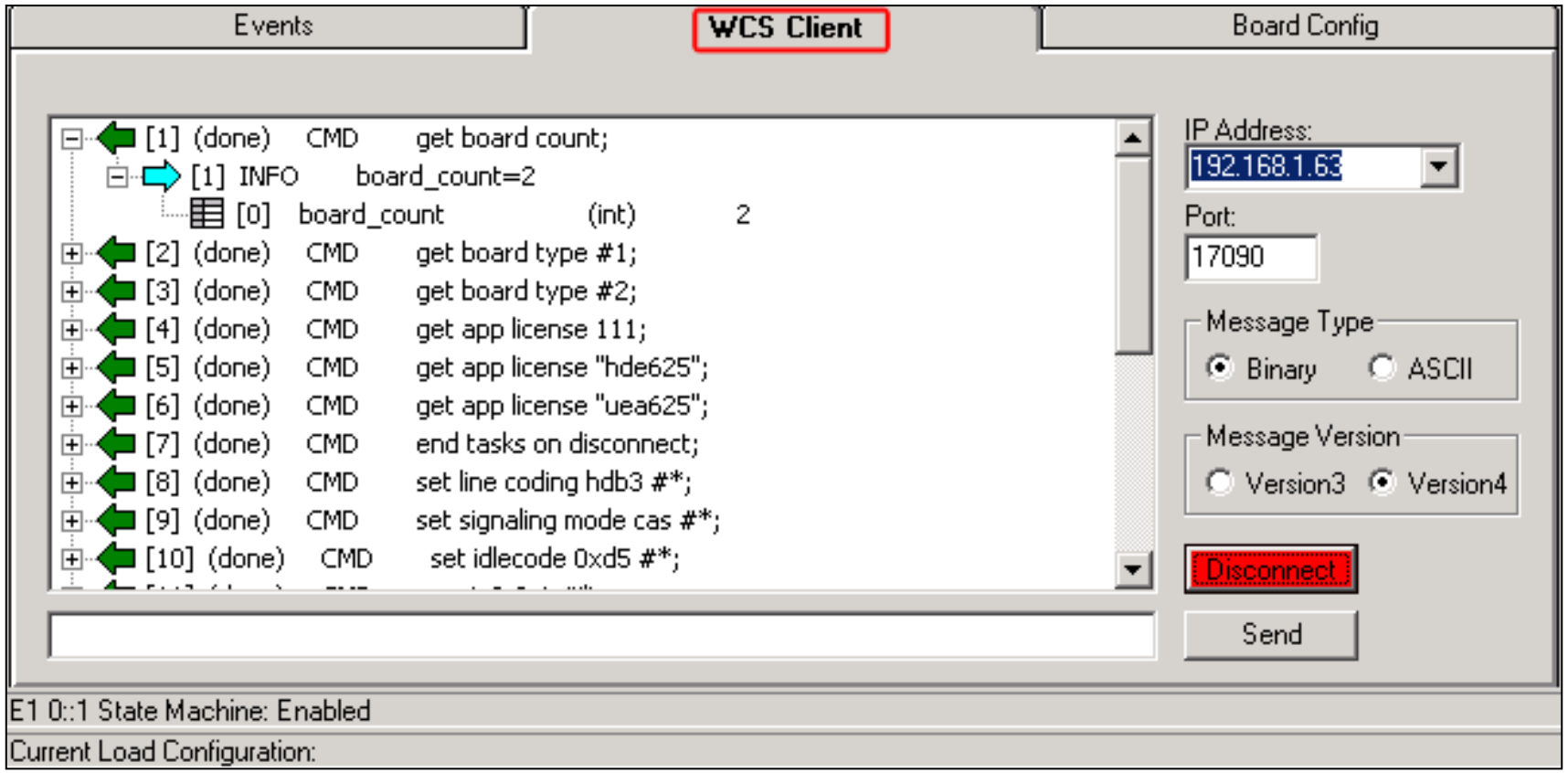
Board Configuration

- Options are provided to set Line Codes, Idle Code, Frame Type, and Signaling Mode
  - ➢ Line Code Formats: Available formats are AMI, B8ZS (T1) or HDB3 (E1)
  - ➢ Framing Formats: Available framing formats are CAS, CCS, CAS & CRC and CCS & CRC (E1) 193S (D4) and 193E (ESF) (T1)
  - ➢ Idle Code: Default Idle code values are 7EX00 (T1) and D5X09 (E1). Line idle code and Signaling bits can be changed by the user
- If Category is set, it is sent out when a call is being placed. If the category is left blank, no category will be sent out when a call is being placed
- Provides an option to set board to either T1 or E1

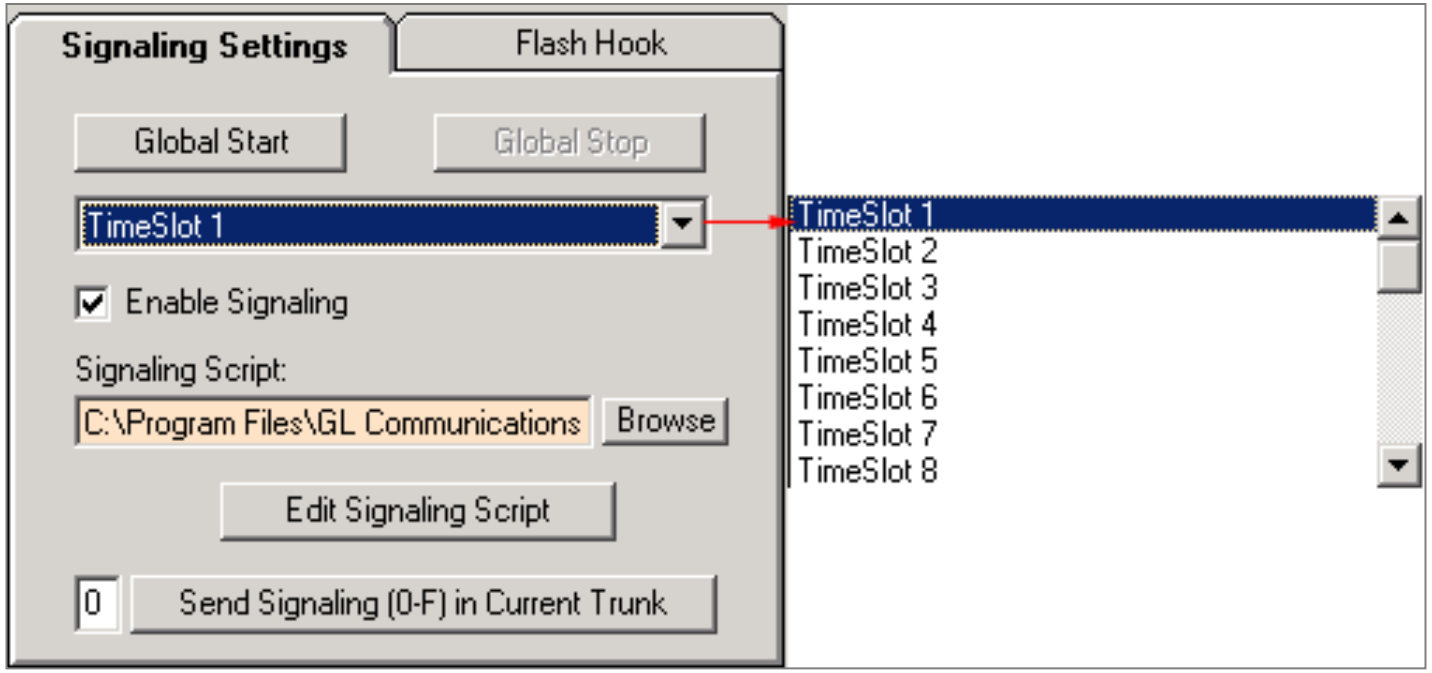


WCS Client

- WCS Client interface allows to connect to one or more GL servers with different instances



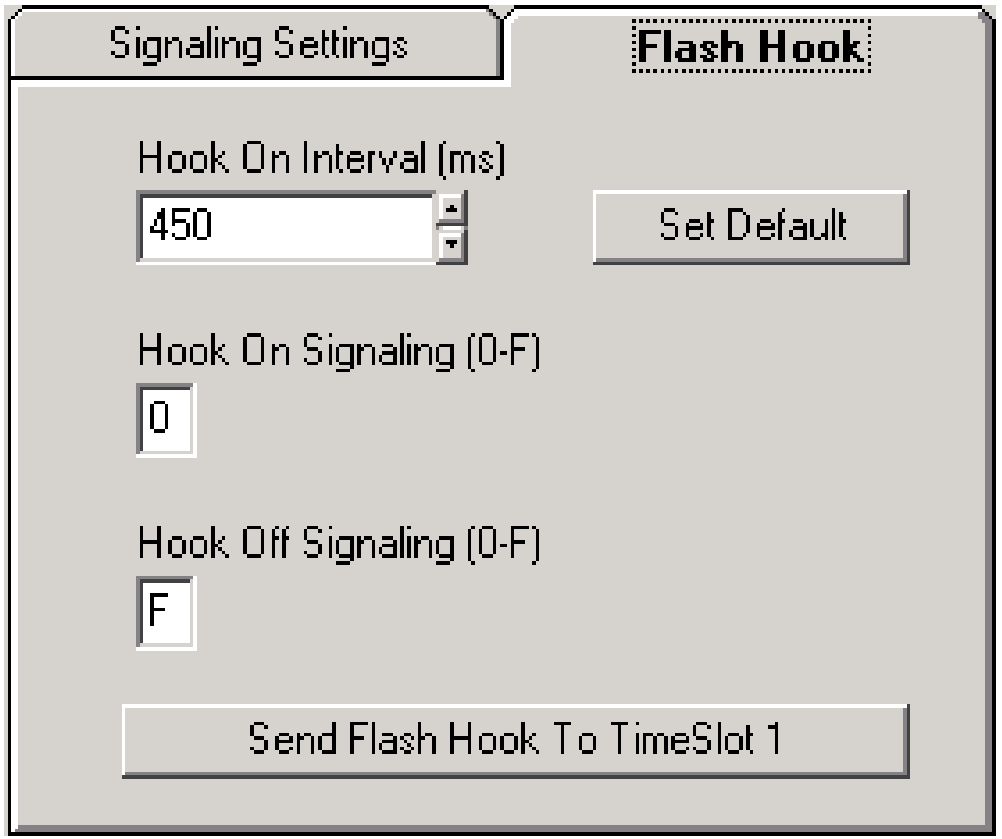
Signaling Settings



- Signaling Settings provides an option to select the timeslots and CAS scripts
- Enabling CAS signaling on the selected timeslot
- Allows to launch CAS Script Editor to edit CAS signaling scripts

Flash Hook

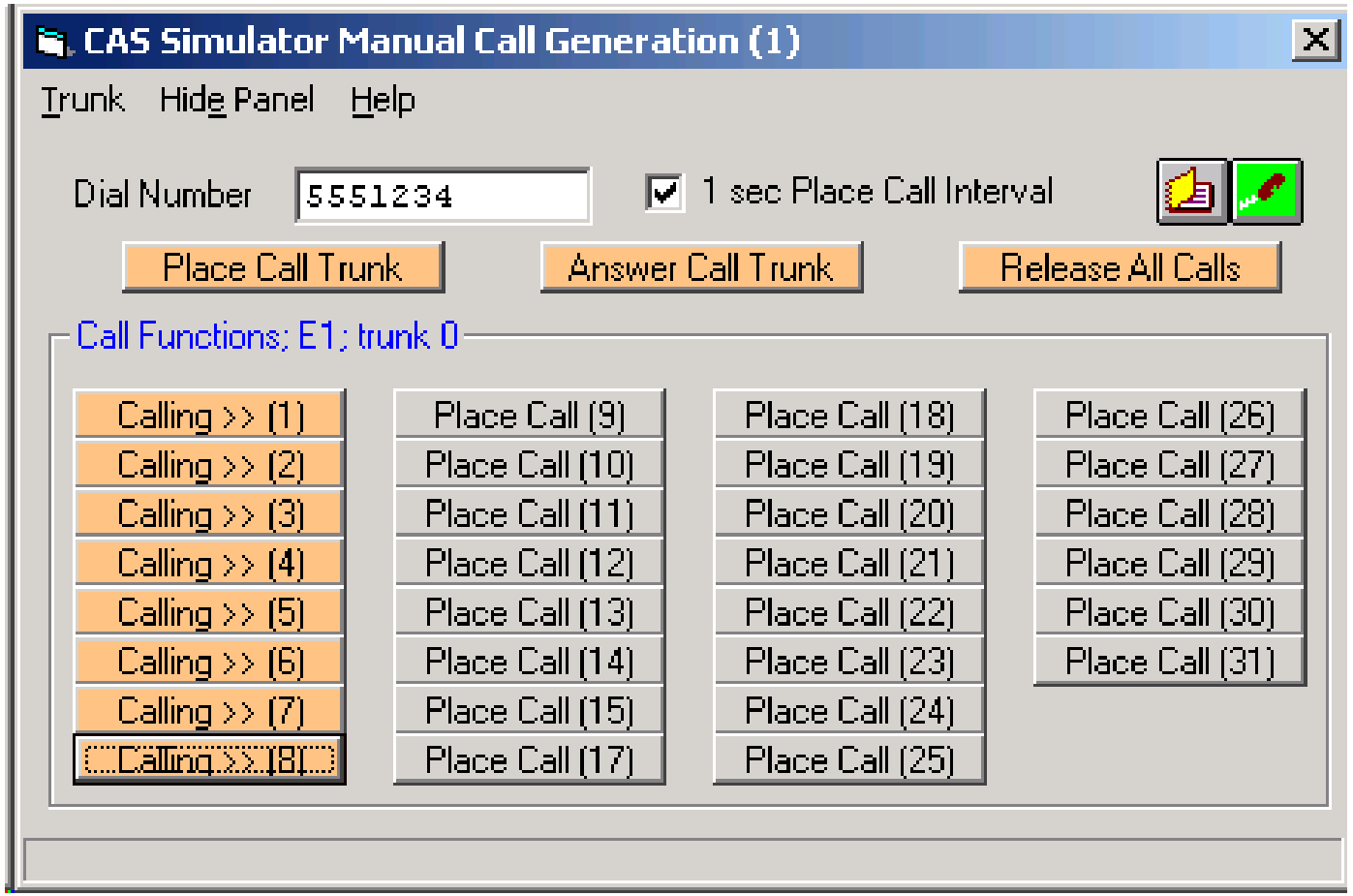
- Provides a way for the users to send Flash Hook signal manually
- Users can vary Flash Hook On Signal (0-F), Flash Hook Off Signal (0-F) and Flash Hook Interval (ms) for a given timeslot
- Flash Hook On Signal should be different than current line signal



