
T1 E1 Analyzer – Special Applications



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- Call Data Records
- Voice Band Analyzer
- Protocol Analysis and Emulation
- Protocol Identifier
- Echo Test Solutions
- MC BERT

T1 E1 Special Applications

- Record / Playback
 - Playback File,
 - Record Data to File
 - Record from Multiple Cards
 - Automated Record / Playback
 - Automated Continuous Capture
- Call Capture and Analysis
 - Multiple Call Capture
 - Call Data Records
 - Voiceband Analyzer
 - View PCM Files (Adobe Audition/Goldwave/Audacity)
 - Multiple Call Capture
- Echo Test Solutions
 - Measure Loop Delay / ERL
 - Delay Attenuate Timeslots
 - Delay Attenuate Timeslots - Single channel
 - Digital Echo Canceller Simulator
 - GLC View - Waveform Viewer
- Multi-Channel BERT
- Protocol Identifier and Classifier
- Voice Quality Assessment

T1 E1 Special Applications (Contd.)

- Protocol Analysis
 - HDLC, Physical Layer Analyzer, ISDN, SS7, Frame Relay, GR-303, ATM, DDS, GSM, MLPPP, TRAU, GPRS, CDMA, V5.x, CAS, UMTS, E1 Maintenance Data Link, T1 Facility Data Link, SS1, DCME
- Protocol Emulation
 - E1 Maintenance Data Link, T1 Facility Data Link, ISDN, ISUP, MAP, CAS
 - GSM, HDLC, TRAU, SS1
 - Multilink Frame Relay, Multi-link PPP, ATM IMA
- Windows Client / Server Modules

Supported T1 E1 Platforms



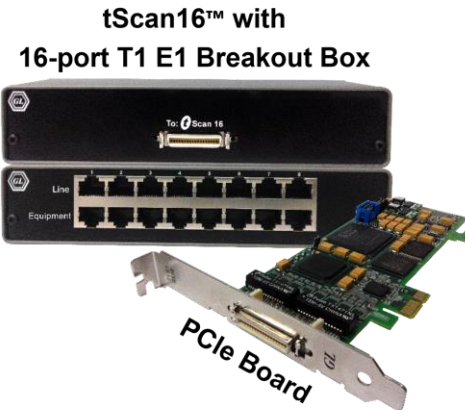
**tProbe™ - Portable USB based T1 E1 VF
FXO FXS and Serial Datacom Analyzer**



Quad / Octal T1 E1 PCIe Card



Dual T1 E1 Express (PCIe) Board



**tScan16™ with
16-port T1 E1 Breakout Box**

PCIe Board

Supported T3 E3 Platforms

Front Panel



Back Panel

**Portable USB based
Dual T3 E3 Analyzer Unit**

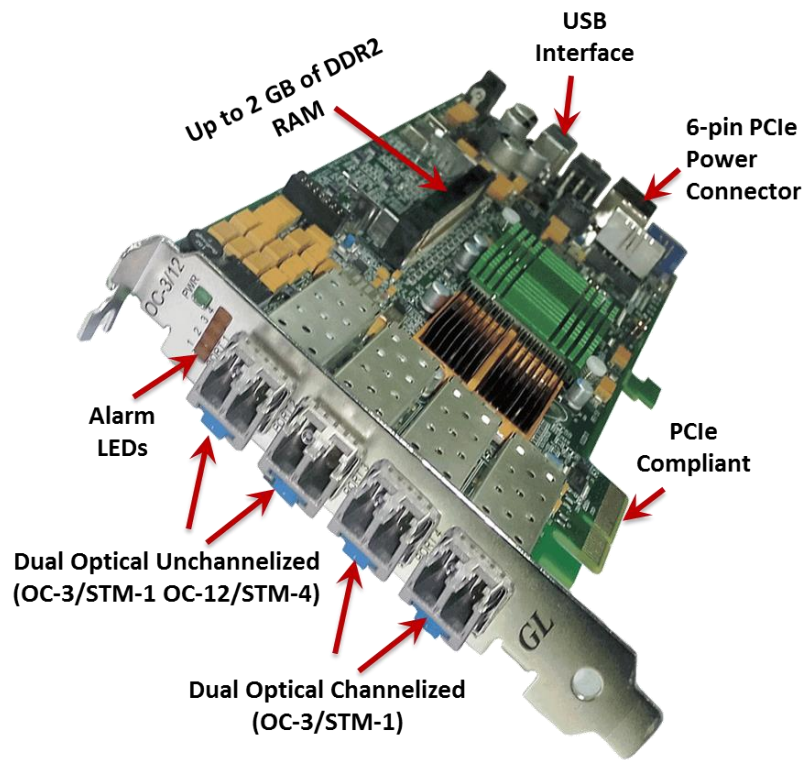
2U Rack T3 E3 Analyzer



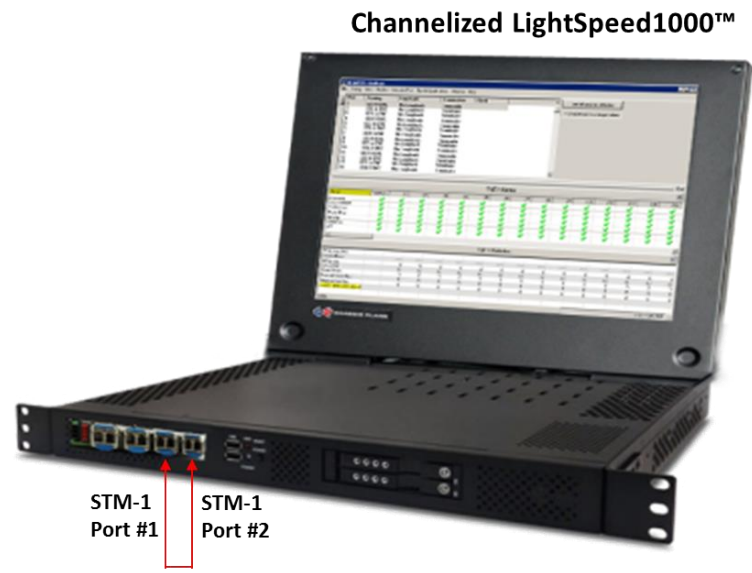
T3 T1 E3 E1 Multi-Tester Rackmount



Supported LightSpeed1000™ Platforms

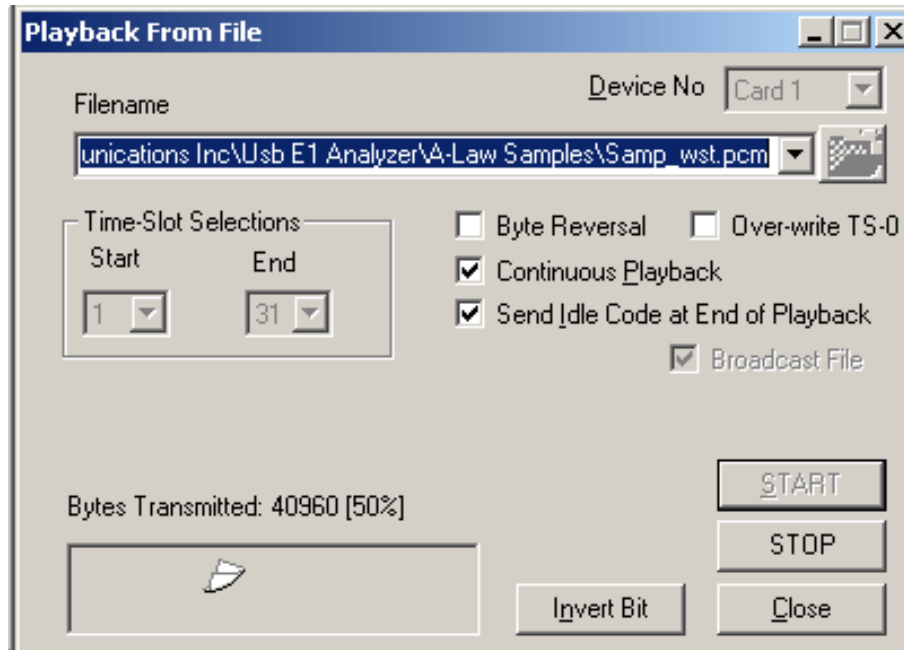


OC3 / OC12 PCIe Card LightSpeed1000™



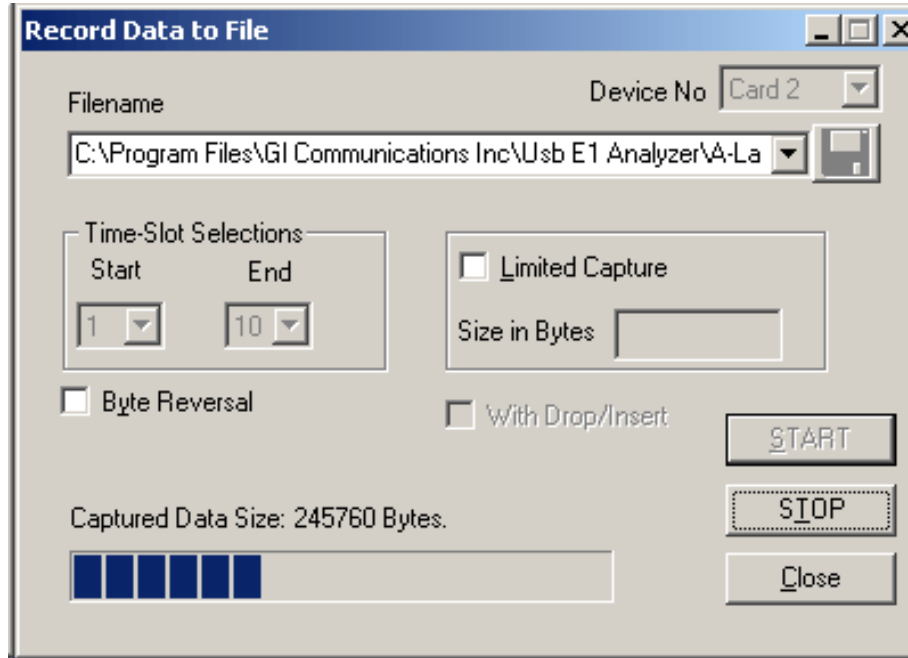
Optical Cable

Playback from File



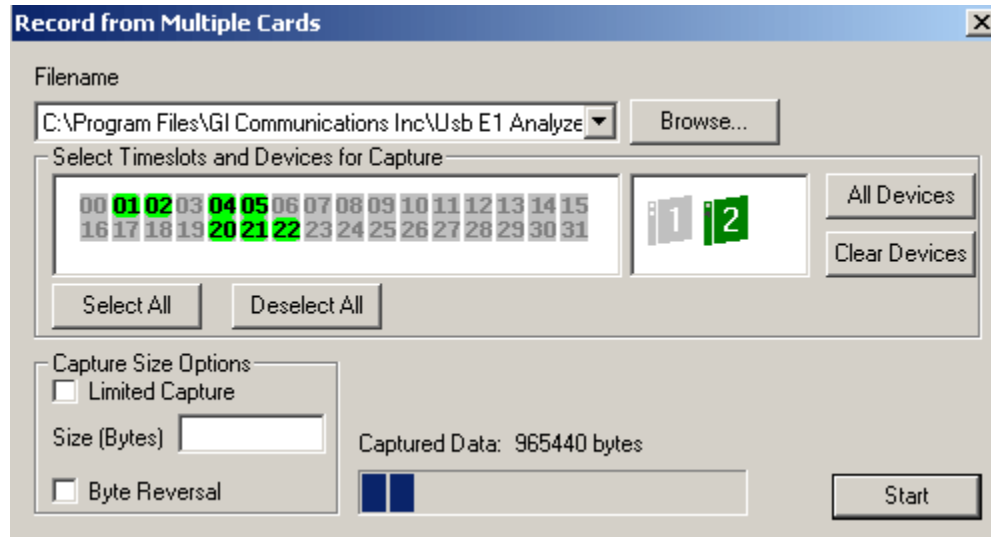
- Continuous transmission of data files (*.pcm or *.raw) on contiguous timeslots
- Repeated transmission of a single file without any data loss

