Channel Associated Signaling (CAS) Analysis and Simulation
Index

• CAS Protocol Analysis
• CAS Simulator (GUI)
• Bulk CAS Simulation using MAPS™
• CAS Packet Data Analysis (PDA)
T1 E1 Analyzer Hardware Platform
TDM mTOP™ Solutions

mTOP™ tprobe FXO FXS with Dual UTA

1U tProbe with FXO and FXS
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.
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.
Real-time Analysis

Card1 TimeSlot=1 Frame=0 at 00:00:00.000000 OK Len=2
HDLC Frame Data + PCS
  Event Type  CAS-NPCR2 Layer
  Signal      = 00000001 Signal
  = ....1101 Seizure Ack Or Clear Back

How Dump of the Frame Data

<table>
<thead>
<tr>
<th>Call ID</th>
<th>Call Status</th>
<th>Call Start Date &amp; Time</th>
<th>Call Duration</th>
<th>Dev No</th>
<th>TS</th>
<th>Calling Number</th>
<th>Called N.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>active</td>
<td>2012-06-13 16:02:06.497000</td>
<td>00:00:00.524000</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>active</td>
<td>2012-06-13 16:02:06.497000</td>
<td>00:00:00.524000</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>complete</td>
<td>2012-06-13 16:02:06.497000</td>
<td>00:00:00.524000</td>
<td>1</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>active</td>
<td>2012-06-13 16:02:06.497000</td>
<td>00:00:00.524000</td>
<td>1</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>active</td>
<td>2012-06-13 16:02:06.497000</td>
<td>00:00:00.524000</td>
<td>1</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Running, Utilisation 0.00%
Protocol Standard
Call Detail Records

![Call Detail Records](image_url)

- **Call ID**
- **Call Status**
- **Call Start Date & Time**
- **Call Duration**
- **DestNo**
- **TS**
- **Calling Number**
- **Called Number**
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 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
Manual Call Generation

- CAS Simulator processes the receipt of Dialled 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 Interface]

- **Enable Signaling** is checked.
- **Signal On** and **Signal Off** options are displayed.
- **Flash Hook** is available.
- **CAS Simulator Signaling Status**:
  - CAS Simulator Signaling Enabled
  - CAS Simulator Signaling Activated

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**Note:**
- Right-click on timeslot to pop-up edit menu.
- Double-click on timeslot to start/stop.

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GL Communications
Signal Status - Started
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.
CAS Script Editor

- CAS Simulator script editor is a self-descriptive language that can define the behavior 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
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 & 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.
• 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.
Profiles are used to provide the user configured values to the fields through variables which are replaced during the course of a call.
Call Statistics & 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.
## Main Features

<table>
<thead>
<tr>
<th>CDR, Call Flow, Statistics, and Report Generation</th>
<th>Isolates call specific information for each individual call from the captured data and displays the information in an organized fashion.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A host of call and message counters gives the user an instantaneous snapshot of the traffic on the network.</td>
</tr>
<tr>
<td></td>
<td>Pictorial representation of the statistics including ladder diagrams for the calls of various protocols.</td>
</tr>
<tr>
<td></td>
<td>Ability to export and analyze call detail records of completed calls in CSV file format.</td>
</tr>
<tr>
<td></td>
<td>These reports can be further fed to DB and accessed using GL’s NetSurveyorWeb™ Lite for analysis.</td>
</tr>
<tr>
<td></td>
<td>Isolates calls, a graphical call flow diagram can be created from a call trace.</td>
</tr>
<tr>
<td></td>
<td>Filters on CDR information feature is used to search required calls by using “key” as CDR parameters.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Flexible options are provided to interchange/hide the columns as required.</td>
</tr>
<tr>
<td>Traffic Recording</td>
<td>Supports capturing of voice, digits, tones and FAX etc to *.PCM file format.</td>
</tr>
<tr>
<td>Triggers and Actions</td>
<td>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..</td>
</tr>
<tr>
<td>Exporting Calls</td>
<td>Supports saving the selected calls from traffic analyzer into *.HDL, *.PCAP, or *.PCAPNG formats.</td>
</tr>
</tbody>
</table>
CAS Data Link Group

File

Device Selection

East 1  
West 2

Add
Delete
Delete All

Close

East  West
1      2
3      4
5      6
7      8
9      10
11     12
13     14
15     16
17     18
19     20
21     22
Traffic Recording Configurations

Traffic Recording Configuration

File

Traffic Recording

☑ Recording (Non Segmented)
  
  Directory: C:\Program Files\GL Communications Inc\...
  