GL Communications

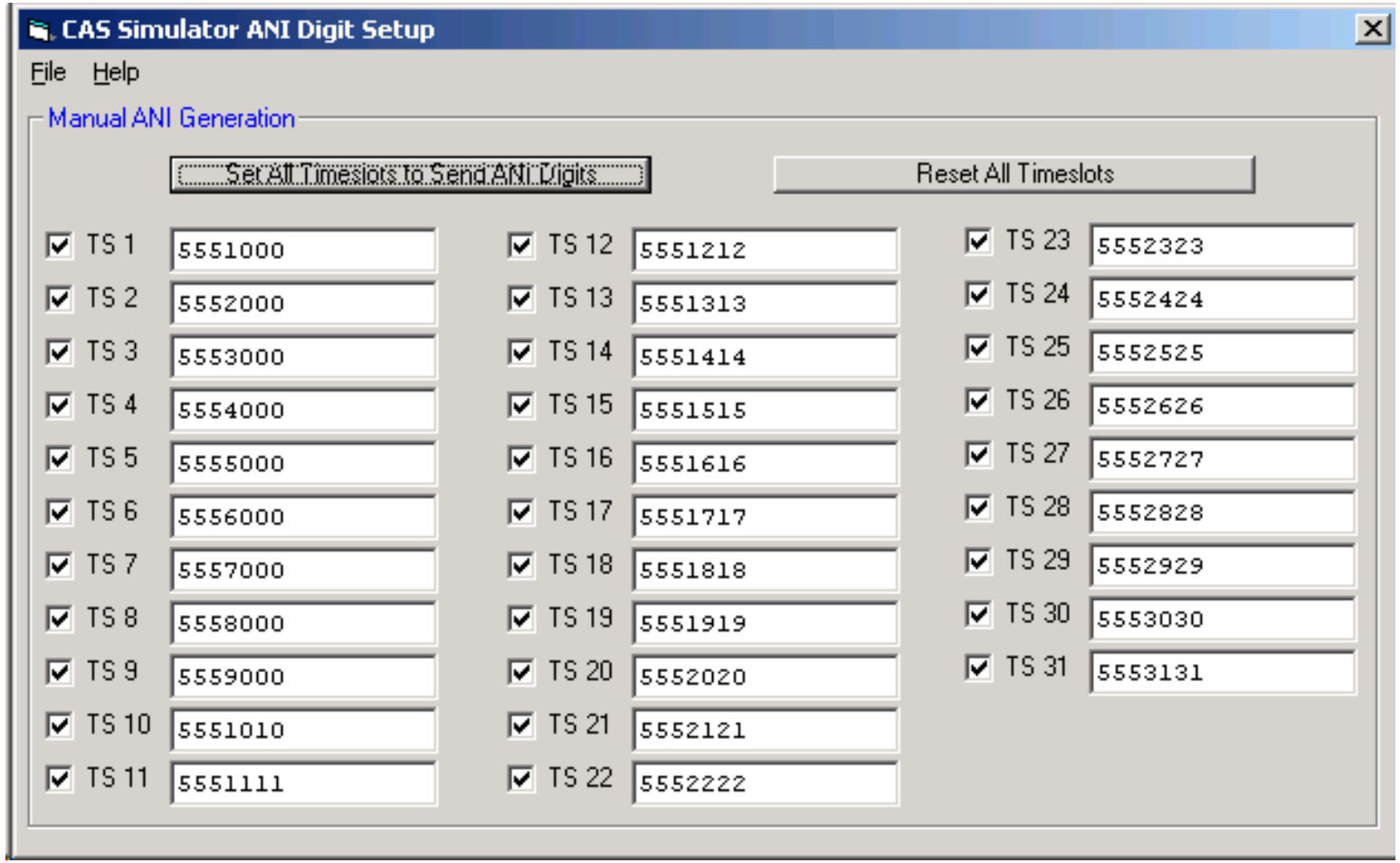
Manual Call Generation

- CAS Simulator processes the receipt of Dialed Number Identification Service (DNIS) and Automatic Number Identification (ANI) information, which is used to support addressing, routing, and other functions

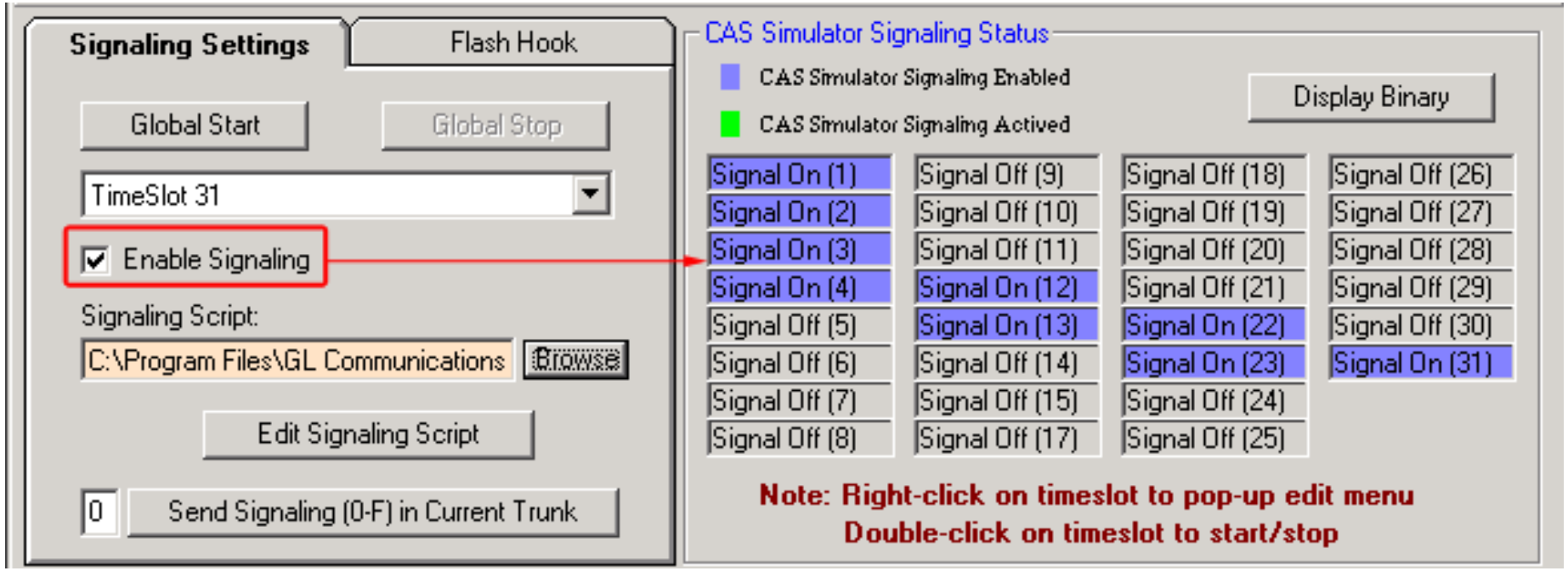


ANI Digit Setup

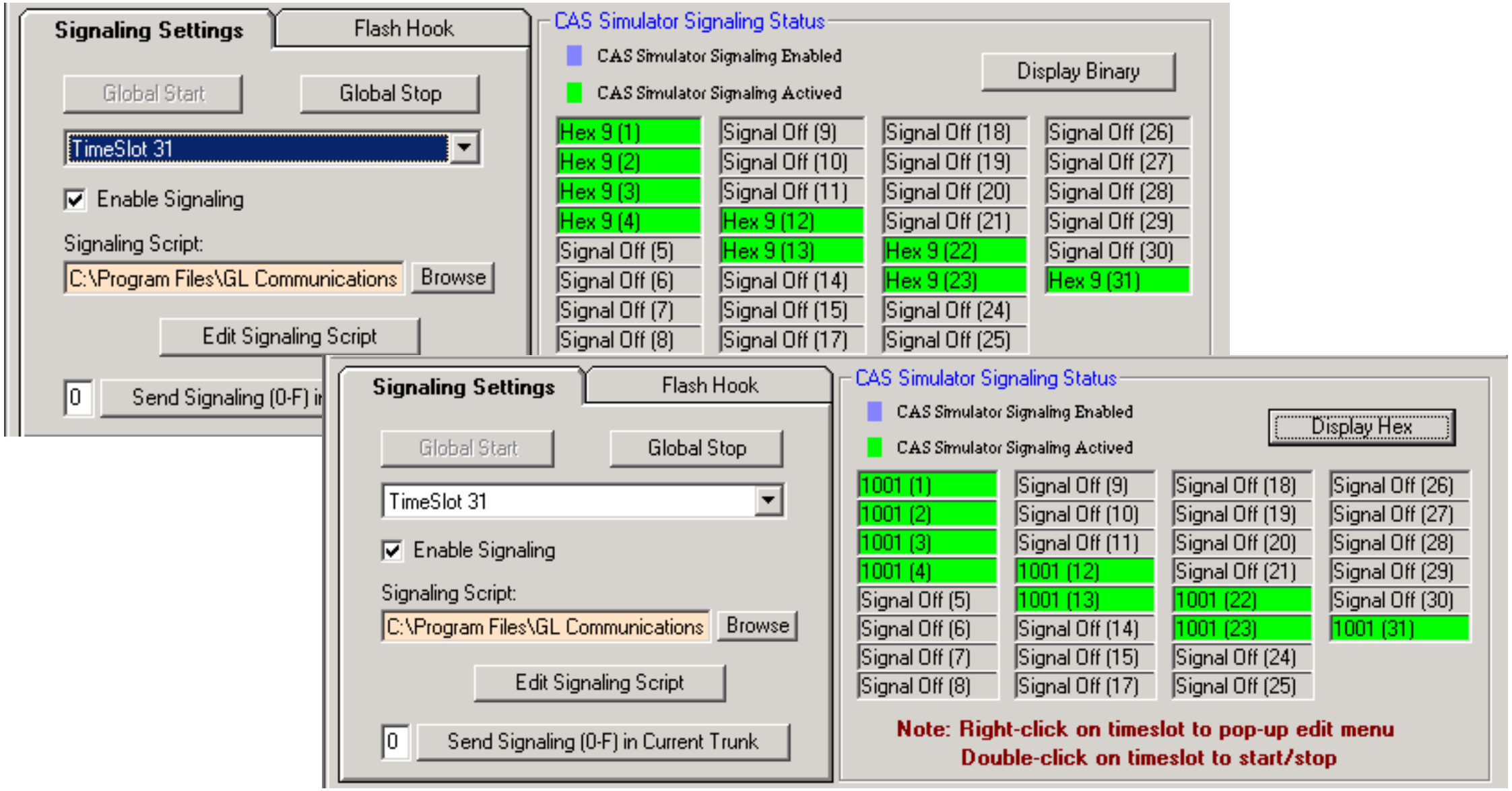
- Enables the user to set ANI digits manually



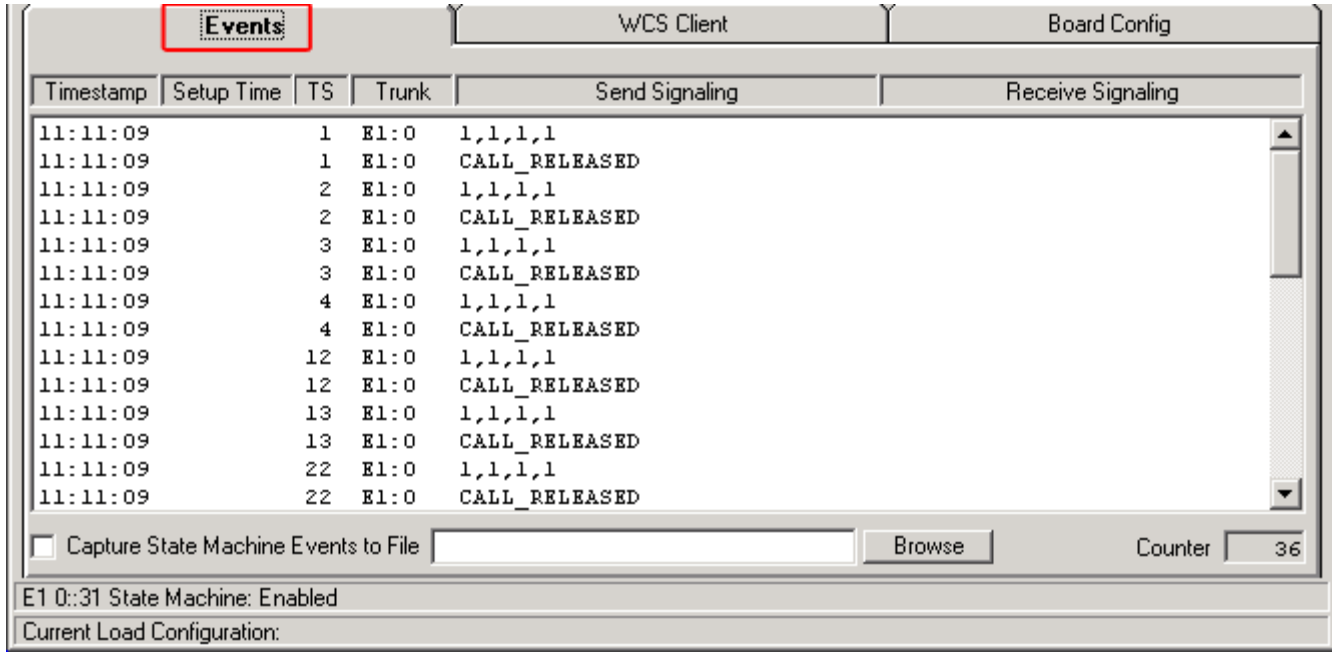
Signal Status - Enabled



Signal Status - Started



Signaling Events



- Information displayed includes all signaling bit transitions as they are processed, and includes a timestamp with date, timeslot and trunk
- The Signals sent and received during the Signaling transition appears in the “Send Signaling” and “Receive Signaling” columns
- Status Events screen chronologically lists the entire signaling bit transitions, digit detections, and tone detections generated by each timeslot of all trunks