Record Data to File



- Limited capture (specific number of bytes) to a file from all or selectable contiguous timeslots
- Synchronized capture, and capture in normal or reverse order

Record from Multiple Cards



- Capture data on non-contiguous timeslots
- Bytes may be captured in reverse or normal order
- Limited capture (specific number of bytes) to files from all or selected timeslots

Automated Record Playback

Task #	Tx/Rx	Card #	Timeslots	Capture/Transmit ...	Invert Bits	Reverse Bits	Continuous	
7	Gl C...	Tx	1	1-3	120000	No	No	Yes
8	Gl C...	Tx	1	4-7	80352	No	No	Yes
9	Gl C...	Tx	1	10-14	129500	No	No	No

Task #	Status	Bytes Tx/Rx	Bytes Underru...
0	TERMINATED	36960	0
1	TERMINATED	79152	0
2	COMPLETED	80352	0
3	COMPLETED	129500	0
4	TERMINATED	58016	0
5	TERMINATED	25056	0
6	COMPLETED	129500	0
7			
-			

- Permits to run several transmit or receive operation tasks synchronously
- Supports subchannel and multiple subchannel streams for transmission and reception

Filename: C:\Program Files\GL Communications Inc\Usb E File Selection

Transmit/Receive:
 Transmit
 Receive

Device Selection: Card #1

Timeslot Selection: 0-16 (0-3 selected)

Tx/Rx Parameters:
Tx/Rx File Size (Bytes):
 Limited Capture/Transmit
 Continuous
 Invert Bits
 Reverse Bits
 Broadcast
 Start Immediately

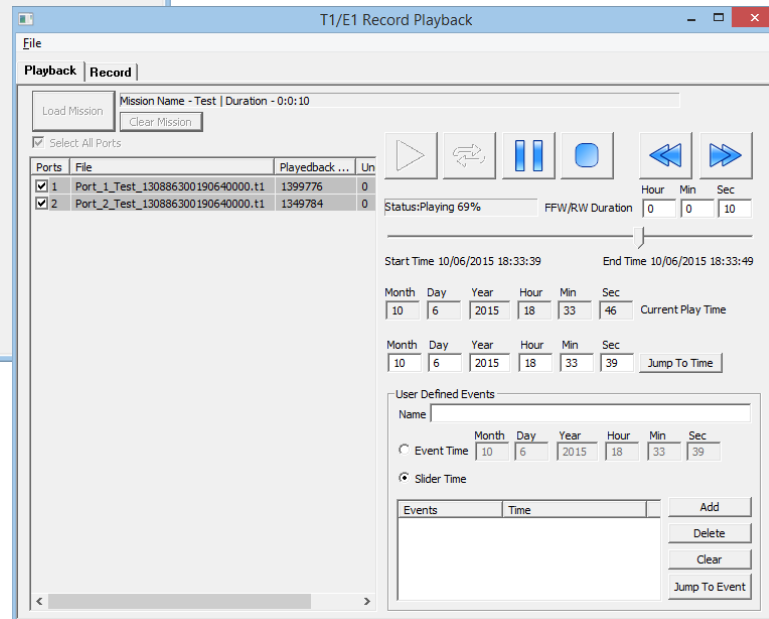
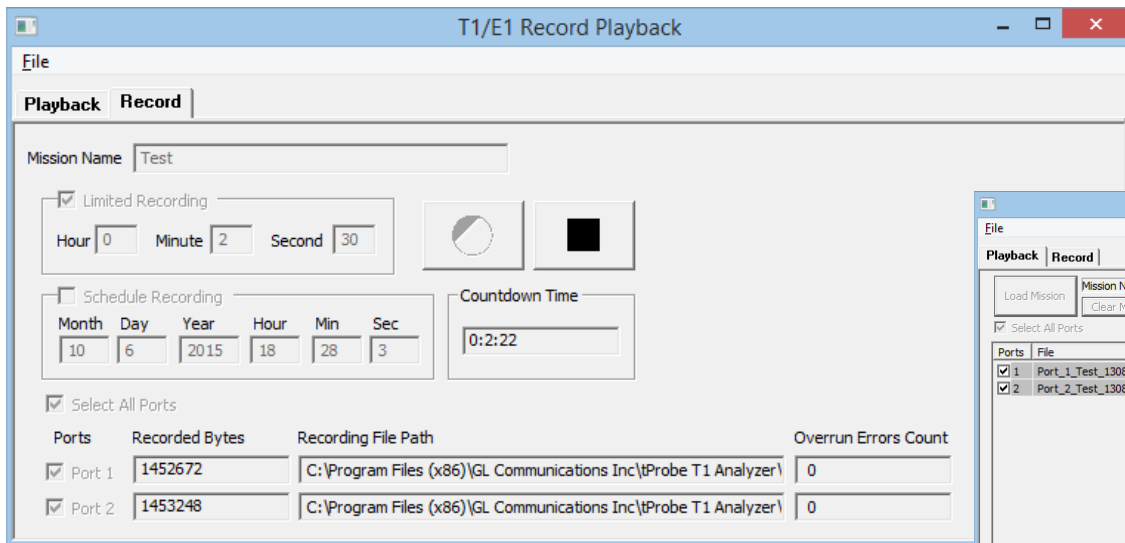
Safe Margin (Bytes):
 Default
 User Defined

SubChannels:
 Subchannels
 Multiple SubChannel Streams

MSB(1) -> LSB(8):
DS0 Bits: 8, 16, 24, 32, 40, 48, 56
1-8 selected

OK Cancel

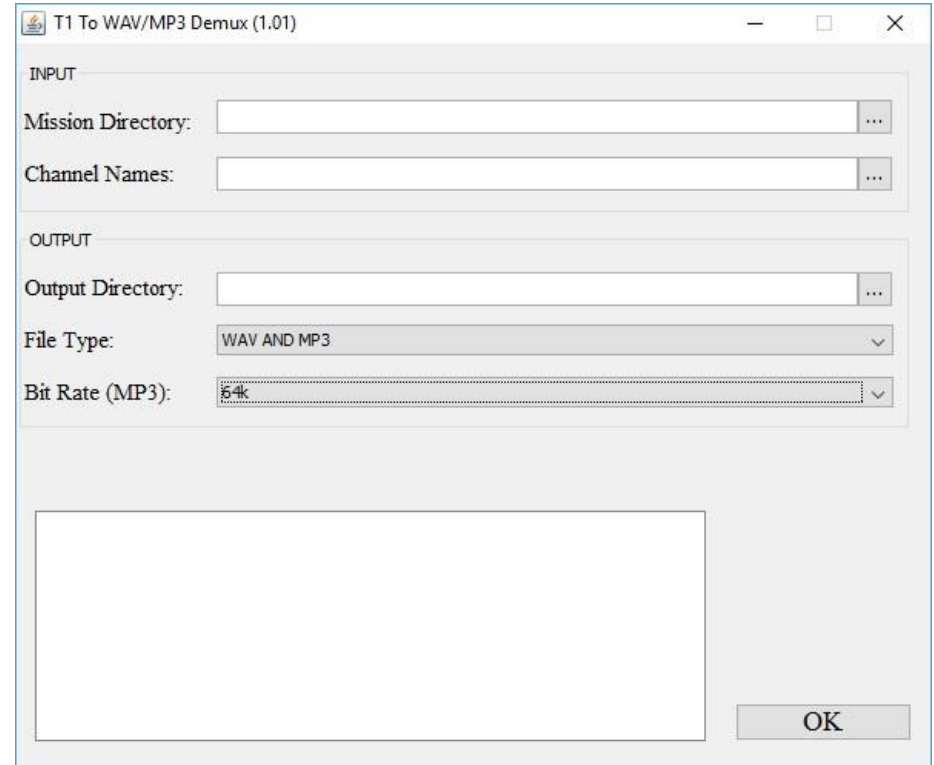
Synchronous Trunk Record Playback



- Synchronously Record and Playback live T1 E1 traffic on multiple T1 E1 trunks
- Record traffic on all 24 T1 channels (or all 32 E1 channels) for a specified duration or continuously

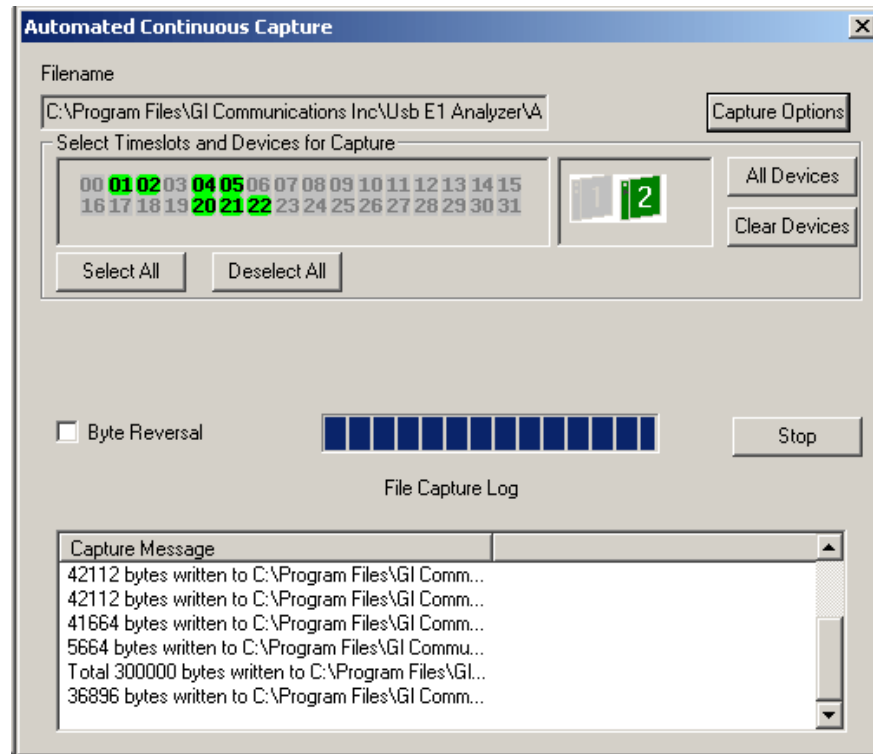
T1 Demux

- Provides options to split the T1 file containing the T1 trunk traffic into 24 individual files containing each time slot traffic, and then recorded in “WAV” or “WAV and MP3” format at user-defined bit rates configuration



Automated Continuous Capture

- Continuous capture of data (*.ala, *.ula, *.pcm, *.wav, *.ber) to different files
- Seamless chunks of data capture to files with specified size, or time limit