  Record Duration: 0 sec (0 to Record Entire Call Duration)
  
  Include Absolute Path in CDR

☑ Segmented Recording
  
  Directory: C:\Program Files\GL Communications Inc\...
  
  No. of Segments: 3
  Segment Length: 8 sec
  
  Max Simultaneous Recordings: 200
  
  Create Subfolder Every: 1 min

Activate  Close
CAS Call Summary
Active Call Graph
Call Graph
Call Summary - Signaling Parameters
Triggers and Action Settings
Save Call to File

- Allows the users to save the filtered files either in *.HDL, *.PCAP, or *.PCAPNG format.
• Allows to save the filtered files as the voice files in *.wav format.
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.
Alert Summary...

<table>
<thead>
<tr>
<th>Call#</th>
<th>Protocol</th>
<th>Message</th>
<th>Type</th>
<th>Threshold</th>
<th>Value</th>
<th>Caller</th>
<th>Callee</th>
<th>CallId</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>ISDN</td>
<td>Triggers at the specified value.</td>
<td>Warning</td>
<td>5552525</td>
<td>5552525</td>
<td>5552525</td>
<td>4713318</td>
<td>26</td>
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<td>ISDN</td>
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<td>Warning</td>
<td>5552525</td>
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<td>Warning</td>
<td>5552525</td>
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<td>5552525</td>
<td>6813093</td>
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<tr>
<td>116</td>
<td>ISDN</td>
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<td>5552525</td>
<td>5552525</td>
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<td>146</td>
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<td>9949501</td>
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<tr>
<td>176</td>
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<td>Warning</td>
<td>5552525</td>
<td>5552525</td>
<td>5552525</td>
<td>8216780</td>
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<td>ISDN</td>
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<td>Warning</td>
<td>5552525</td>
<td>5552525</td>
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<td>5242990</td>
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<td>236</td>
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<td>5552525</td>
<td>5552525</td>
<td>5552525</td>
<td>4315996</td>
<td>236</td>
</tr>
<tr>
<td>266</td>
<td>ISDN</td>
<td>Triggers at the specified value.</td>
<td>Warning</td>
<td>5552525</td>
<td>5552525</td>
<td>5552525</td>
<td>9284515</td>
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<tr>
<td>297</td>
<td>ISDN</td>
<td>Triggers at the specified value.</td>
<td>Warning</td>
<td>5552525</td>
<td>5552525</td>
<td>5552525</td>
<td>1089521</td>
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<tr>
<td>322</td>
<td>ISDN</td>
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<tr>
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<td>5552525</td>
<td>5552525</td>
<td>5723954</td>
<td>433</td>
</tr>
</tbody>
</table>
• 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
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.
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX625</td>
<td>CAS Simulator</td>
</tr>
<tr>
<td>XX651</td>
<td>MAPS™ - CAS Protocol Emulator</td>
</tr>
<tr>
<td></td>
<td><strong>TDM Traffic Options</strong></td>
</tr>
<tr>
<td>XX610</td>
<td>File based Record/Playback (requires xx600)</td>
</tr>
<tr>
<td>XX620</td>
<td>Transmit/Detect digits (Place Call/ Answer Call) (requires xx600)</td>
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<tr>
<td>XX649</td>
<td>MAPS™ - ISUP Emulator</td>
</tr>
<tr>
<td>XX647</td>
<td>MAPS™ - ISUP Conformance Test Suite (Test Scripts)</td>
</tr>
<tr>
<td>PTE001</td>
<td>#Probe™ Dual T1 E1 Laptop Analyzer with Basic Analyzer Software</td>
</tr>
<tr>
<td>HTE001</td>
<td>Universal T1/E1 Card w/ Basic Analyzer Software</td>
</tr>
<tr>
<td>UTE001</td>
<td>Portable USB based Dual T1 or E1 Laptop Analyzer w/ Basic Analyzer Software</td>
</tr>
</tbody>
</table>
Thank You!