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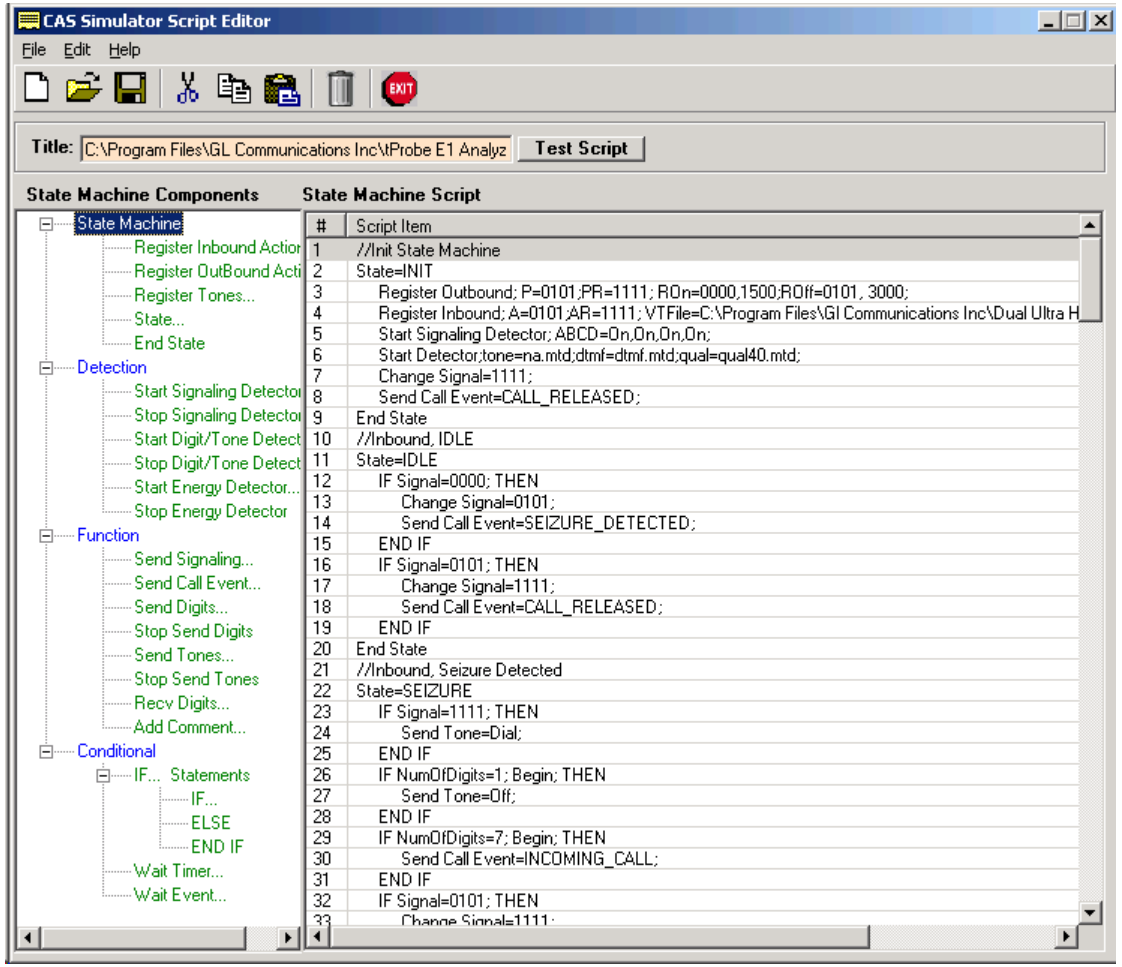
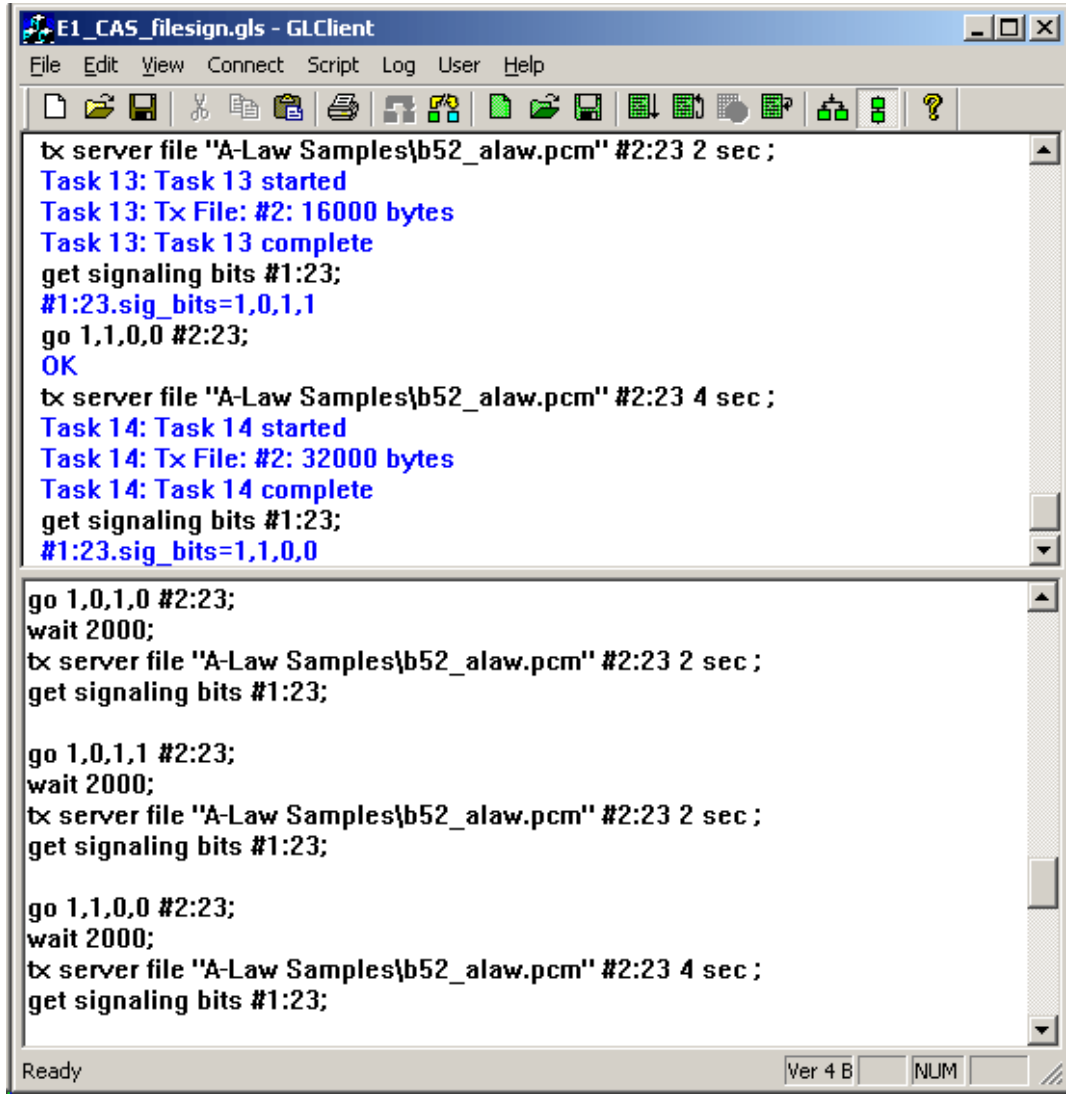
CAS Script Editor

- CAS Simulator script editor is a self-descriptive language that can define the behaviour of CAS Call Control procedure
- Functions such as Place Call, Answer Call, Incoming Call, and Disconnect Call are defined within the script
- Additionally, more advanced script may also be defined in the script editor
- User may define Signaling Bit Transitions and forward/backward digits/tones within each script



CAS Simulator using Command Line

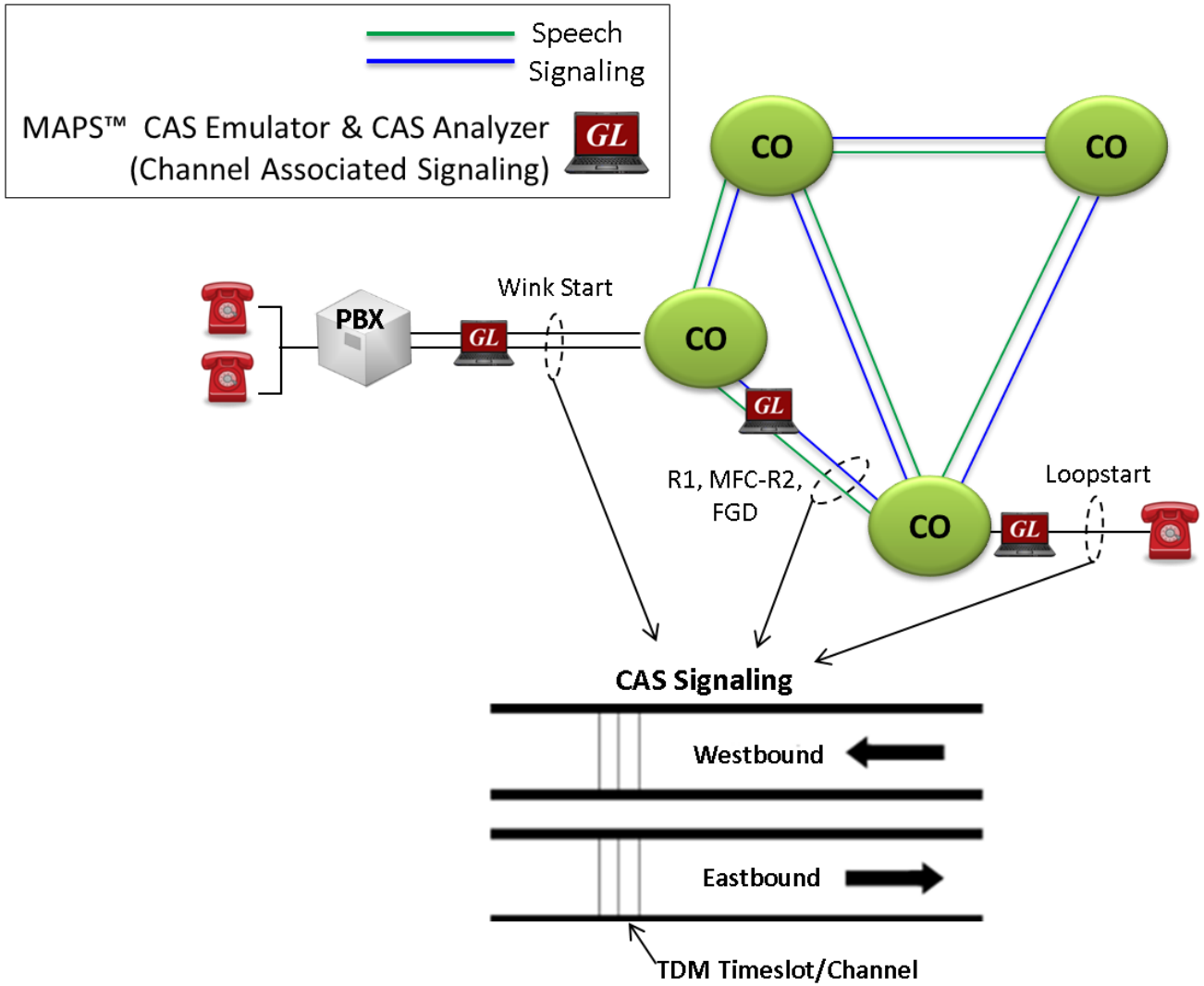
- CAS simulation using client-server command line application



GL Communications

MAPS™ CAS SMULATOR (XX651)

Channel Associated Signaling (CAS)