Call Capture and Analysis

- Calls can be captured manually or captured automatically from both directions (east and west) of transmission using trigger action feature
- File naming conventions based on the types of capture (MFC-R2, Signaling, ISDN, SS7, Manual)
- The call capture application supports following types of triggers for auto capturing of call
 - Signaling based triggers - CAS -R1, wink start, MFC-R2
 - ISDN and SS7 message-based triggers
 - Traffic activated triggers –
 - Voice based on a minimum power level
 - Tones of specified frequency - Ring back tone, Dial tone, Busy tone, and DTMF digits
 - Fax traffic - V.32 / V.17, V.27, V.29
 - Modem traffic - V.22 forward/reverse channel, V.34 and V.90 uplink, Binary V.90 downlink, FSK
 - Any traffic based on any power level

Multiple Call Capture

Call Capture and Analysis

File Capture Settings

Capture Directory: D:\CapturedFiles\USDNCalls\0516091147

Capture File #1: 554005_555005_May16W06_50_0001.pcm
Bytes Captured: 272512

Capture File #2: 554005_555005_May16E06_50_0001.pcm
Bytes Captured: 272512

Signaling File: May16S06_50_0001.sbf

Timeslot Activity

ISDN Status	Isdn Message	Call Ref Value	Timeslot	Card	Called Num
	ISDN_MSG_SETUP	73	30	2	554029
	ISDN_MSG_SETUP	74	31	2	554030

Error Type	Card #1	Card #2
Underruns	0	0
Ok Frames	124	124
Frame Errors	0	0
CRC Errors	0	0

Multiple Call Capture and Analysis

Multi Call Capture for Manual - Untitled

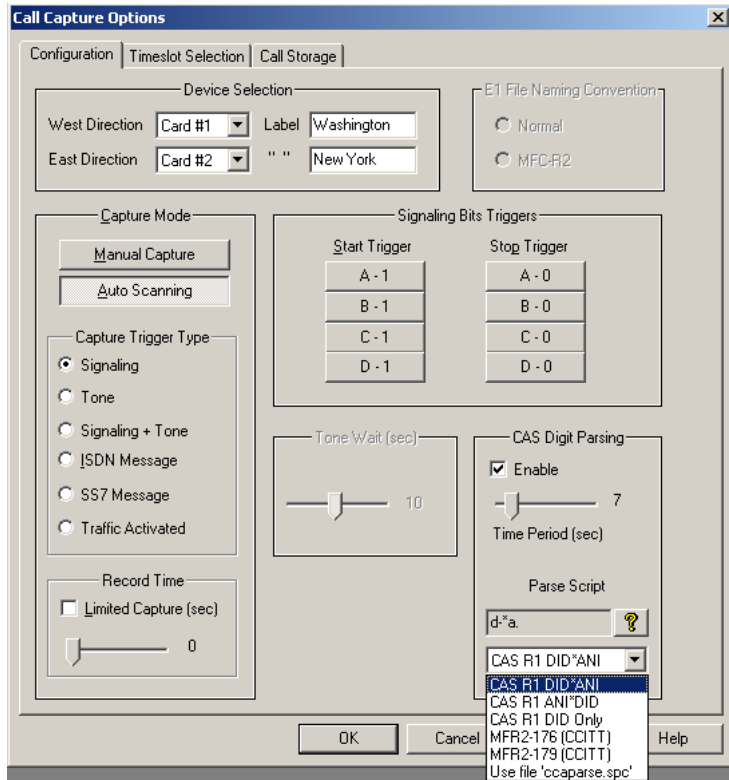
CC No	Capture Name	West (Port)	East (Port)	Timeslots	Storage Location	Trigger Option	Action
1	CCA1	1	2	0-23	C:\Program Files\GL Communications Inc\USB T1 Analyzer	Edit	Abort

TS	TS Status	West Filename	Bytes Cap...	East Filename	Bytes Cap...	Signaling File
0	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-
1	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-
2	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-
3	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-
4	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-
5	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-
6	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-
7	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-
8	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-
9	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-
10	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-
11	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-
12	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-
13	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-
14	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-
15	Capturing	C:\Program Files\GL Communications...	247080	C:\Program Files\GL Communications...	247080	-

- Used to record calls directly from T1/E1 lines
- Calls can be captured manually or captured automatically from both directions (east and west) of transmission using trigger action feature

Configuration

Call Capture and Analysis



Call Capture Options

Configuration | Timeslot Selection | Call Storage

Device Selection

West Direction: Card #1 | Label: Washington
East Direction: Card #2 | " " | New York

E1 File Naming Convention

Normal
 MFCR2

Capture Mode

Manual Capture
Auto Scanning

Capture Trigger Type

Signaling
 Tone
 Signaling + Tone
 ISDN Message
 SS7 Message
 Traffic Activated

Record Time

Limited Capture (sec)
0

Signaling Bits Triggers

Start Trigger	Stop Trigger
A - 1	A - 0
B - 1	B - 0
C - 1	C - 0
D - 1	D - 0

Tone Wait (sec)

10

CAS Digit Parsing

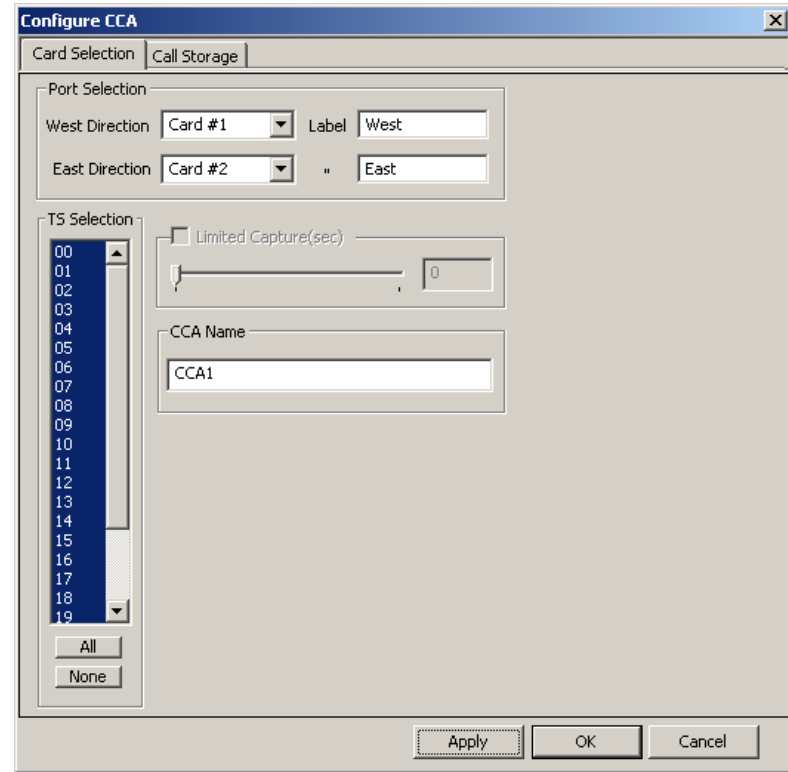
Enable
7
Time Period (sec)

Parse Script

d*a ?
CAS R1 DID*ANI
CAS R1 ANI*DID
CAS R1 DID Only
MFR2-176 (CCITT)
MFR2-179 (CCITT)
Use file 'ccaparse.spc'

OK Cancel Help

Multiple Call Capture and Analysis



Configure CCA

Card Selection | Call Storage

Port Selection

West Direction: Card #1 | Label: West
East Direction: Card #2 | " " | East

TS Selection

Limited Capture(sec)
0

CCA Name

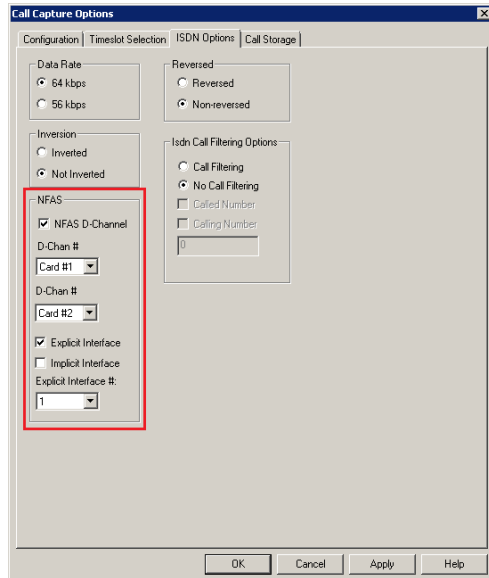
CCA1

All
None

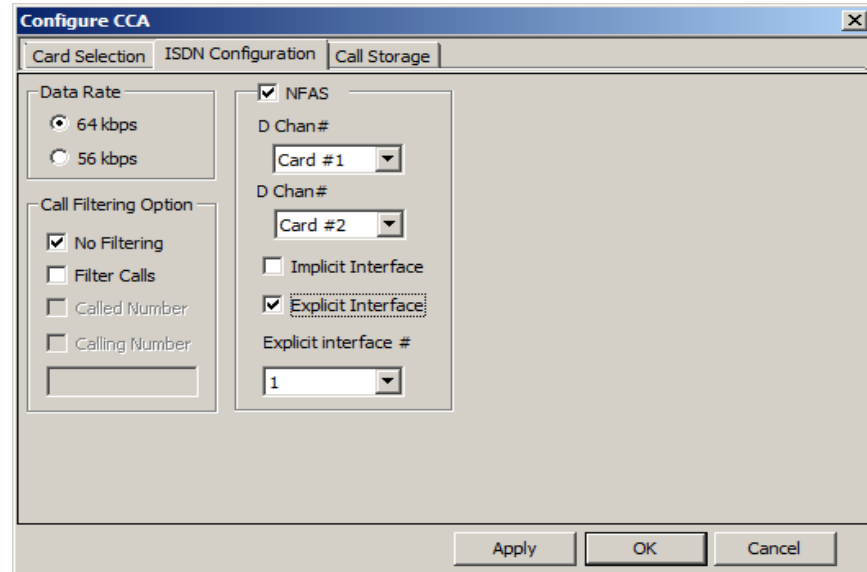
Apply OK Cancel

ISDN Call Triggering Options

Call Capture and Analysis



Multiple Call Capture and Analysis



- **NFAS D-Channel** - enables NFAS feature during ISDN call capturing on the trunk that contains the D-Channel or the signaling
- **Filtering** – capture ISDN messages with the called/calling number that matches the filtering criteria

SS7 Call Triggering Options

Call Capture and Analysis

Call Capture Options

Configuration | Ss7 Options | Call Storage

Data Rate:
 64 kbps
 56 kbps

Ss7 Call Filtering:
 Call Filtering
 No Call Filtering
 Originating Number
 Destination Number

Signaling Link:
First Card #: Second Card #
Uplink: Card 1 | Card 1
Downlink: Card 2 | Card 2
Timeslot #: 23 | 1

Protocol Selection:
ITU

DPC Code:
OPC: 1 | 1 | 1
DPC: 2 | 2 | 2

Circuit Group Configuration:
Device Selection: West: Card 1 | East: Card 2
CIC Start: 1 | CIC Quantity: 24
Timeslot Start: 0
Skip TS 16 CIC Numbering

T1/E1 #	Start CIC	# of Chan...	Start Timeslot	Skip TS16	Skip CIC
1+2	1	24	0	Yes	No

Add CIC

OK Cancel Apply Help

Multiple Call Capture and Analysis

Call Capture Options

Configuration | Call Storage | Ss7 Options

Data Rate:
 64 kbps
 56 kbps

Ss7 Call Filtering:
 Call Filtering
 No Call Filtering
 Originating Number
 Destination Number

Signaling Selection:
Primary Card #: Secondary Card #
Uplink: Card 1 | Card 1
Downlink: Card 2 | Card 2
Timeslot #: 1 | 1

Protocol Selection:
ITU

CIC Group Configuration:
CIC Start: 100
CIC Quantity: 8
Device Selection: Card 1+2
Timeslot Start: 11
Add CIC

DPC Code:
DPC: 2 | 2 | 2

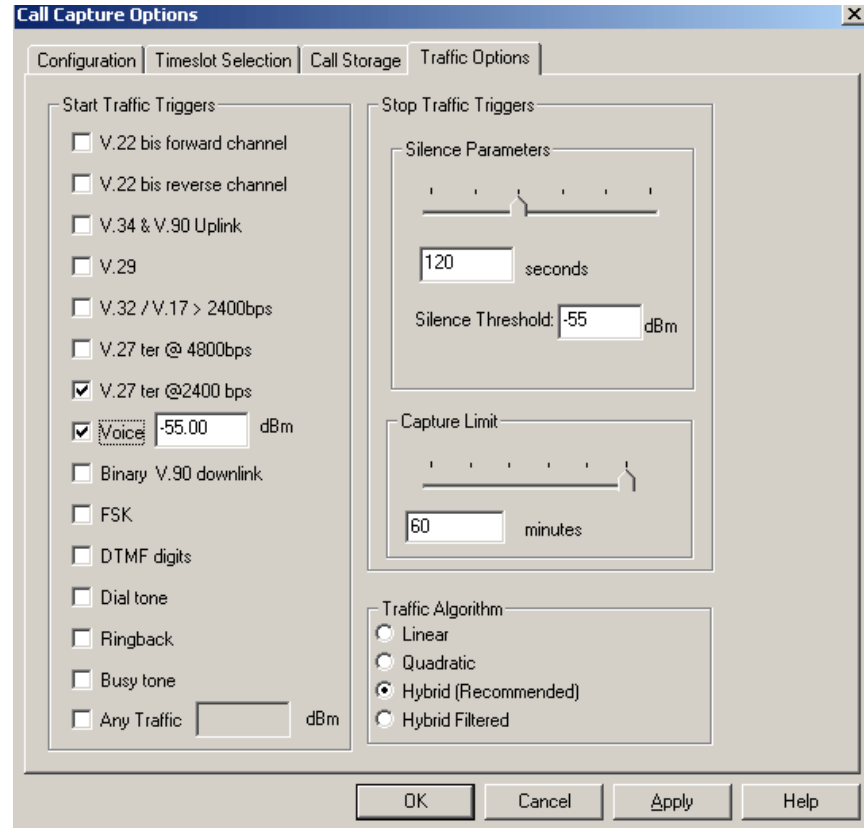
T1/E1 #	Start CIC	# of Chan...	Start Timeslot
1+2	1	10	1
1+2	100	8	11

OK Cancel Apply Help

- Provides options to set SS7 parameters such as Data Rate, Call Filtering, Signaling Selection, and CIC (Circuit Identification Codes) Group Configuration

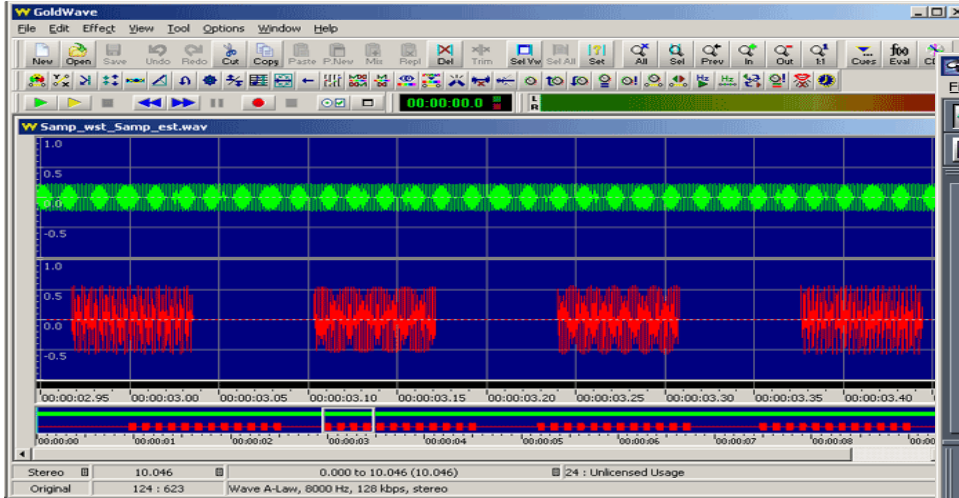
Traffic Activated Triggering Options

- Provides start traffic and stop traffic trigger options
- Triggers capturing on any of supported traffic, or to trigger on a specified power level
- Capture can be terminated either by specifying the silence parameters or specifying time of capture limit

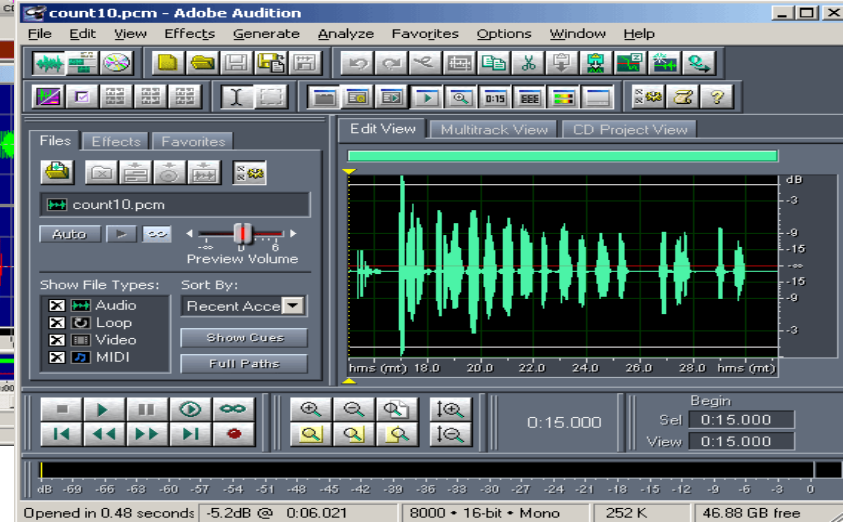


View PCM File

Goldwave



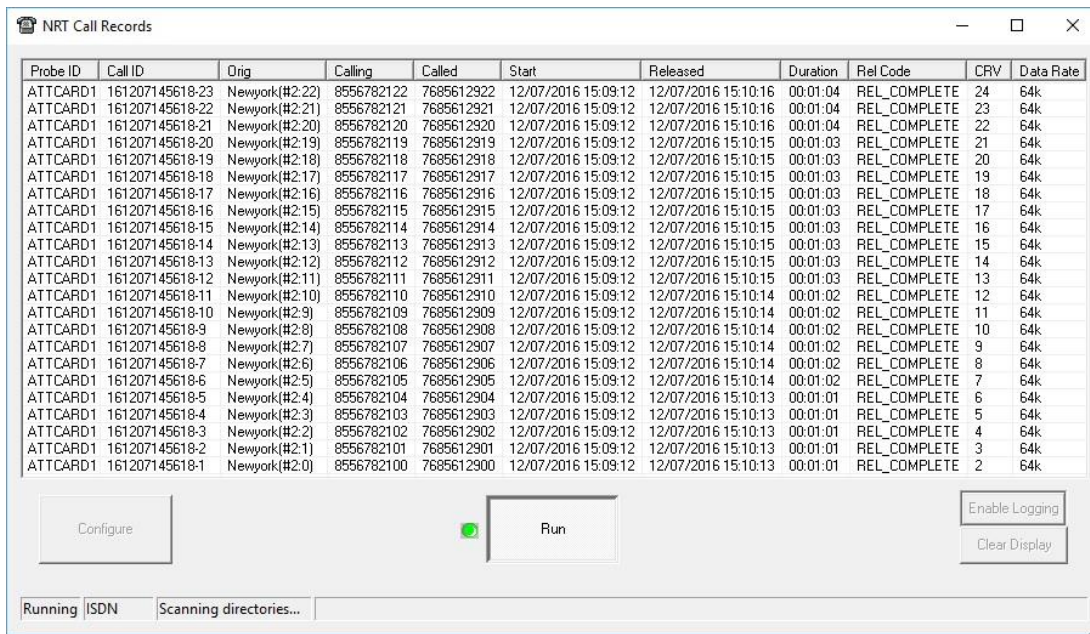
Adobe Audition



- Adobe Audition or Goldwave are used for viewing captured files

Call Data Records

- Compiles the output of CCA (Call Capture and Analysis) application and (optionally) VBA (Voice Band Analyzer) application and generates the following 2 types of reports –
 - Call Side Report - contains a single summary line for each call with inbound and outbound ports, channel #, time of seizure and release, and other summary information
 - Call Detail Report - contains a single summary line for each call with inbound and outbound ports, channel #, time of seizure and release, and other summary information



The screenshot shows the 'NRT Call Records' application window. It features a table with 12 columns: Probe ID, Call ID, Orig, Calling, Called, Start, Released, Duration, Rel Code, CRV, and Data Rate. The table contains 20 rows of call data. Below the table are several control elements: 'Configure' and 'Run' buttons, a green status indicator, 'Enable Logging' and 'Clear Display' buttons, and a status bar at the bottom showing 'Running | ISDN | Scanning directories...'.