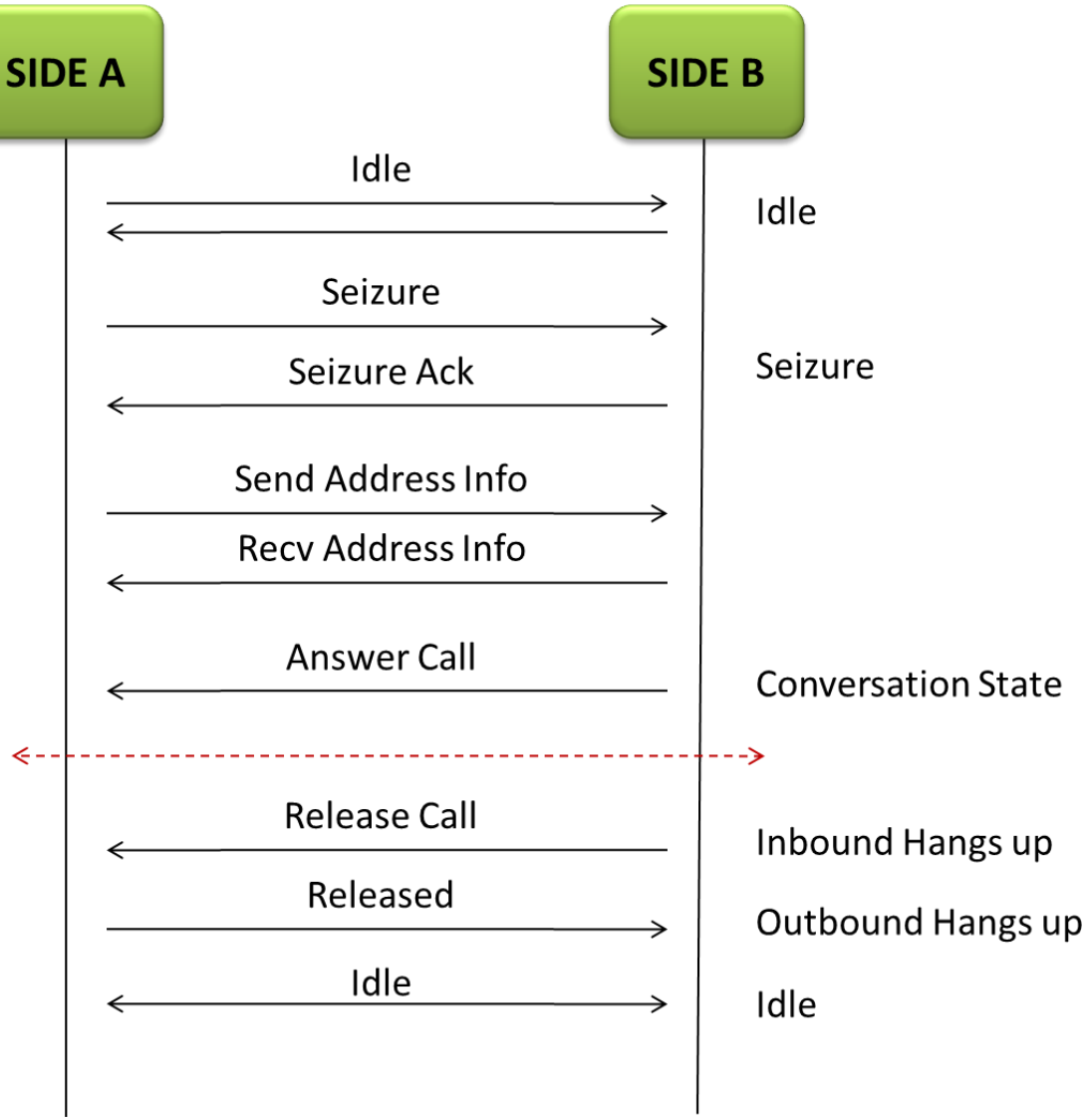
Supported Protocols

MAPS™ CAS Simulator supports the following CAS protocols:

- Winkstart (R1 wink)
- T1 Loopstart
- T1 Groundstart
- T1 Feature Group D
- T1 Immediate Start
- E1 MFC-R2 (All variants, full /semi compelled) - Defined by the ITU Recommendations Q.421-Q.442
- E1 European Digital CAS (EUC)
- E1 Digital E&M
- E1 International Wink Start
- Any User-defined CAS Protocol

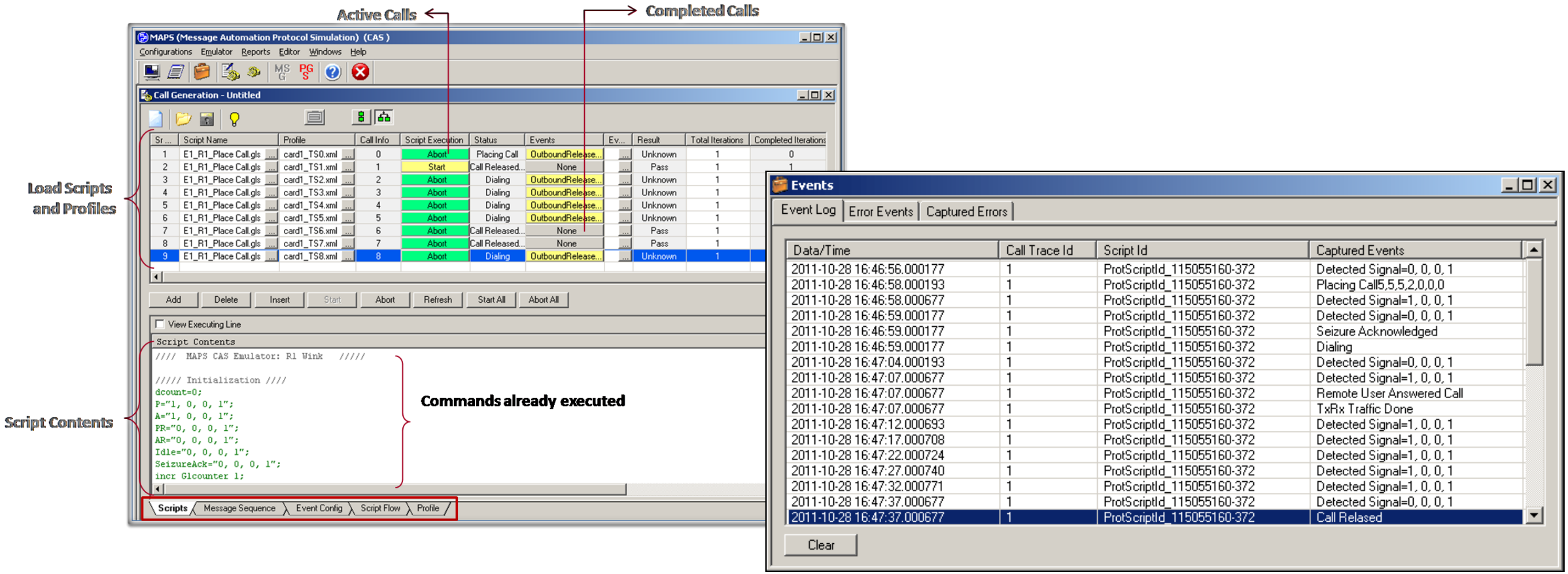
Typical CAS Signaling Procedure

- MFC-R2 Signaling - uses a multi-frequency compelled signaling protocol to exchange address information
- T1 Winkstart (R1 wink) - 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



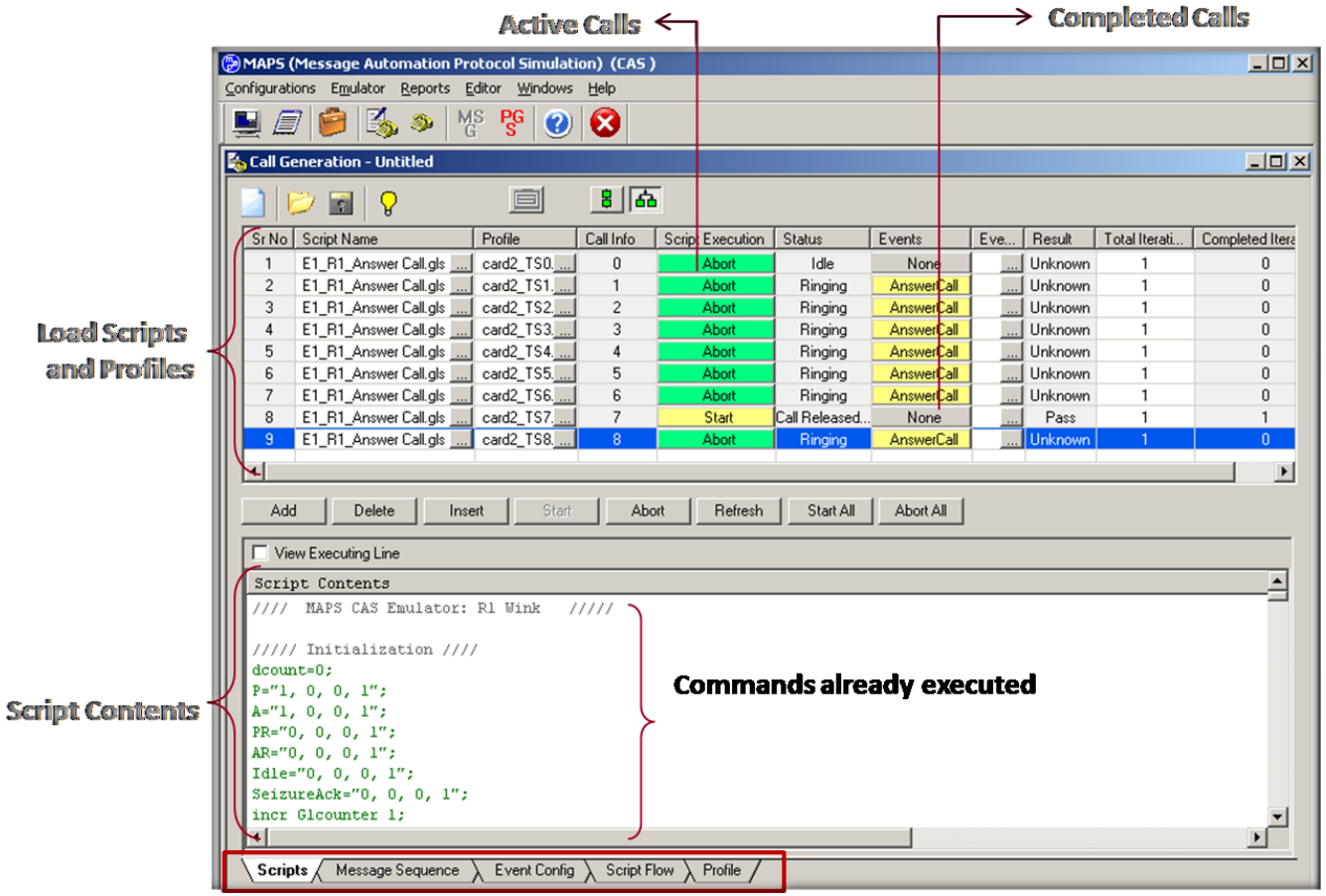
Call Generation and Bulk Call Settings

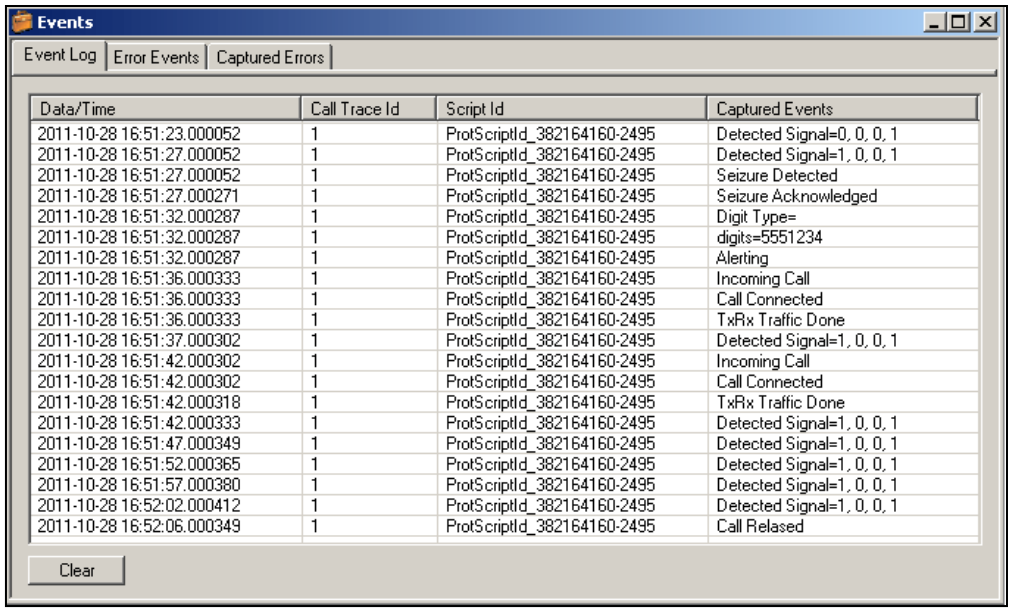
- Supports generation and detection of TDM traffic using CAS
- Supports transmission and detection of signaling information such as signaling bits, DTMF/MF Digits, or Tones



Call Reception

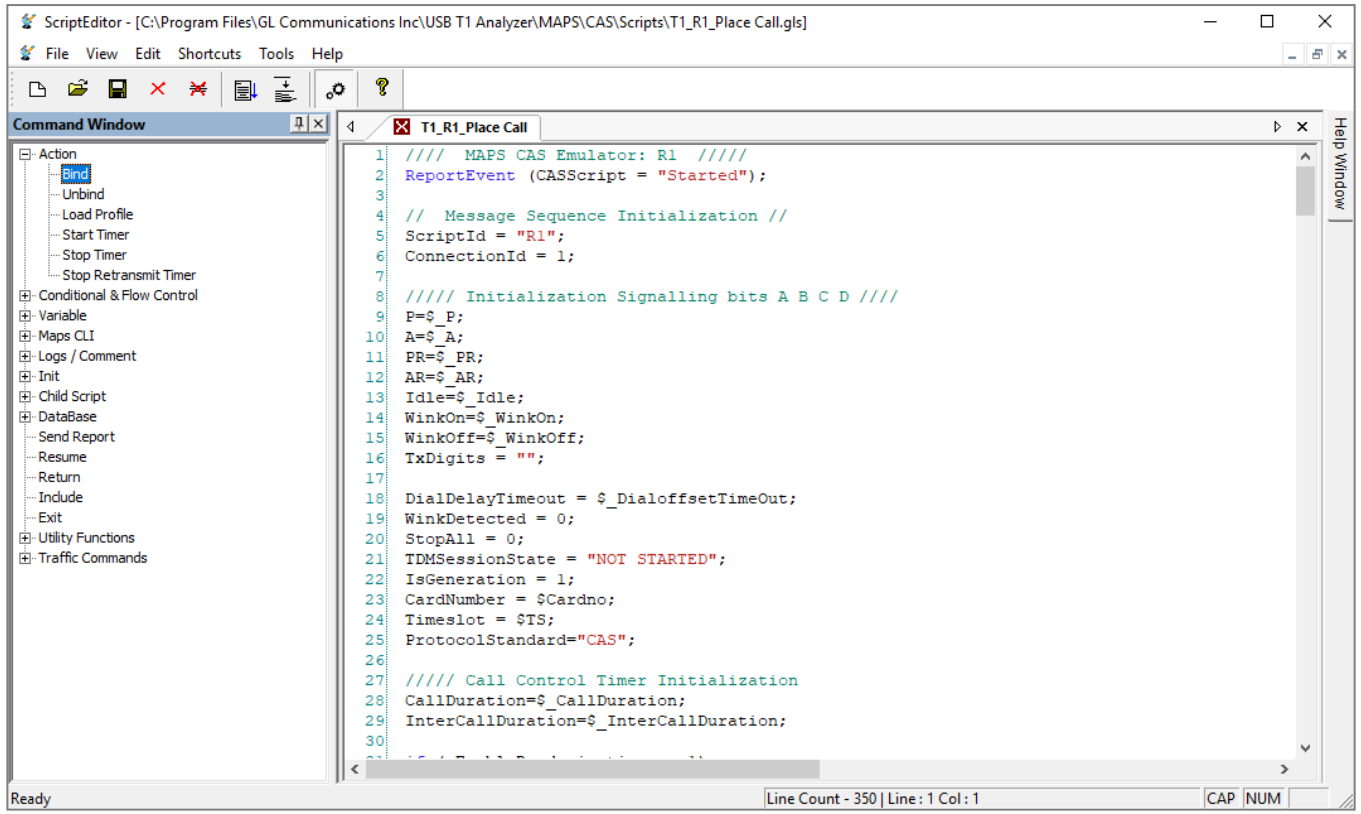
- MAPS™-CAS acting as inbound switch and responds to the incoming signals
- Provides Event Log, Error Events, and Captured Errors report log encountered during the progress of the call





GL Communications

Script Editor



- Script editor allows the user to create / edit scripts and to define variables for the protocol fields
- Uses pre-defined templates to build call flow and perform send and receive actions
- Provides options to run the test for multiple iterations in sequential or random flow
- Commands allow retransmission with specific interval

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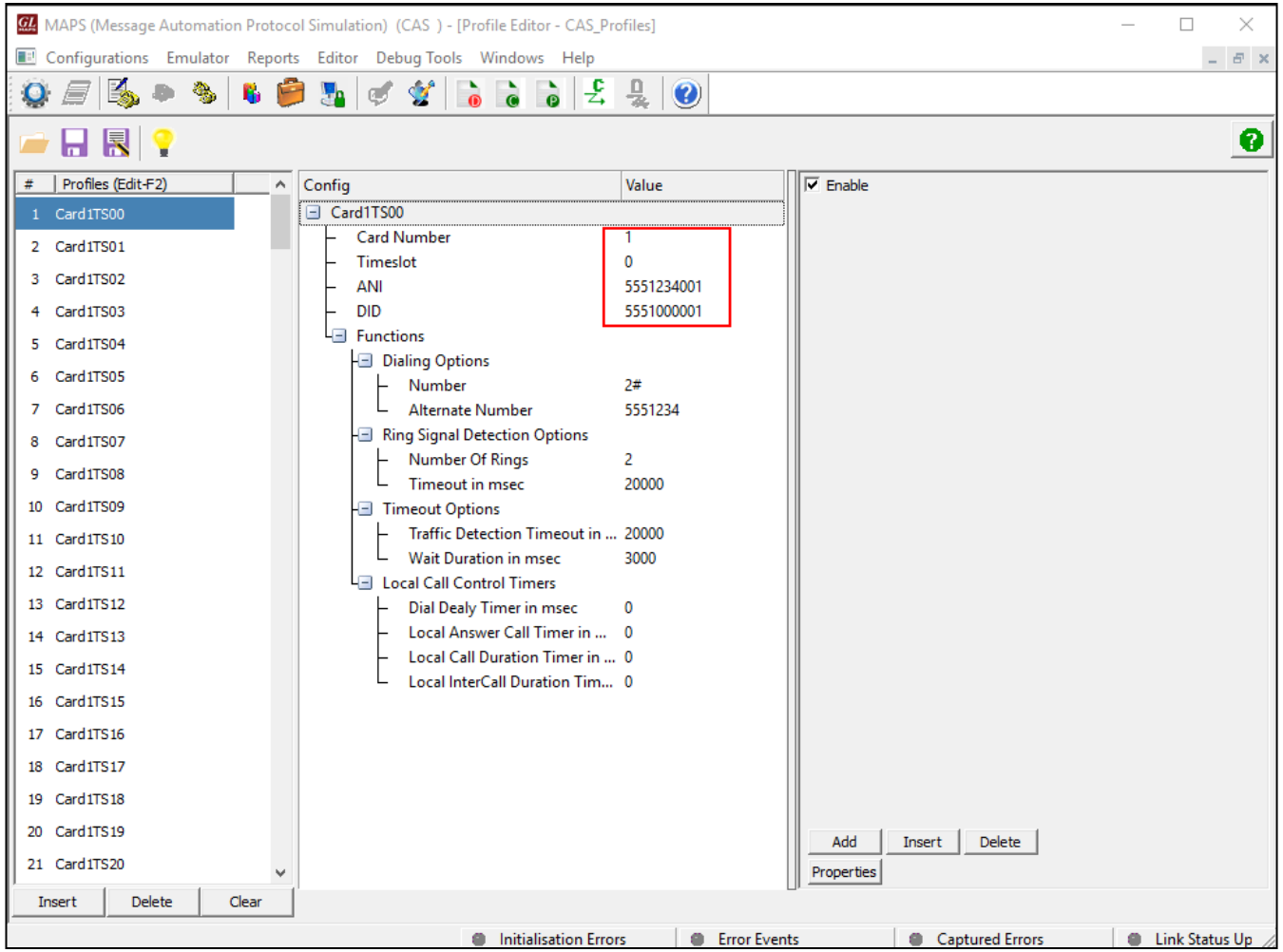
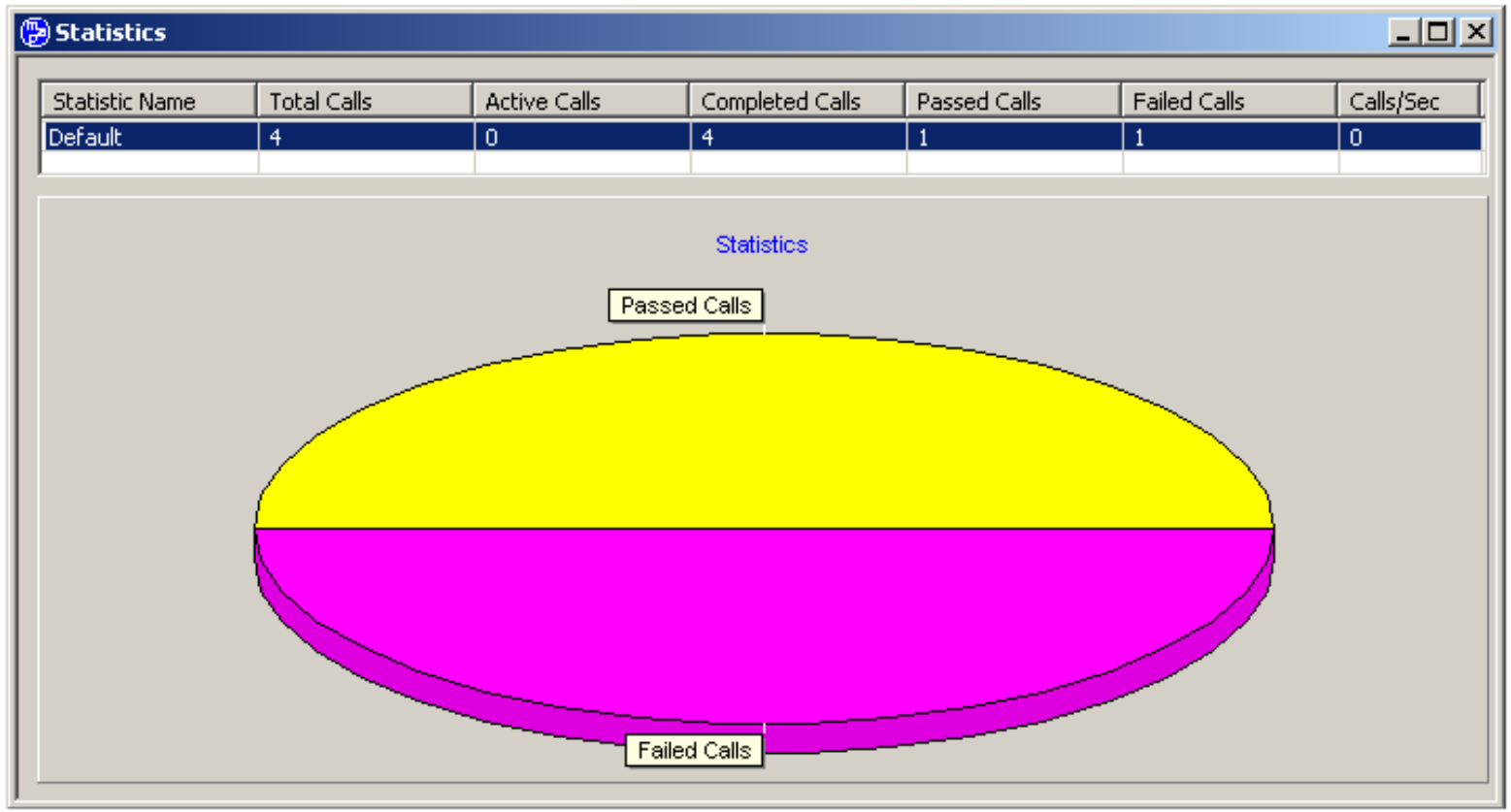
Profile Editor

- Profiles are used to provide the user configured values to the fields through variables which are replaced during a call



Call Statistics and Status

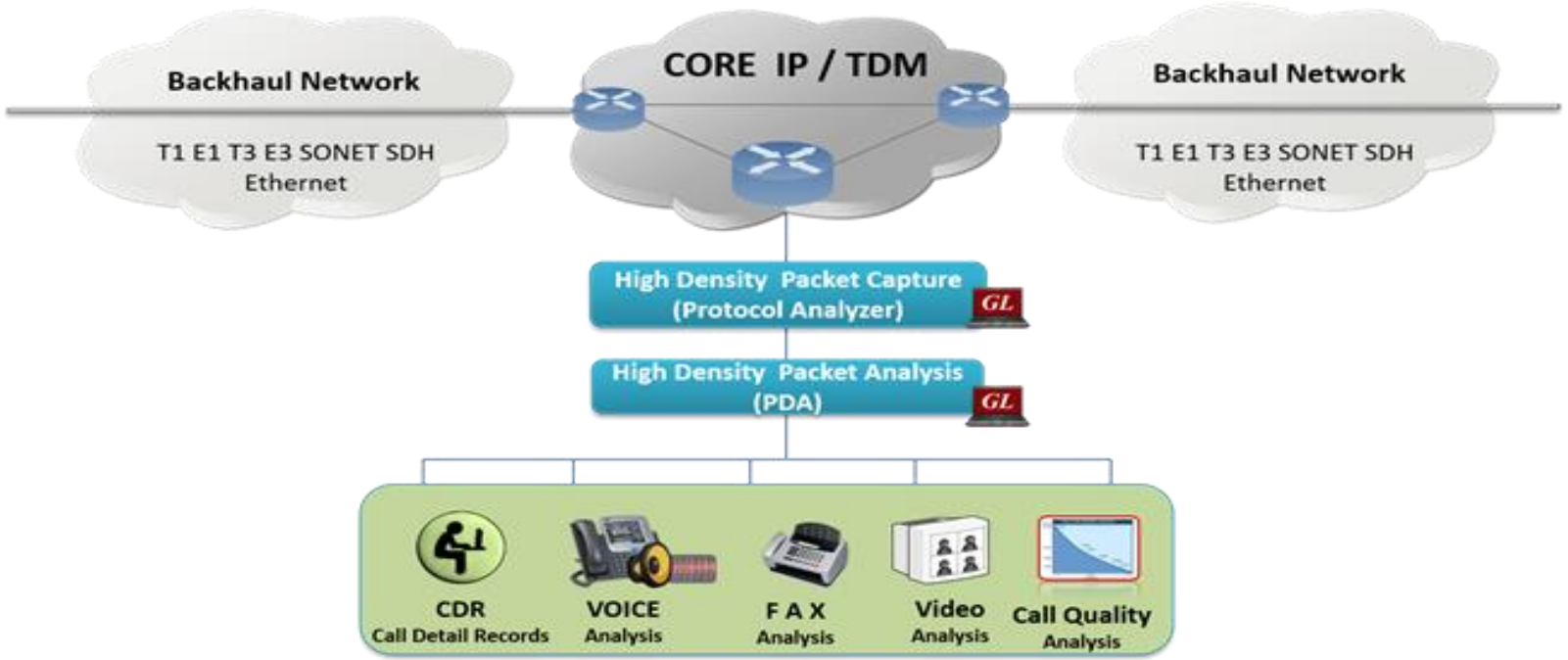
- By default, all call handling scripts (irrespective of the type of the functions) are assessed by MAPS™ to provide statistical information about total calls, active calls, completed calls, passed calls, and failed calls



CAS Packet Data Analysis (PDA)

Packet Data Analyzer over TDM

- Monitors live TDM networks including capture, analysis, and reporting of every call-in detail. Supported protocols include CAS, ISDN, ISUP, CAMEL, MAP, INAP, and GSM