Probe ID	Call ID	Orig	Calling	Called	Start	Released	Duration	Rel Code	CRV	Data Rate
ATTCARD1	161207145618-23	Newyork(#2:22)	8556782122	7685612922	12/07/2016 15:09:12	12/07/2016 15:10:16	00:01:04	REL_COMPLETE	24	64k
ATTCARD1	161207145618-22	Newyork(#2:21)	8556782121	7685612921	12/07/2016 15:09:12	12/07/2016 15:10:16	00:01:04	REL_COMPLETE	23	64k
ATTCARD1	161207145618-21	Newyork(#2:20)	8556782120	7685612920	12/07/2016 15:09:12	12/07/2016 15:10:16	00:01:04	REL_COMPLETE	22	64k
ATTCARD1	161207145618-20	Newyork(#2:19)	8556782119	7685612919	12/07/2016 15:09:12	12/07/2016 15:10:15	00:01:03	REL_COMPLETE	21	64k
ATTCARD1	161207145618-19	Newyork(#2:18)	8556782118	7685612918	12/07/2016 15:09:12	12/07/2016 15:10:15	00:01:03	REL_COMPLETE	20	64k
ATTCARD1	161207145618-18	Newyork(#2:17)	8556782117	7685612917	12/07/2016 15:09:12	12/07/2016 15:10:15	00:01:03	REL_COMPLETE	19	64k
ATTCARD1	161207145618-17	Newyork(#2:16)	8556782116	7685612916	12/07/2016 15:09:12	12/07/2016 15:10:15	00:01:03	REL_COMPLETE	18	64k
ATTCARD1	161207145618-16	Newyork(#2:15)	8556782115	7685612915	12/07/2016 15:09:12	12/07/2016 15:10:15	00:01:03	REL_COMPLETE	17	64k
ATTCARD1	161207145618-15	Newyork(#2:14)	8556782114	7685612914	12/07/2016 15:09:12	12/07/2016 15:10:15	00:01:03	REL_COMPLETE	16	64k
ATTCARD1	161207145618-14	Newyork(#2:13)	8556782113	7685612913	12/07/2016 15:09:12	12/07/2016 15:10:15	00:01:03	REL_COMPLETE	15	64k
ATTCARD1	161207145618-13	Newyork(#2:12)	8556782112	7685612912	12/07/2016 15:09:12	12/07/2016 15:10:15	00:01:03	REL_COMPLETE	14	64k
ATTCARD1	161207145618-12	Newyork(#2:11)	8556782111	7685612911	12/07/2016 15:09:12	12/07/2016 15:10:15	00:01:03	REL_COMPLETE	13	64k
ATTCARD1	161207145618-11	Newyork(#2:10)	8556782110	7685612910	12/07/2016 15:09:12	12/07/2016 15:10:14	00:01:02	REL_COMPLETE	12	64k
ATTCARD1	161207145618-10	Newyork(#2:9)	8556782109	7685612909	12/07/2016 15:09:12	12/07/2016 15:10:14	00:01:02	REL_COMPLETE	11	64k
ATTCARD1	161207145618-9	Newyork(#2:8)	8556782108	7685612908	12/07/2016 15:09:12	12/07/2016 15:10:14	00:01:02	REL_COMPLETE	10	64k
ATTCARD1	161207145618-8	Newyork(#2:7)	8556782107	7685612907	12/07/2016 15:09:12	12/07/2016 15:10:14	00:01:02	REL_COMPLETE	9	64k
ATTCARD1	161207145618-7	Newyork(#2:6)	8556782106	7685612906	12/07/2016 15:09:12	12/07/2016 15:10:14	00:01:02	REL_COMPLETE	8	64k
ATTCARD1	161207145618-6	Newyork(#2:5)	8556782105	7685612905	12/07/2016 15:09:12	12/07/2016 15:10:14	00:01:02	REL_COMPLETE	7	64k
ATTCARD1	161207145618-5	Newyork(#2:4)	8556782104	7685612904	12/07/2016 15:09:12	12/07/2016 15:10:13	00:01:01	REL_COMPLETE	6	64k
ATTCARD1	161207145618-4	Newyork(#2:3)	8556782103	7685612903	12/07/2016 15:09:12	12/07/2016 15:10:13	00:01:01	REL_COMPLETE	5	64k
ATTCARD1	161207145618-3	Newyork(#2:2)	8556782102	7685612902	12/07/2016 15:09:12	12/07/2016 15:10:13	00:01:01	REL_COMPLETE	4	64k
ATTCARD1	161207145618-2	Newyork(#2:1)	8556782101	7685612901	12/07/2016 15:09:12	12/07/2016 15:10:13	00:01:01	REL_COMPLETE	3	64k
ATTCARD1	161207145618-1	Newyork(#2:0)	8556782100	7685612900	12/07/2016 15:09:12	12/07/2016 15:10:13	00:01:01	REL_COMPLETE	2	64k

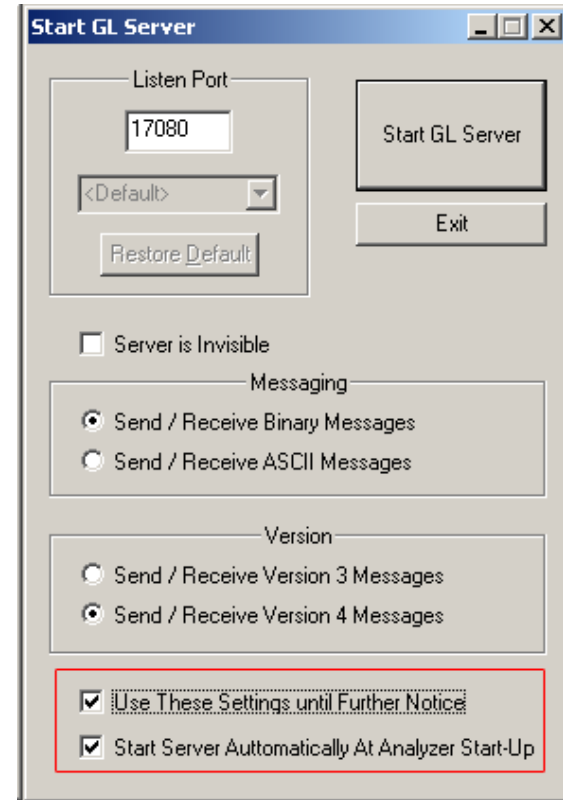
Voiceband Analyzer

Input	File	Directory	Start	Elapsed	ASL	AF	RMS
L	S7L.ula	C:\Program Fil...	06/12/2007 15:22:48	175.000	-22.70...	48.890...	-25.6
R	S7R.ULA	C:\Program Fil...	06/12/2007 15:22:46	175.000	-26.83...	63.196...	-28.4
L	S6L.ULA	C:\Program Fil...	06/12/2007 15:22:46	200.000	-22.87...	55.526...	-25.4
R	S6R.ula	C:\Program Fil...	06/12/2007 15:22:46	200.000	-25.32...	40.734...	-29.2
L	S5L.ula	C:\Program Fil...	05/09/2007 13:26:42	185.000	-24.94...	36.086...	-29.3
R	S5R.ula	C:\Program Fil...	05/09/2007 13:26:56	185.000	-25.75...	40.959...	-29.6
L	S4L.ula	C:\Program Fil...	05/09/2007 13:26:20	190.000	-25.52...	35.426...	-30.0
R	S4R.ula	C:\Program Fil...	05/09/2007 13:26:30	190.000	-22.80...	68.776...	-24.4
L	S3L.ula	C:\Program Fil...	05/09/2007 13:25:52	185.000	-25.33...	54.317...	-27.5
R	S3R.ula	C:\Program Fil...	05/09/2007 13:26:06	185.000	-23.10...	40.540...	-27.0
L	S2L.ula	C:\Program Fil...	05/09/2007 13:25:28	190.000	-24.36...	37.295...	-28.6
R	S2R.ula	C:\Program Fil...	05/09/2007 13:25:38	190.000	-26.94...	55.183...	-29.5
L	S12L.ULA	C:\Program Fil...	07/16/2007 11:18:44	190.000	-42.52...	82.930...	-43.3
R	S12R.ULA	C:\Program Fil...	07/16/2007 11:18:38	190.000	-22.80...	68.965...	-24.4
L	S11L.ULA	C:\Program Fil...	06/13/2007 12:52:50	185.000	-24.94...	36.086...	-29.3
R	S11R.ULA	C:\Program Fil...	06/13/2007 12:52:48	185.000	-42.58...	35.083...	-47.1
L	S10L.ULA	C:\Program Fil...	06/13/2007 12:52:42	190.000	-34.24...	66.403...	-36.0
R	S10R.ULA	C:\Program Fil...	06/13/2007 12:52:46	190.000	-22.80...	68.776...	-24.4
L	S1L.ula	C:\Program Fil...	05/09/2007 13:25:04	200.000	-22.54...	50.707...	-25.4
R	S1R.ula	C:\Program Fil...	05/09/2007 13:25:16	200.000	-25.32...	40.734...	-29.2

- VBA works in conjunction with GL's TDM, Packet, and Wireless non-intrusive capture products, such as T1 and E1 Call Capture and Analysis, PacketScan™, and PPP Analyzer products

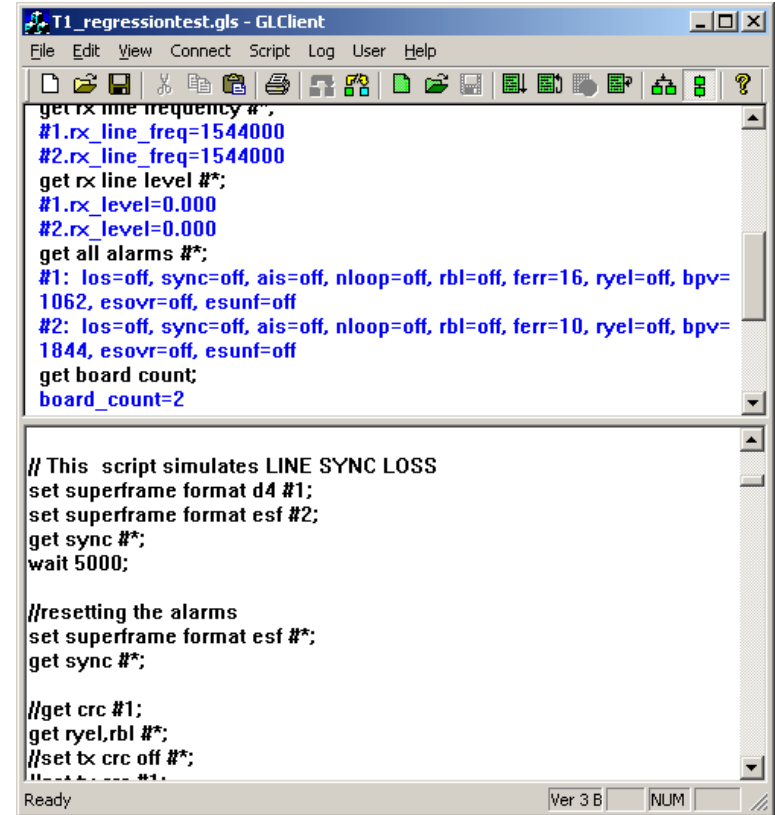
Connecting to the Server

- **Listen Port:** This is the TCP/IP port on which the server should listen for incoming connection requests from clients
- **Send / Receive Binary Messages:** Indicates that the server is to communicate with clients using binary messages
- **Send / Receive ASCII Messages:** Indicates that the server is to communicate with clients using ASCII (text-based) messages
- **Send / Receive Version 3 Messages:** Indicates that the server is to communicate with clients using version 3 messages
- **Send / Receive Version 4 Messages:** Indicates that the server is to communicate with clients using version 4 messages
- **Use these settings Until Further Notice:** This option to use the current configuration settings as default settings at analyzer startup
- **Start Server Automatically At analyzer Startup:** It will start the WCS server at analyzer startup by default



T1/E1 Client

- In the lower workspace area, the client users key in commands or load in commands from previously saved files
- The upper log area displays the script and the server responses



```
T1_regressiontest.gls - GLClient
File Edit View Connect Script Log User Help
get rx line frequency #*;
#1.rx_line_freq=1544000
#2.rx_line_freq=1544000
get rx line level #*;
#1.rx_level=0.000
#2.rx_level=0.000
get all alarms #*;
#1: los=off, sync=off, ais=off, nloop=off, rbl=off, ferr=16, ryel=off, bpv=
1062, esovr=off, esunf=off
#2: los=off, sync=off, ais=off, nloop=off, rbl=off, ferr=10, ryel=off, bpv=
1844, esovr=off, esunf=off
get board count;
board_count=2

// This script simulates LINE SYNC LOSS
set superframe format d4 #1;
set superframe format esf #2;
get sync #*;
wait 5000;

//resetting the alarms
set superframe format esf #*;
get sync #*;

//get crc #1;
get ryel,rbl #*;
//set tx crc off #*;
//----- #1;
```