GL's Packet Capture Module
PacketScan, LightSpeed1000, T1 E1 T3 E3 Analyzer Pods

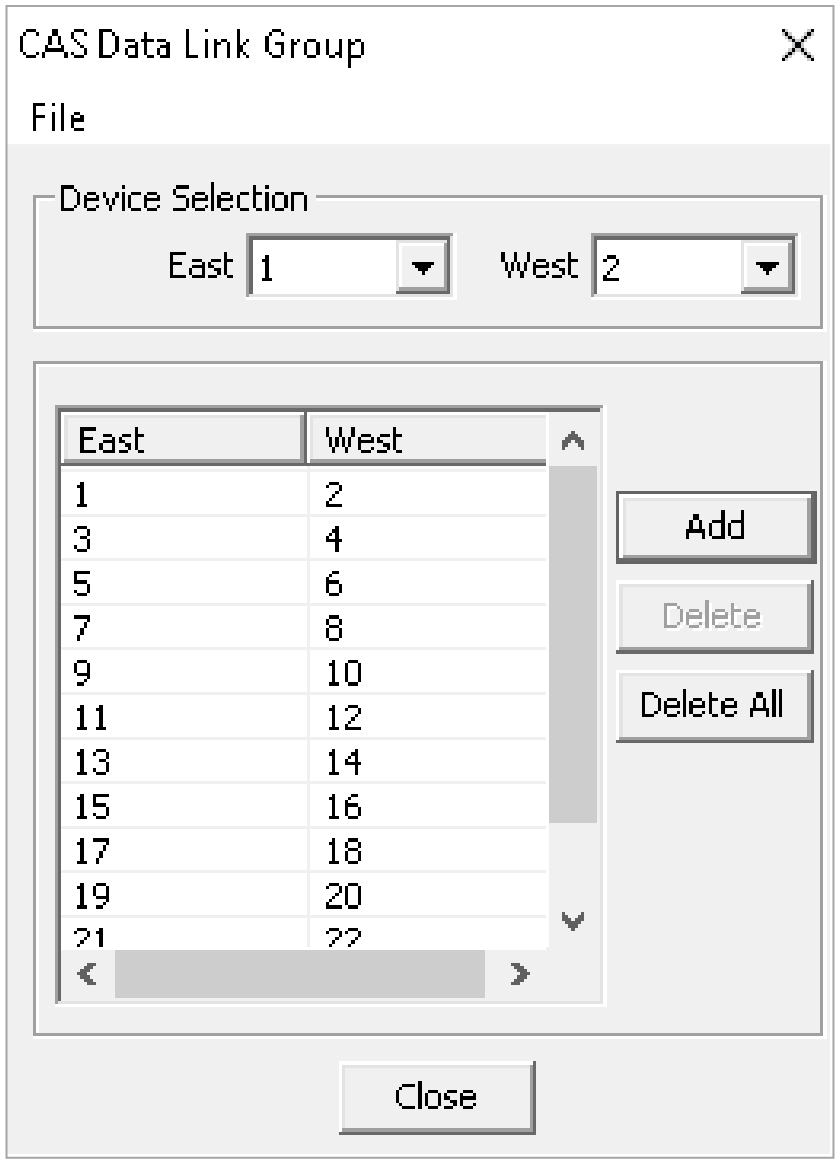
GL's Packet Analysis Module
H.323, LTE, IMS, SIP, MGCP, MEGACO, UMTS, GPRS, GSM A, BICC, CAP, MAP, SIGTRAN

GL Communications

Main Features

CDR, Call Flow, Statistics, and Report Generation	• Isolates call specific information for each individual call from the captured data and displays the information in an organized fashion • A host of call and message counters gives the user an instantaneous snapshot of the traffic on the network. • Pictorial representation of the statistics including ladder diagrams for the calls of various protocols. • Ability to export and analyze call detail records of completed calls in CSV file format. • These reports can be further fed to DB and accessed using GL's NetSurveyorWeb™ Lite for analysis. • Isolates calls, a graphical call flow diagram can be created from a call trace. • Filters on CDR information feature is used to search required calls by using "key" as CDR parameters. • Event counters on CDR information provides over all count of completed events such as total calls, active calls, completed calls, purged calls, failed calls, calls per second, remaining calls and more. • Flexible options are provided to interchange/hide the columns as required.
Traffic Recording	• Supports capturing of voice, digits, tones and FAX etc to *.PCM file format.
Triggers and Actions	• Filter captures based on protocol parameters such as OPC, DPC or CIC in case of ISUP followed by a set of actions such as save call, send mail, trigger alarm notification etc for the completed calls..
Exporting Calls	• Supports saving the selected calls from traffic analyzer into *.HDL, *.PCAP, or *.PCAPNG formats.

CAS Data Link Group



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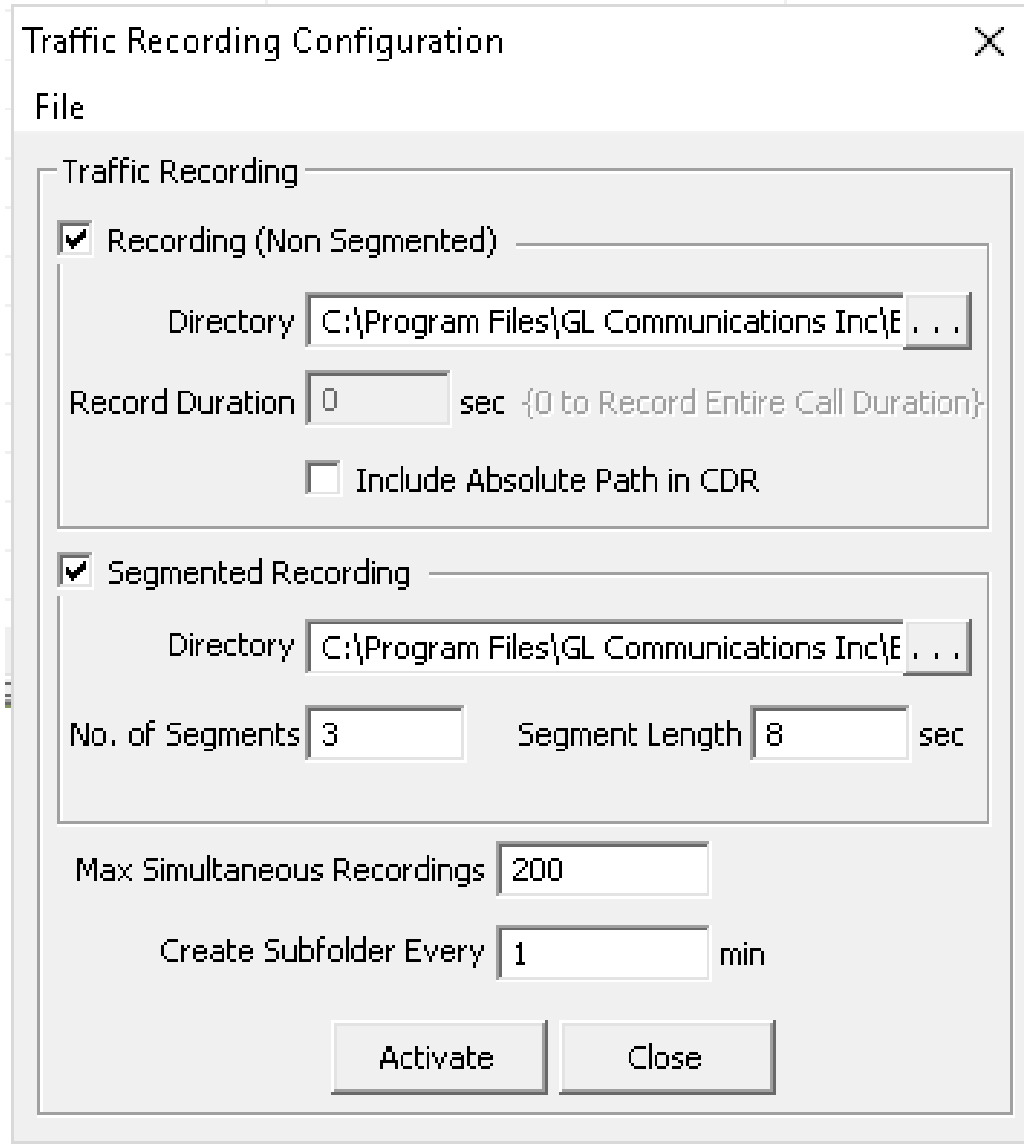
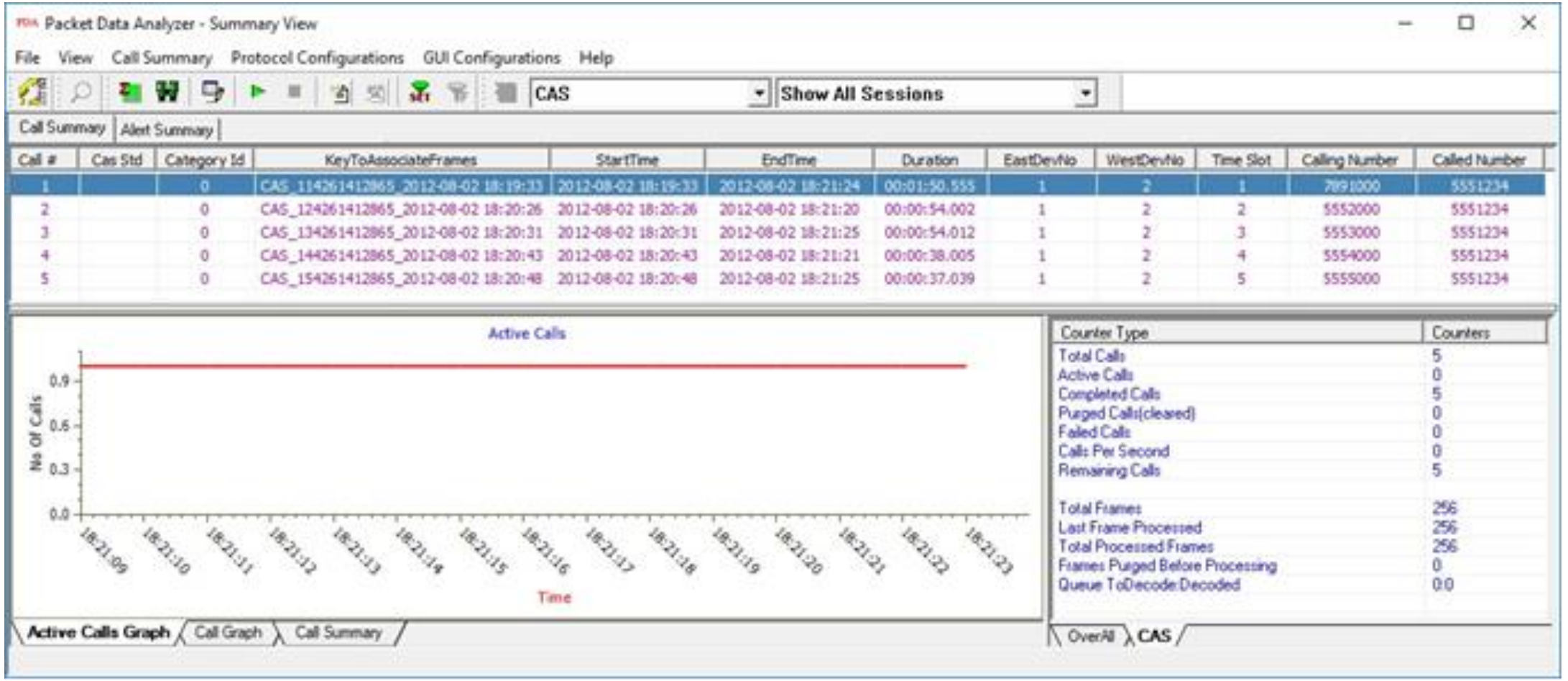
Traffic Recording Configurations