Ready Ver 3 B NUM

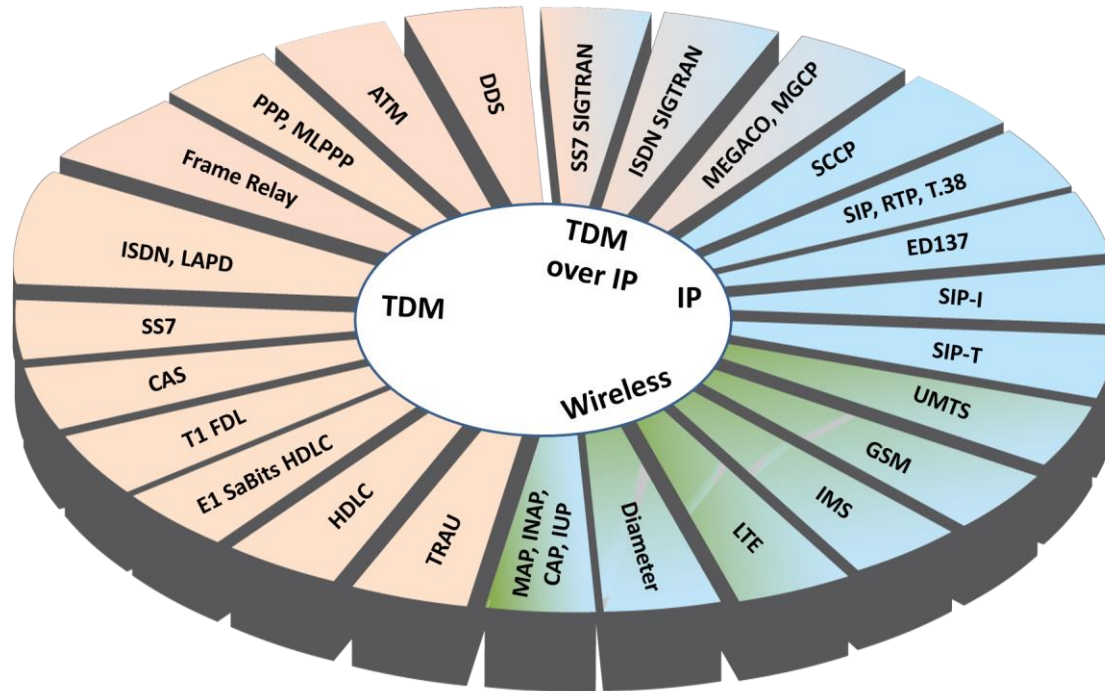
Features

Remote operation	✓
Automation	✓
Multi-site connectivity	✓
Simultaneous testing of high capacity T1/E1 systems through a single Client	✓
Integration of T1/E1 testing into more complex testing systems	✓
Intrusive / Non-Intrusive T1/E1 Testing	✓

Applications

- File based Record / Playback
- Transmit / Detect digits
- Channel Associated Signaling (CAS) Simulation
- FAX Simulation
- Jitter Measurement, Pulse Mask
- DSP Functionality
- Dynamic DSP Capability
- ISDN Emulation
- Multi-Channel HDLC Emulation and Analysis
- File based HDLC Record / Playback and Remote Record / Playback
- File based High Throughput HDLC Record / Playback
- PPP, MLPPP, and Multi-Channel (MC) Emulation and Analysis
- File based TRAU Record / Playback
- Multi-Channel TRAU Tx / Rx Emulation and Analysis
- File based HDLC Record / Playback over SA-bits
- File based Record / Playback over FDL
- Multi-link Frame Relay Emulation
- Inverse Multiplexing for ATM Emulation
- Multi-Channel BER Testing
- T1 E1 Traffic Classifier
- SS7 Decode Agent
- ISDN Decode Agent
- SS1 Protocol Emulation

Protocol Analysis



- GL Communications provides a host of protocol analyzers and simulators for testing a variety of protocols
- Analysis may be done both in real-time and off-line

Protocol Analysis and Emulation

- HDLC Analysis and Emulation
 - HDLC Analysis, Playback, Impairment, Tx and Rx Utility
 - Client –Server based HDLC Emulation modules
- ISDN Analysis and Emulation
 - ISDN Analysis
 - ISDN Emulator (GUI)
 - Client-Server based ISDN Emulation module
 - Scripted Emulator using MAPS™
- T1 Facility Data Link
 - Facility Data Link Analysis
 - Facility Data Link Playback
 - Client-Server based FDL Emulation module
- E1 Maintenance Data Link
 - E1 Maintenance Data Link Analysis and Playback
 - Client-Server based SaBits HDLC Emulation module
- TRAU Analysis and Emulation
 - TRAU Analysis, Traffic Playback, TRAU ToolBox
 - TRAU Tx/Rx Test (GUI Based)
 - Client-Server based TRAU Emulation modules
- Multilink PPP Analysis and Emulation
 - MLPPP Analysis
 - MC-MLPPP Emulator (GUI Based)
 - Client-Server based MLPPP Emulation module
 - Scripted Conformance Test Tool using MAPS™

Protocol Analysis and Emulation (Contd.)

- Multilink Frame Relay Analysis and Emulation
 - Frame Relay Analysis
 - Multilink Frame Relay Emulator (GUI Based)
 - Client-Server based MFR Emulation module
- ATM IMA Analysis and Emulation
 - ATM IMA Analysis
 - ATM IMA Emulator (GUI Based)
 - Client-Server based ATM IMA Emulation module
- CAS
 - Emulation using (GUI Based)
 - DTMF, MF, MFC-R2 Emulation using GUI and Client-server
 - Scripted Emulator using MAPS™
- SS7(C7) Analysis and Emulation
 - SS7 Analysis
 - Scripted ISUP Emulator using MAPS™
 - Scripted MAP Emulator using MAPS™
- GSM Analysis and Emulation
 - GSM Analysis
 - Scripted GSM A Emulator using MAPS™
 - Scripted GSM Abis Emulator using MAPS™
- SS1 Analysis and Emulation
 - SS1 Signaling Analysis
 - SS1 Emulator (Dialer)
- Other Protocol Analyzers
- GR-303, DDS, V5.X, GPRS, CDMA 2000, UMTS, DCME

Protocol Analysis

The screenshot displays the ISDN Protocol Analysis Q.93x 64-bit software interface. The main window is divided into several sections, each with a red arrow pointing to a label on the right:

- Summary view:** A table showing protocol frames. The first frame (Frame# 4) is a SETUP message with a length of 46. Subsequent frames (5, 6, 7) are CALL PROCEEDING messages with lengths of 6, 11, and 6 respectively.
- Detail view:** A text-based representation of the HDLC Frame Data + FCS for the selected frame. It shows the LAPD Layer structure with fields like C/R, S/API, TEI, and Ctl.
- Hex Dump view:** A hex dump of the frame data, showing hexadecimal values and their corresponding ASCII characters.
- Statistics view:** A table showing the frame count for each device. Device 1 has 13973 frames, and Device 2 has 13973 frames.
- Call trace view:** A table showing call details for five completed calls, including Call ID, Call Status, Calling Num, Called Num, Call Start Date & Time, Call Duration, Release Complete Cause, DevNo, TS, CRV, and Interf.

Summary view

Detail view

Hex Dump view

Statistics view

Call trace view

Key Features

- Consolidated GUI – Displays summary of all decodes, detail and hex-dump view of each frame, statistics view, and call detail record views
- Perform real-time / offline / remote analysis
- Supports various protocol standards for proper decode
- Capture options such as channel selection, CRC, bit reversion, bit inversion, scrambler and more for real-time capture
- Fine tune results with filtering and search capability
- Export decode results to ASCII or CSV files
- Any protocol field can be added to the summary view, filtering, and search features providing users more flexibility to monitor required protocol fields
- Trace File Saving Options
- Extensive statistics computation capabilities
- Call Detail Records for ISDN, Frame Relay, ATM, SS7, GR303, GSM, GPRS, CDMA, UMTS, and V5.x
- Network Monitoring
- Remote Access Capability
- 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

Packet Data Analysis (PPP Protocols)

PPP Protocol Analysis PPP

File View Capture Statistics Database Configure Help

0 GoTo

Dev	TSlot	SubCh	Fram...	TIME (Relative)	Len	Error	PPP Laye...	LCP Code	IPCP Code	BCF
✓ 1	1-31		0	00:00:00.000000	14		Link Control	Echo-Request		
✓ 2	1-31		1	00:00:00.000625	14		Link Control	Echo-Reply		
✓ 2	1-31		2	00:00:00.088625	14		Link Control	Echo-Request		
✓ 1	1-31		3	00:00:00.092000	14		Link Control	Echo-Reply		
✓ 1	1-31		4	00:00:09.993996	14		Link Control	Echo-Request		
✓ 2	1-31		5	00:00:09.994625	14		Link Control	Echo-Reply		
✓ 2	1-31		6	00:00:10.082625	14		Link Control	Echo-Request		
✓ 1	1-31		7	00:00:10.083250	14		Link Control	Echo-Reply		

Card1 TimeSlots=1-31 Frame=0 at 00:00:00.000000 OK Len=14
 HDLC Frame Data + FCS
 ===== PPP Link Layer =====
 Address = 11111111
 Ctl = 00000001
 Protocol = 11000000
 ===== Link Control Layer =====
 Code = 00001000
 Identifier = 172 (x&A)
 Length = 8 (x0000)
 Magic Number = 16541100

Hex Dump of the Frame Data

```
FF 03 C0 21 09 AC 00 08 09 DC 19 2E 85 63
```

Off-line Viewing D:\misc\MLPPP.hd

Traffic Analyzer - Summary View

File View Call Summary Settings Help

Sip Calls Show All Sessions

Call #	SSRC	Payload	Packet Received	Converted MOS/R...	Listening MOS/R...	Packets Discard	Missing Packets	Duplicate Packets	Out Of Sequen...	Average Gap(m)	Average Delay	Average Jitter	Average Inter-Arr...	Cumulative Packet...	Max/Mn Gap	Max/Mn Delay	Max/Mn Jitter	Max/Mn RTDelta...	Average RTDelta...	lupHdr CRC Pa...	lupPaylo CRC Pa...	
Call#0000001	Caller:0011@192.168.1.70	Callee:0011@192.168.1.73	CallID:GLPG-18536709201519579	Call StartTime:2015-06-18 10:21:46.121	Call Duration:00:00:35.507																	
1	17918...	G726...	1906	2.07 / ...	2.07 / ...	0 / 0.00	241 / ...	658 / ...	0 / 0.00	20.00	0.00	18.00	7	-454	259.46...	110 / ...	36.85 ...	0.316 ...	0.259	0 / 0	0 / 0	
1	17872...	G726...	1941	2.02 / ...	2.02 / ...	0 / 0.00	238 / ...	692 / ...	0 / 0.00	18.25	0.00	21.00	4	-324	258.94...	164 / ...	53.38 ...	0.318 ...	0.293	0 / 0	0 / 0	
Call#0000002	Caller:0125@192.168.1.70	Callee:0125@192.168.1.73	CallID:GLPG-18533109201519584	Call StartTime:2015-06-18 10:21:46.481	Call Duration:00:00:30.428																	
2	17911...	EVRC...	1987	2.57 / ...	2.57 / ...	0 / 0.00	236 / ...	702 / ...	0 / 0.00	16.60	0.00	16.00	21	-393	62.34...	60 / 62	26.06 ...	0.269 ...	0.255	0 / 0	0 / 0	
2	17934...	EVRC...	1963	2.07 / ...	2.07 / ...	83 / 3...	239 / ...	681 / ...	0 / 0.00	15.51	0.00	18.00	18	-411	224.58...	204 / ...	38.50 ...	0.000 ...	0.000	0 / 0	0 / 0	
Call#0000003	Caller:0013@192.168.1.70	Callee:0013@192.168.1.73	CallID:GLPG-18532509201519589	Call StartTime:2015-06-18 10:21:46.541	Call Duration:00:00:32.269																	
3	17903...	G726...	2111	2.27 / ...	2.27 / ...	0 / 0.00	258 / ...	754 / ...	0 / 0.00	16.56	0.00	17.00	21	-475	64.01...	60 / 62	25.01 ...	0.252 ...	0.234	0 / 0	0 / 0	
3	17934...	G726...	2089	1.93 / ...	1.93 / ...	81 / 3...	255 / ...	730 / ...	0 / 0.00	15.45	0.00	18.00	19	-416	224.68...	204 / ...	34.01 ...	0.245 ...	0.235	0 / 0	0 / 0	
Call#0000004	Caller:0072@192.168.1.70	Callee:0072@192.168.1.73	CallID:GLPG-18531709201519595	Call StartTime:2015-06-18 10:21:46.621	Call Duration:00:00:31.055																	
4	17866...	AMR...	1358	4.04 / ...	4.04 / ...	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	22.90	0.00	0.00	0	0	177.63...	17 / 17	2.65 / ...	0.368 ...	0.276	0 / 0	0 / 0	
4	17920...	AMR...	1353	3.69 / ...	3.69 / ...	38 / 2...	0 / 0.00	0 / 0.00	0 / 0.00	23.00	0.00	2.00	0	0	256.07...	196 / ...	34.91 ...	0.356 ...	0.356	0 / 0	0 / 0	
Call#0000005	Caller:0128@192.168.1.70	Callee:0128@192.168.1.73	CallID:GLPG-1852909201519601	Call StartTime:2015-06-18 10:21:46.841	Call Duration:00:00:35.614																	

Active Calls

Print Save...

Counter Type	Counter
Total Calls	1368
Active Calls	0
Completed Calls	1368
Purged Calls(cleared)	0
Failed Calls	0
Calls Per Second	7

Counter Type	Counters
Total SIP Packets	7351
SIP Calls	1368
SIP Active Calls	0
SIP Completed Calls	1368
SIP Discarded Calls	0

Active Calls Graph Average Jitter Distribution E-Model RTP Packets Graph T.38 Analysis Call Graph Call Summary

SIP H323 RTP MEGACO

Key Features

- Supported protocols - SIP (Session Initiation Protocol RFC 2543 and RFC 3261), Megaco RFC 3525, Megaco RFC 3015, MGCP, T.38, H323/H225, and RTP
- Full RTP Analysis with audio capture/playback supported for all common codecs
- Supports saving the selected calls from traffic analyzer into *.HDL or *.PCAP formats
- T.38 Analysis - User can decode T.38 frames received over VoIP calls and can have ladder diagram for T.38 traffic flow, reassemble the fragmented data and to identify the T.30 message from it
- Displays summary of signaling, audio, and video parameters of each call
- Video parameters such as Source/Destination Video Channels, Media Type, SSRC, Average Delay/Gap, Packet Counts, Media Delivery Index (MDI- (Delay Factor : Media Loss Rate), and Frame Rate are calculated are displayed for all video calls

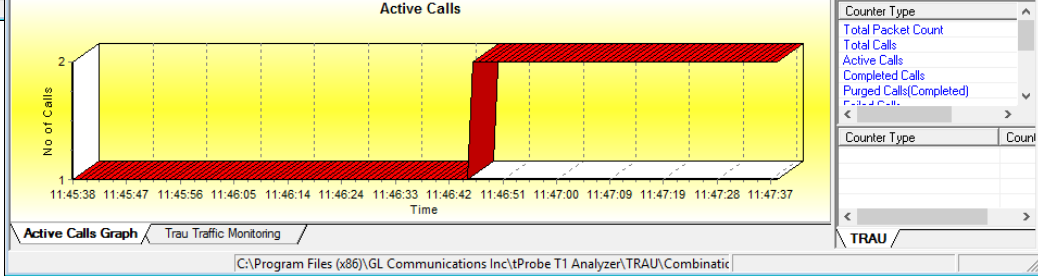
Packet Data Analysis (TRAU Protocols)

Dev	TSlot	SubCh	Frame#	TIME (Relative)	Len	Error	Frame Type TRAU	Speech Classification TRAU	Time Alignment TRAU	Bad Frame Indicator-BFI (C12) TRAU
✓ 1	1	1-2	0	00:00:00.000000	40		Uplink Full Rate Speech (FR - GSM 6.10)	Good Speech (000)	15	Good Traffic Frame (0)
✓ 1	1	1-2	1	00:00:00.020000	40		Uplink Full Rate Speech (FR - GSM 6.10)	Good Speech (000)	15	Good Traffic Frame (0)
✓ 1	1	1-2	2	00:00:00.040000	40		Uplink Full Rate Speech (FR - GSM 6.10)	Good Speech (000)	15	Good Traffic Frame (0)
✓ 1	1	1-2	3	00:00:00.060000	40		Uplink Full Rate Speech (FR - GSM 6.10)	Good Speech (000)	15	Good Traffic Frame (0)
✓ 1	1	1-2	4	00:00:00.080000	40		Uplink Full Rate Speech (FR - GSM 6.10)	Good Speech (000)	15	Good Traffic Frame (0)
✓ 1	1	1-2	5	00:00:00.100000	40		Uplink Full Rate Speech (FR - GSM 6.10)	Good Speech (000)	15	Good Traffic Frame (0)
✓ 1	1	1-2	6	00:00:00.120000	40		Uplink Full Rate Speech (FR - GSM 6.10)	Good Speech (000)	15	Good Traffic Frame (0)
✓ 1	1	1-2	7	00:00:00.140000	40		Uplink Full Rate Speech (FR - GSM 6.10)	Good Speech (000)	15	Good Traffic Frame (0)
✓ 1	1	1-2	8	00:00:00.160000	40		Uplink Full Rate Speech (FR - GSM 6.10)	Good Speech (000)	15	Good Traffic Frame (0)
✓ 1	1	1-2	9	00:00:00.180000	40		Uplink Full Rate Speech (FR - GSM 6.10)	Good Speech (000)	15	Good Traffic Frame (0)
✓ 1	1	1-2	10	00:00:00.200000	40		Uplink Full Rate Speech (FR - GSM 6.10)	Good Speech (000)	15	Good Traffic Frame (0)

```

Card1 TimeSlot=1 SubChannels=1-2 Frame=0 at 00:00:00.000000 OK Len=40
HDLC Frame Data + FCS
===== TRAU Layer =====
0000 Frame Sync          = Valid Frame Sync (000000000000000011)
Frame Direction         = 00010 Uplink (User side) (00010)
0002 Frame Type         = .00010.. Uplink Full Rate Speech (FR
0002 Time Alignment     = .....00 0000.... No change in frame
Speech Classification   = 000 Good Speech (000)
Bad Frame Indicator-BFI (C12) = 0 Good Traffic Frame (0)
0003 Silence Descriptor Frame-SID (C13-C14) = .....00.. n:2 (n=Number of bit de
0003 TAF (C15)         = .....0 (0)
0004 Speech bits (D1-D260) = x33E2D844A114001D913693761A401DB15B51
0004 Speech block (As output from codec) = xCC471B228502809BC896EC862580DBA8AD
0026 DTX indicator (C17) = .....0 DTX not applied
0027 Time Alignment     = ....1111 (15)
    
```

Call Ident...	DevNum...	Channel...	StartSub...	EndSub...	Total Pa...	Codec T...	CRC Errors	Bad frames
Call# 000001	1	1	1	2	716	GSM610	0	0
Call# 000002	2	1	1	2	1086	EFR	0	0
Call# 000003	1	1	1	1	761	AMR	0	0
Call# 000004	2	1	1	1	1122	GSM610	0	0



Key Features

- View summary of data transmission in each direction including call identity, device number, channel Number, start sub channel, end sub channel, total packets, codec type CRC errors and bad frames
- Split and compare the two sessions of a call in Detail View
- Includes separate statistical counts on total packets, calls, and captured frames, and so on
- Provides graphs to view active calls over the duration of the call and TRAU Traffic Monitoring to analyze and classify traffic types in a real-time GSM network
- Extracts speech data from TRAU frames, play the speech data on PC soundcard, or record voice to a file, after decompressing TRAU speech data to 16-bit linear PCM

DCME Analyzer

- Real-time and post processing of the DCME bearer signal
- Verification of channel mapping and implementation timing of the DCME protocol
- Bit level analysis and verification of facsimile data sub-multiplexing on DCME bearer

The screenshot displays the DCME Analyzer software interface. The main window is titled "bearer" and shows a "Bearer Frame-by-Frame Analysis" window. The analysis window contains a hex dump of data, with each line representing a frame. The data is color-coded: blue for the first byte, red for the second, green for the third, and yellow for the fourth. The hex dump shows a sequence of frames, with the first frame starting with "DF 1 5 3 0" and the last frame ending with "1B 0 5 0 3".

```
DF 1 5 3 0 D1E61FFCC346FD2EBFB515FEDDD1C553CF8C53F9FAAC5D2E8FC4632FDEE
1B 1 6 3 3 2122C1DF6E7EB3F92A2623CFEE1116FB2CD1263FDAD42419EB552BEC03
9B 0 0 0 1 34F4CE142314BAEEDF443FBFF34334EEAC3E74ED12E7FDEED1451F8EF23
DF 0 0 0 3 722D8F216E2CEC1EB2235CBB1323D65AB24F22EDECA6FC91125551CDC6F3
5F 1 6 1 3 F4D9D32713BDEE1D142419195551D12DE134FDDEE27F2CCFEF32FEBF4332
9B 0 0 0 1 41AE25542921C6E3532DFED3573E8CCAF57EC1DD34F2A8C35322EFDE44F1
5F 0 4 0 3 EACDF64BACF341331499FD3161D8DB122622AC237333DC153FDC2C5E95FA
1B 0 1 3 3 FECF1FE1E1F511533CED4F644DFED4371DB921532F932345FAE16532FAE
DF 0 1 3 1 FF15F3CDFE532133ECAB415FFDCCFB24F1EBF172FF9DF223CAD1553FBABE
1B 1 6 0 1 F2152DE21325B82F9FB3663CFE11E73FDFEC3341AEE5321AA93454AEE12
5F 1 1 3 2 46518F3C7F51AE3ADB126FEA1FF3171ABDF235E1EFF41CF1F3671FB92D7
1B 1 3 0 2 43EDEF6F5DADDEC84351BBB217F113D1ED4F239ECD341AECF5613BE2341
DF 1 2 1 3 45DAF4633DDFB2EE34123A1A2532DFFAC46112C1E342D99F2321ECCBF531
9B 0 2 0 3 5E8DE75FE81EEF2326FDDFC174FD9EEBE635DAFC9522BAD654221FEC762F
DF 1 3 0 3 2BBB1242EFC45245FD91A2533EBCE12531E81E46522EF1551FBFE4514CD
1B 0 5 0 3 FCD1E1DCCE2512651F8D1D711E1BDC42519D12432D801351D9EF4612EAE
```

Below the hex dump, the software displays file information:

```
Filename: C:\DCMETOOL\TEST\TEST3.E1 Filesize: 9920000
Unique Word : C87A (Unknown)
Control Channel : B80C2138B49D
Fax Control Channel : F043CC40
Bearer Frame No : 1
File Position (Bytes): 0
```

The interface also includes navigation controls at the bottom, such as "Inc/Dec 1 Frame", "Page Up/Down 16 Frames", and "1024 Frames". There are also checkboxes for "Beep ON" and "Log All", and buttons for "Reset All" and "Hide Pa".