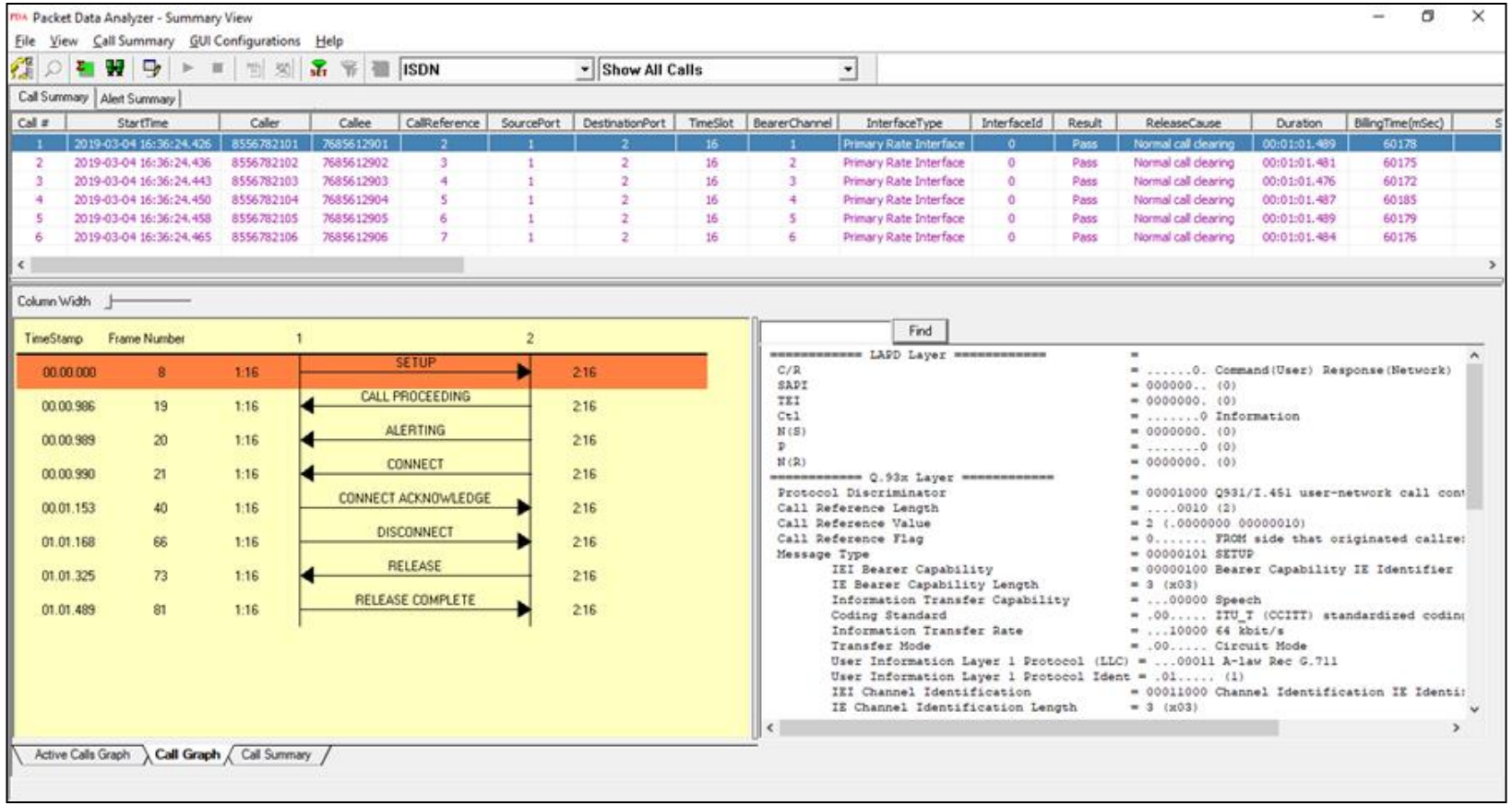


CAS Call Summary

Active Call Graph



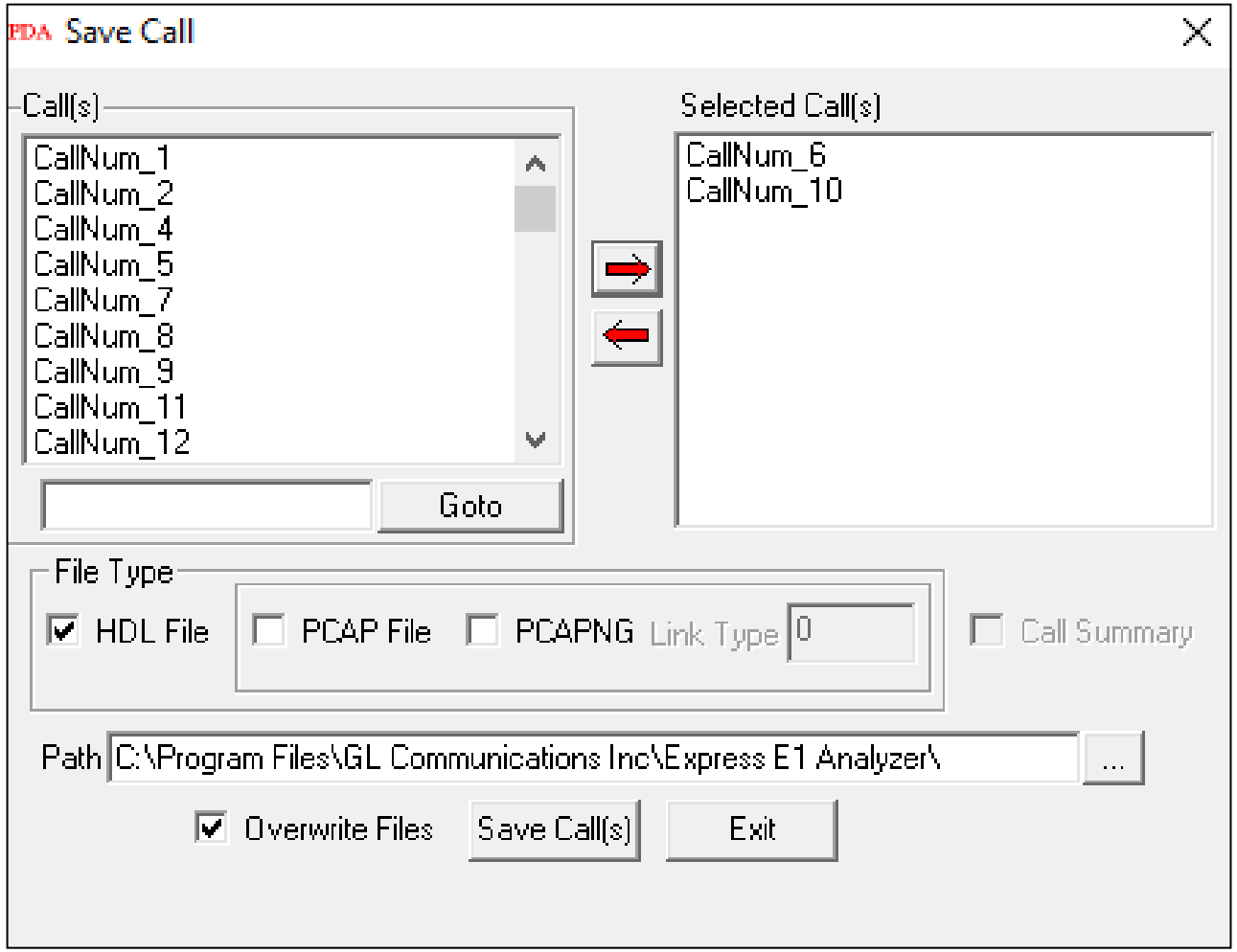
Call Graph


Packet Data Analyzer - Summary View
File View Call Summary GUI Configurations Help
ISDN
Show All Calls
Call Summary
Alert Summary
Call # StartTime Caller Callee CallReference SourcePort DestinationPort TimeSlot BearerChannel InterfaceType InterfaceId Result ReleaseCause Duration BillingTime(mSec)
1 2019-03-04 16:36:24.426 8556782101 7685612901 2 1 2 16 1 Primary Rate Interface 0 Pass Normal call clearing 00:01:01.489 60178
2 2019-03-04 16:36:24.436 8556782102 7685612902 3 1 2 16 2 Primary Rate Interface 0 Pass Normal call clearing 00:01:01.481 60175
3 2019-03-04 16:36:24.443 8556782103 7685612903 4 1 2 16 3 Primary Rate Interface 0 Pass Normal call clearing 00:01:01.476 60172
4 2019-03-04 16:36:24.450 8556782104 7685612904 5 1 2 16 4 Primary Rate Interface 0 Pass Normal call clearing 00:01:01.487 60185
5 2019-03-04 16:36:24.458 8556782105 7685612905 6 1 2 16 5 Primary Rate Interface 0 Pass Normal call clearing 00:01:01.489 60179
6 2019-03-04 16:36:24.465 8556782106 7685612906 7 1 2 16 6 Primary Rate Interface 0 Pass Normal call clearing 00:01:01.484 60176
Column Width
TimeStamp Frame Number 1 2
00.00.000 8 1:16 SETUP 2:16
00.00.986 19 1:16 CALL PROCEEDING 2:16
00.00.989 20 1:16 ALERTING 2:16
00.00.990 21 1:16 CONNECT 2:16
00.01.153 40 1:16 CONNECT ACKNOWLEDGE 2:16
01.01.168 66 1:16 DISCONNECT 2:16
01.01.325 73 1:16 RELEASE 2:16
01.01.489 81 1:16 RELEASE COMPLETE 2:16
Find
========== LAPD Layer ==========
C/R = ...0. Command(User) Response(Network)
SAPI = 000000.. (0)
TEI = 0000000. (0)
Ctl = ...0 Information
N(S) = 0000000. (0)
P = ...0 (0)
N(R) = 0000000. (0)
========== Q.93x Layer ==========
Protocol Discriminator = 00001000 Q931/I.451 user-network call con
Call Reference Length = ...0010 (2)
Call Reference Value = 2 (.0000000 00000010)
Call Reference Flag = 0....... FROM side that originated callre
Message Type = 00000101 SETUP
IEI Bearer Capability = 00000100 Bearer Capability IE Identifier
IE Bearer Capability Length = 3 (x03)
Information Transfer Capability = ...00000 Speech
Coding Standard = .00..... ITU_T (CCITT) standardized codin
Information Transfer Rate = ...10000 64 kbit/s
Transfer Mode = .00..... Circuit Mode
User Information Layer 1 Protocol (LLC) = ...00011 A-law Rec G.711
User Information Layer 1 Protocol Ident = .01..... (1)
IEI Channel Identification = 00011000 Channel Identification IE Identi
IE Channel Identification Length = 3 (x03)
Active Calls Graph
Call Graph
Call Summary

Triggers and Action Settings

Save Call to File

- Allows the users to save the filtered files either in *.HDL, *.PCAP, or *.PCAPNG format

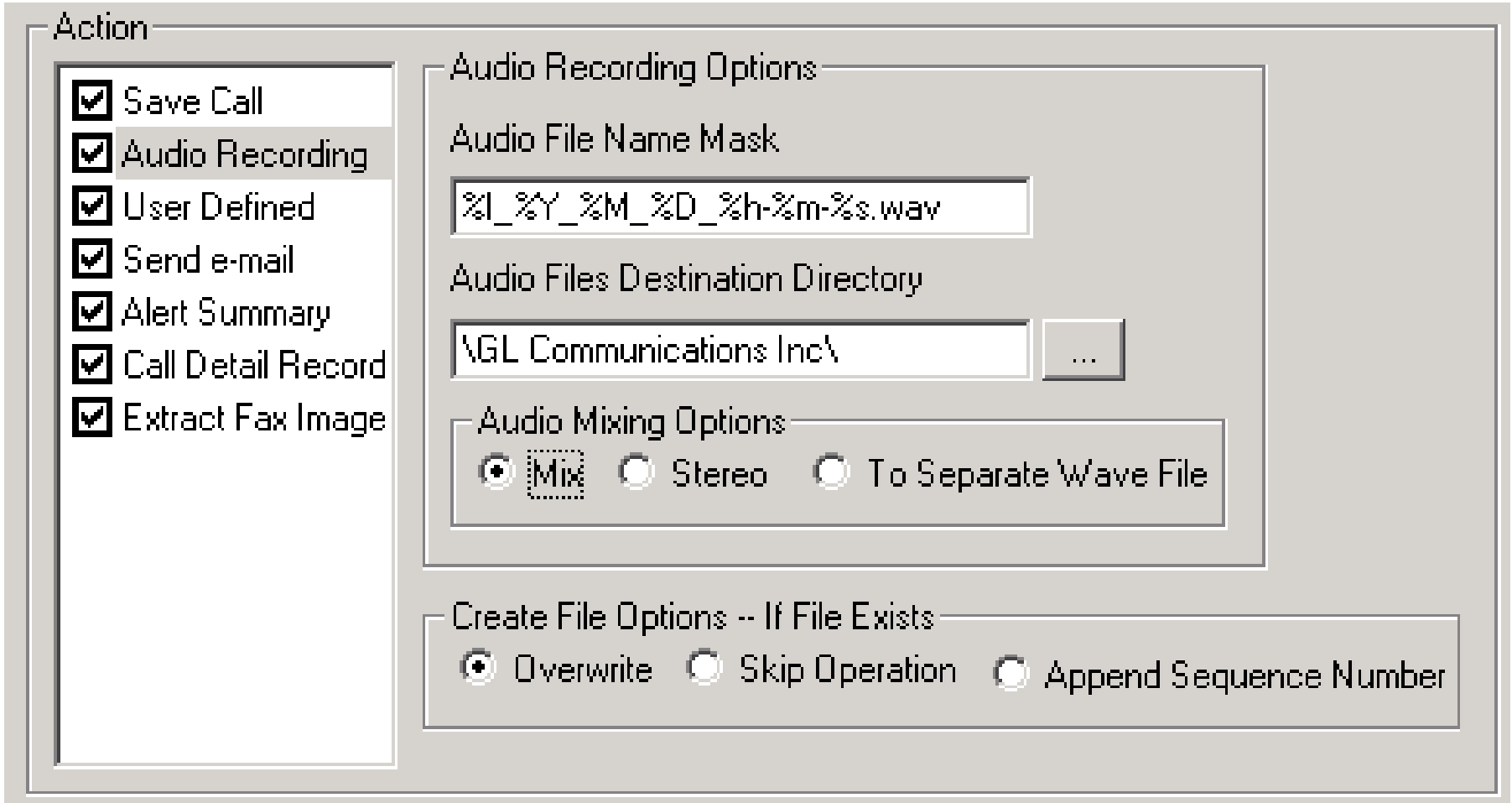


Audio Recording

- Allows to save the filtered files as the voice files in *.wav format

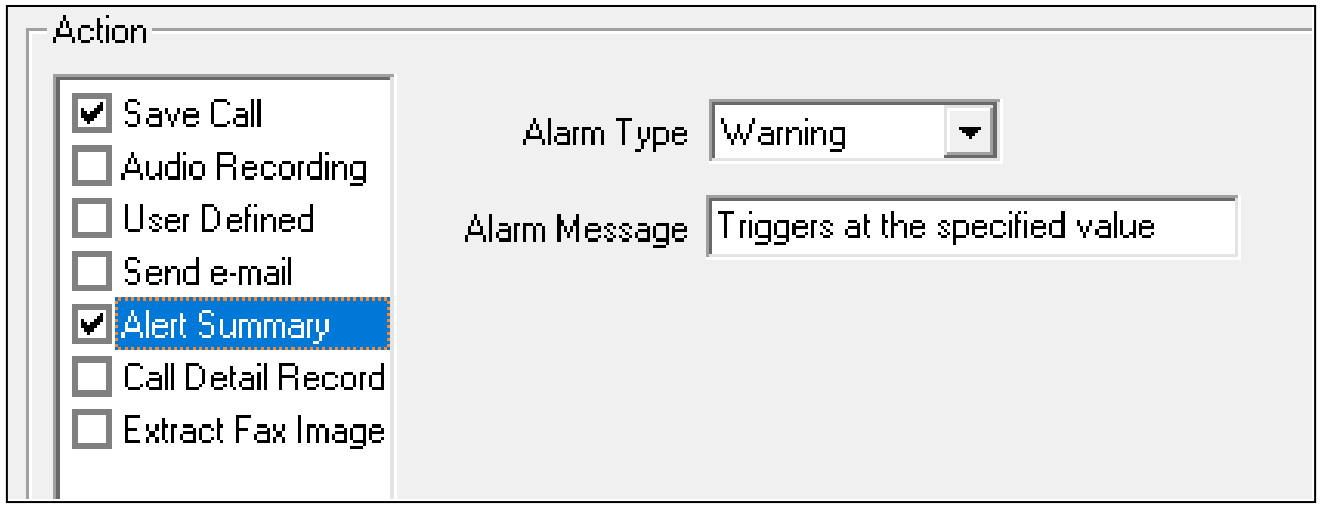
Send e-mail

- With this option, the Packet Data Analyzer sends an e-mail containing useful information about each filtered call



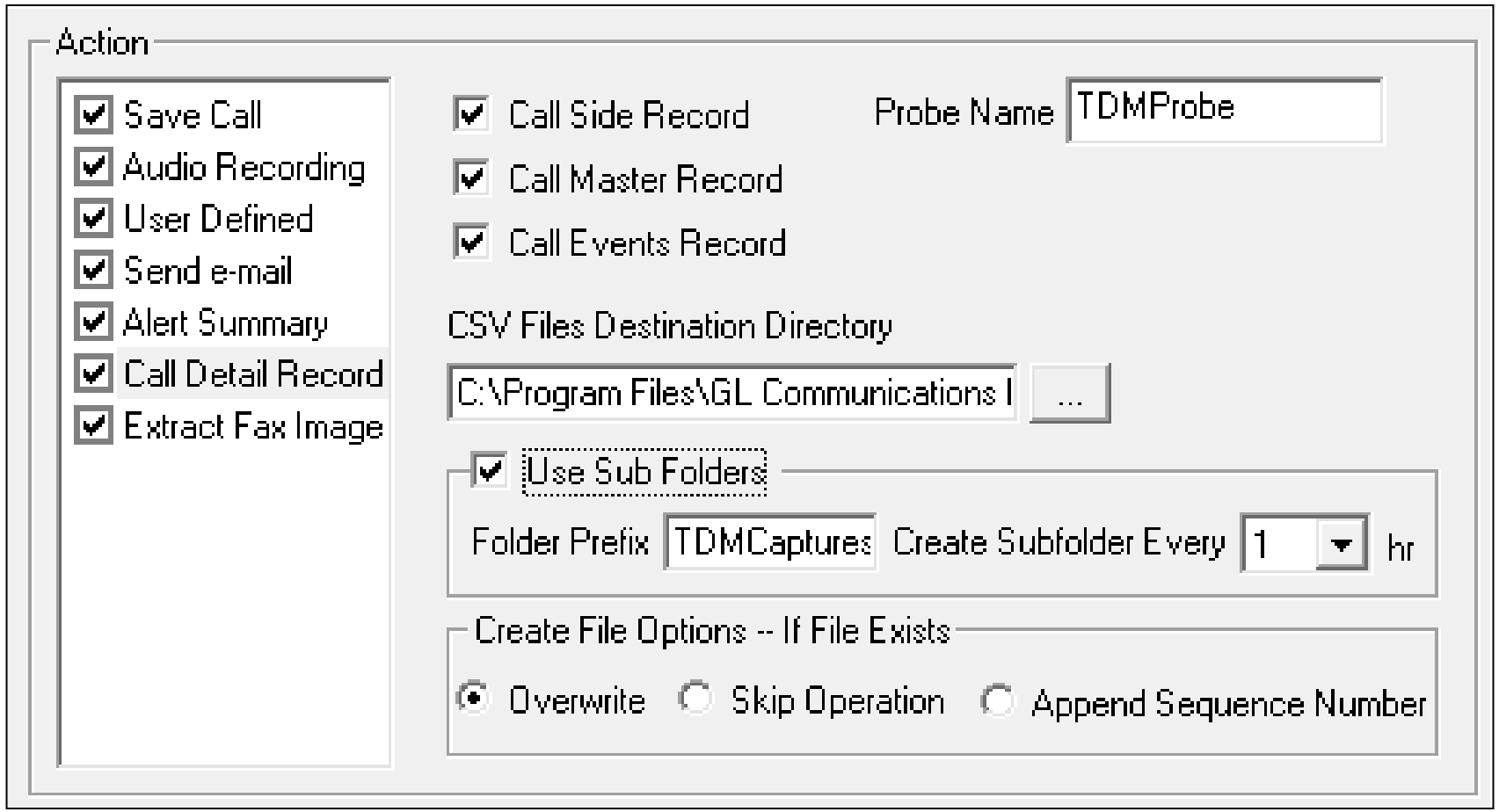
Alert Summary

- With this option, the user can set the alarm type and alarm message for the selected triggering type

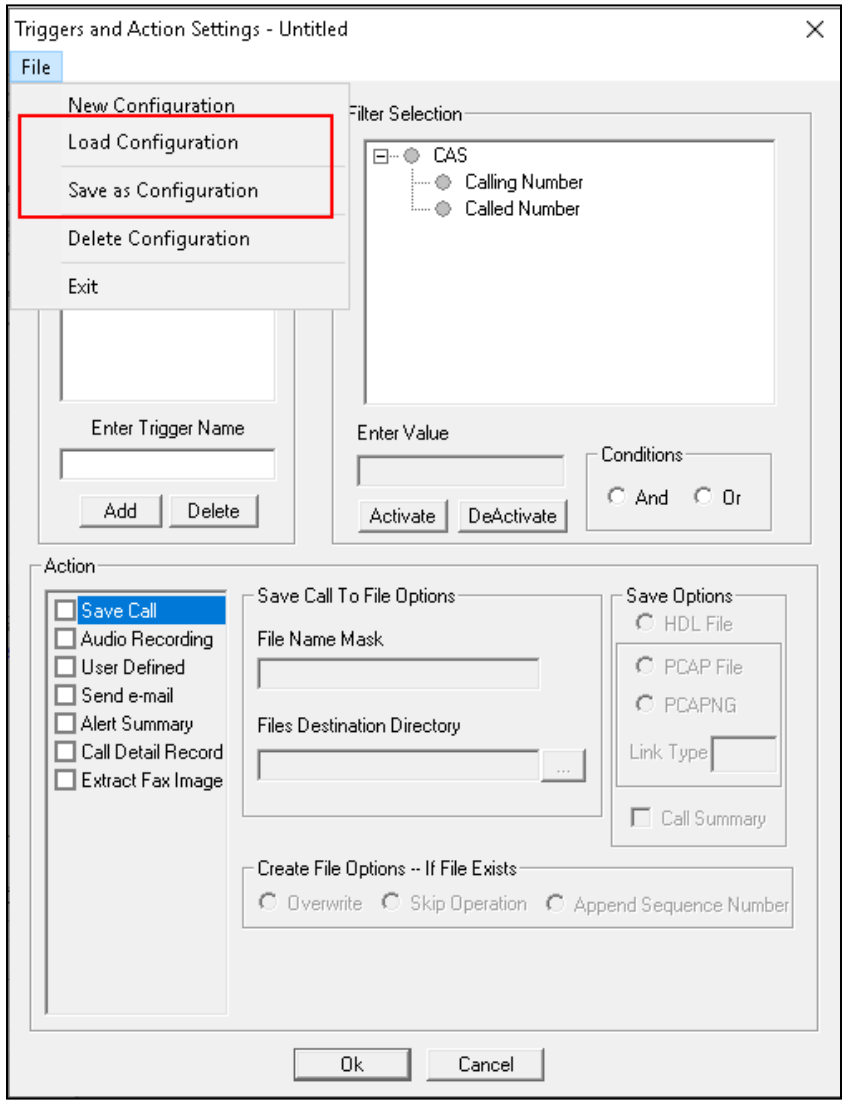


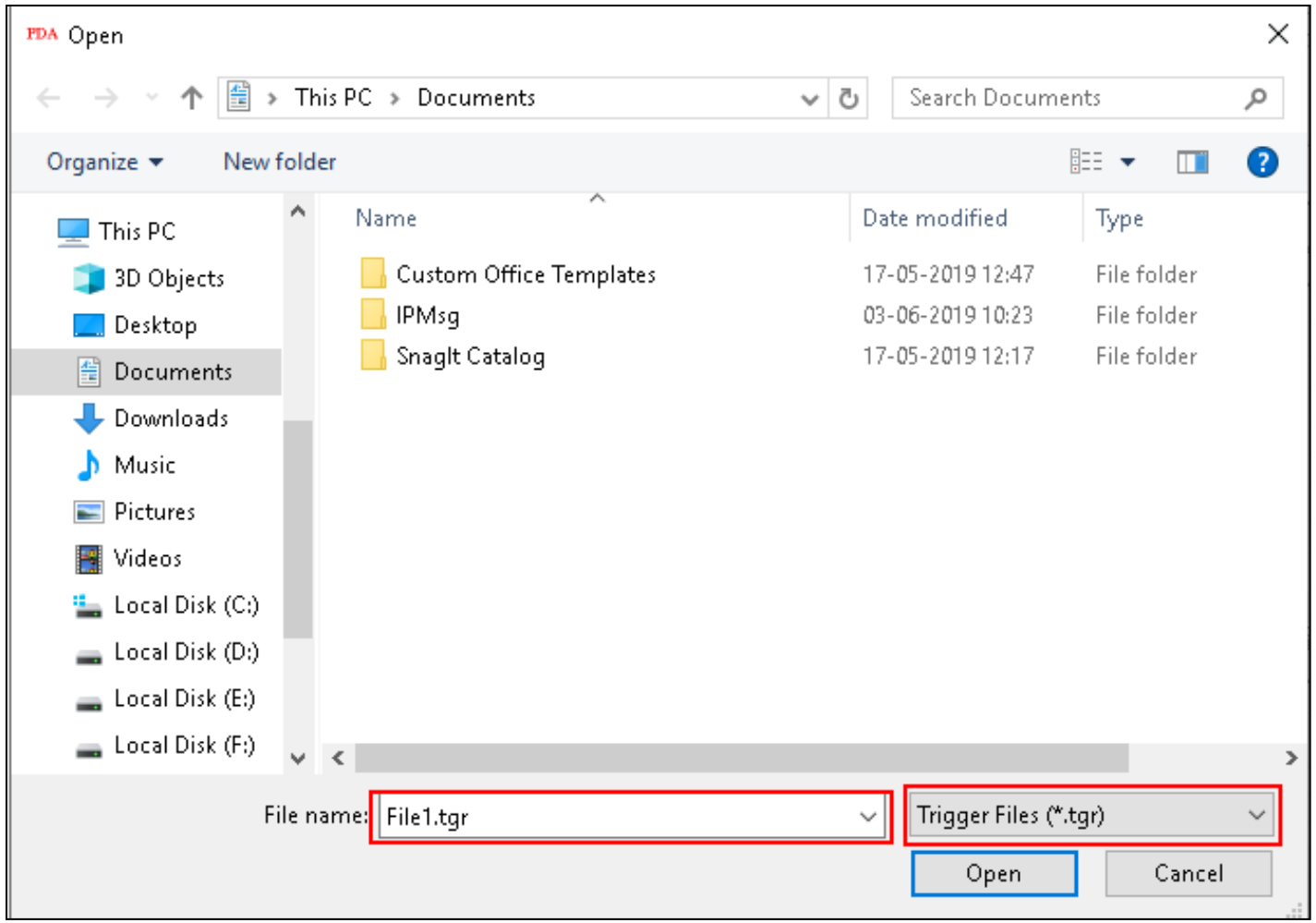
Call Detail Record (CDR)

- With this option, the Packet Data Analyzer can output call detail records (CDR) in the form of three Comma Separated Value (CSV) files such as Call Side Record, Call Master Record, and Call Events



Load or Save Configurations

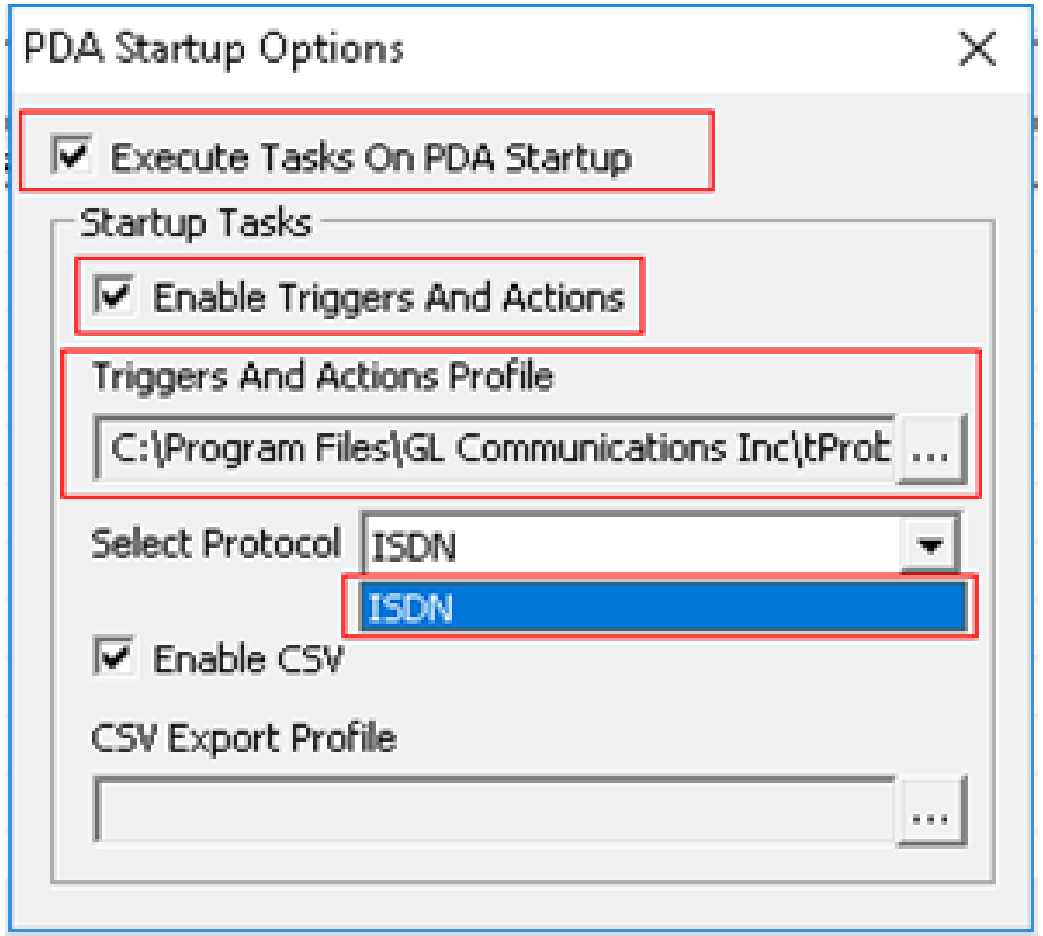




GL Communications

PDA Startup Options

- Allows user to configure start-up tasks which will be started automatically whenever PDA is launched
- Loads the selected Triggers and Actions profile while invoking PDA



Thank you