DDS Protocol Analyzer

- Conventional Digital Signal Services (DDS) data channel may utilize multiple, all, or a fractional timeslot of the T1 line, with the transmission rates of 2.4 kbps, 4.8 kbps, 9.6 kbps, 19.2 kbps, and 56 kbps
- Users can capture and analyze DDS frames using either real-time or offline analyzers, and record all into a trace file

The screenshot displays the DDS Protocol Analysis software interface. At the top, there is a menu bar with options: File, View, Capture, Statistics, Database, Configure, Help. Below the menu is a toolbar with various icons for file operations and analysis. The main window is divided into several sections:

- Table of Captured Frames:** A table with columns: Dev, TSlot, SubCh, Frame#, TIME (Date), Len, Error. The data shows frames 12655 through 12661, all with a length of 411 bytes and no errors.
- Frame Data View:** A detailed view of a frame (Card2 TimeSlot=7 Frame=12655) showing the DDS Layer structure. The data includes: DDS = 212, DDS = A4- 36 ESN=030 12, DDS = (903) 757-8786 06:33 07/31/2017, DDS = 2131, DDS = ALPINE RD, DDS = (903) 757-8786 BUSN, DDS = LONGVIEW TX, and DDS = BUSN LONGVIEW.
- Hex Dump of the Frame Data:** A hex dump showing the raw data of the frame. The hex values are displayed in two columns, with corresponding ASCII characters on the right. The data matches the structure shown in the DDS Layer view.

At the bottom of the window, there is a status bar showing "Running. Utilization 0.00%" and "C:\Program Files (x86)\GL Comr Captured 12 696 frames".

ISDN Analysis and Emulation

ISDN Protocol Analysis Q.93x

Frame#	TIME (Relative)	Len	E...	C/R	SAPI	TEI	CTL	P/F	N(S)	N(R)	F...	CRV	Message Type
177	00:00:47.382125	6											
178	00:00:47.482250	15							49	30		25	ALERTING
179	00:00:47.484250	16							50	30		26	CALL PROCEEDING
180	00:00:47.504375	15							51	30		26	ALERTING
181	00:00:47.506375	16							52	30		27	CALL PROCEEDING
182	00:00:47.508500	15							53	30		27	ALERTING
183	00:00:47.510500	16							54	30		28	CALL PROCEEDING
184	00:00:47.512500	16							55	30		28	ALERTING

Card1 TimeSlot=16 Frame=177 at 00:00:47.382125 OK Len=6
HDLC Frame Data + FCS

```

----- LAPD Layer -----
C/R
SAPI
TEI
CTL
Supervisory Function
P/F
N(R)
Hex Dump of the Frame Data
02 01 01 62 B8 C6
Stopped
  
```

Untitled - GLClient

```

Task 1: TS#2:28, CallState=PROCEEDING
Task 1: TS#2:28, CallState=ALERTING
Task 1: TS#2:29, CallState=PROCEEDING
Task 1: TS#2:29, CallState=ALERTING
Task 1: TS#2:30, CallState=PROCEEDING
Task 1: TS#2:30, CallState=ALERTING
Task 1: TS#2:31, CallState=PROCEEDING
Task 1: TS#2:31, CallState=ALERTING
inform task "AnswerCall #1:1..31";
Task 1 informed
Task 1: TS#1:1, CallState=CONNECTED
Task 1: TS#1:2, CallState=CONNECTED
Task 1: TS#1:3, CallState=CONNECTED
Task 1: TS#1:4, CallState=CONNECTED
Task 1: TS#1:5, CallState=CONNECTED
Task 1: TS#1:6, CallState=CONNECTED

run task "ISDNsvrE:ISDNsvr";
inform task "SetISDNProt EuroISDN Belgium Switch #1";
inform task "SetISDNProt EuroISDN Belgium Subscriber #2";
inform task "StartDChan #1..2";
inform task "PlaceCall 5551234 5551000 #2:1..31";
inform task "AnswerCall #1:1..31";
inform task "DisconnectCall CAUSE_NORMAL_CLEAR #1:1..31";
inform task "StopDChan #1..2";
  
```

Ready Ver 4 B NUM

ISDN Emulator

ISDN Setup

Protocol: USA Variant: AT&T #4ESS Protocol End: Subscriber

Stop T1:1 USA AT&T #4ESS Subscriber

Stop T1:2 USA AT&T #4ESS Switch

Link Down Link Up L1 Active

Call Management: Card #1 (T1) - Subscriber End

TimeSlot	Called Nr	Calling Nr
00. Connected	554000	555000
01. Connected	554001	555001
02. PlaceCall	554002	555002
03. Connected	554003	555003
04. Connected	554004	555004
05. PlaceCall	554005	555005
06. Connected	554006	555006
07. Connected	554007	555007
08. PlaceCall	554008	555008
09. Connected	554009	555009
10. Connected	554010	555010
11. Connected	554011	555011
12. Connected	554012	555012
13. Connected	554013	555013
14. Connected	554014	555014
15. Connected	554015	555015
16. Connected	554016	555016
17. Connected	554017	555017
18. Connected	554018	555018
19. Connected	554019	555019
20. PlaceCall	554020	555020
21. PlaceCall	554021	555021
22. PlaceCall	554022	555022
23. Unavail	554023	555023

Call Management: Card #2 (T1) - Switch End

TimeSlot	Called Nr	Calling Nr	Last Cause	Release Cause
00. Connected	554000	555000		Normal clear
01. Connected	554001	555001		Normal clear
02. PlaceCall	554002	555002	Normal	Normal clear
03. Connected	554003	555003		Normal clear
04. Connected	554004	555004		Normal clear
05. PlaceCall	554005	555005	Normal	Normal clear
06. Connected	554006	555006		Normal clear
07. Connected	554007	555007		Normal clear
08. PlaceCall	554008	555008	Normal	Normal clear
09. Connected	554009	555009		Normal clear
10. Connected	554010	555010		Normal clear
11. Connected	554011	555011		Normal clear
12. Connected	554012	555012		Normal clear
13. Connected	554013	555013		Normal clear
14. Connected	554014	555014		Normal clear
15. Connected	554015	555015		Normal clear
16. Connected	554016	555016		Normal clear
17. Connected	554017	555017		Normal clear
18. Connected	554018	555018		Normal clear
19. Connected	554019	555019		Normal clear
20. PlaceCall	554020	555020	Normal	Normal clear
21. PlaceCall	554021	555021	Normal	Normal clear
22. PlaceCall	554022	555022	Normal	Normal clear
23. Unavail	554023	555023		Normal clear

Link Up USA AT&T #4ESS Subso

Link Up USA AT&T #4ESS Switch Active Calls: 17

- Capture and analyze stream of frames on an ISDN PRI link
- Simulate Switch and Subscriber

HDLC Analysis and Emulation

The image displays two windows from the HDLC Protocol Analysis X.25 software. The main window shows a table of captured frames with columns for Dev, TSlot, SubCh, Frame#, TIME (Relative), Len, and Error. Below the table, it shows details for a specific frame (Frame=1210646) including the LAFB Layer address and FCS information. A hex dump of the frame data is also visible.

The 'Transmit HDLC' window is in the foreground, showing configuration options for transmission. It includes a 'Time Slots' field with a hexadecimal value, a 'Playback File' field, and checkboxes for 'Continuous Play' and 'Limited'. There are also options for 'Revert Bits', 'Invert Bits', and 'Flags Between Frames'. The 'Hyper-Channel' and 'Single Channel' sections offer different transmission rates and bit configurations. A progress bar at the bottom indicates 'Transmitted 310 out of 720 Frames ...'.

- Provides the capability to capture, and analyze HDLC data on a full duplex T1 or E1 line
- Supports decoding of frames with FCS of 16 bits and 32 bits, or none
- Captured frames can later be used for traffic simulation using HDLC Transmit/Receive/Playback application

MLPPP Analysis and Emulation

PPP Protocol Analysis PPP

Dev	TSlot	SubCh	Fram...	TIME (Relative)	Len	Error	PPP Laye...	LCP Code	IPCP Code
✓ 1	1-31		0	00:00:00.000000	14		Link Control	Echo-Request	
✓ 2	1-31		1	00:00:00.000625	14		Link Control	Echo-Reply	
✓ 2	1-31		2	00:00:00.008625	14		Link Control	Echo-Request	
✓ 1	1-31		3	00:00:00.009200	14		Link Control	Echo-Reply	
✓ 1	1-31		4	00:00:00.009396	14		Link Control	Echo-Request	
✓ 2	1-31		5	00:00:00.0094625	14		Link Control	Echo-Reply	
✓ 2	1-31		6	00:00:00.0082625	14		Link Control	Echo-Request	

Card1 TimeSlots=1-31 Frame=0 at 00:00:00.000000 OK Len=14
HDLC Frame Data + FCS
----- PPP Link Layer -----
Address = 11111111 (255)
Ci1 = 00000011 (3)
Protocol = 11000000 00100001 Link Control
----- Link Control Layer -----
Code = 00001001 Echo-Request
Identifier = 172 (*AC)
Length = 8 (*0008)
Media...
Hex Dump of the Frame Data
FF 03 C0 21 09 AC 00 08 09 DC 19 2E 85 63

MC-MLPPP Emulator

Simulation
PPP

Link Name	Action	LCP Status	NCP Status	Tx/Rx Status
#1:1-31	Close	Link UP	Link UP	Tx: Not Transmitting , Rx: Not Receiving
#2:1-31	Close	Link UP	Link UP	Tx: Not Transmitting , Rx: Not Receiving

Add Delete Open Close

LCP Configuration NCP Configuration Link Test Statistics HDLC Statistics Impairments

MC-MLPPP Emulator
Simulation
MLPPP

MC-MLPPP Options

Fragment Format Long Sequence
Maximum Receive Reconstructed Unit 1500
Multi-Class options
Suspendable classes 8
Endpoint Discriminator
Class Locally Assigned
Address 192.168.1.19
PPP in MLPPP
Protocol Field Compression
Address and Control Field Compression
Maximum Differential Delay 250 ms
NCP
Network Control Protocol IPCP
Ncp Over MLPPP
Options
Option type IP Address
IP Address
Peer IP Address

- Capable of generating and receiving MC-MLPPP/PPP traffic (with or without impairments)
- Supports LCP Echo Test at PPP and MLPPP level

TRAU Analysis and Emulation

TRAU Protocol Analysis TRAU

Dev	TS...	Su...	Frame#	TIME (Relative)	Len	TRAU Fram...	TRAU Frame...	Frame Sy...	Speech Fra...	Time Ali...	CRC	RIF	AMRmode
2	1	1-2	3	00:00:00.060000	40	Uplink (User)	Adaptive Mul...	Valid	Good Speech	No cha...	Valid CRC	Indicati...	Codec_Mode 5.15...
2	1	1-2	4	00:00:00.080000	40	Uplink (User)	Adaptive Mul...	Valid	Good Speech	No cha...	Valid CRC	Indicati...	Codec_Mode 5.15...
2	1	1-2	5	00:00:00.100000	40	Uplink (User)	Adaptive Mul...	Valid	Good Speech	No cha...	Valid CRC	Indicati...	Codec_Mode 5.15...
2	1	1-2	6	00:00:00.120000	40	Uplink (User)	Adaptive Mul...	Valid	Good Speech	No cha...	Valid CRC	Indicati...	Codec_Mode 5.15...
2	1	1-2	7	00:00:00.140000	40	Uplink (User)	Adaptive Mul...	Valid	Good Speech	No cha...	Valid CRC	Indicati...	Codec_Mode 5.15...
2	1	1-2	8	00:00:00.160000	40	Uplink (User)	Adaptive Mul...	Valid	Good Speech	No cha...	Invalid CRC	Indicati...	Codec_Mode 5.90...

Card2 TimeSlot=1 SubChannels=1-2 Frame=3 at 00:00:00.060000 OK Len=40
HDLC Frame Data + FCS
----- TRAU Layer -----
Frame Sync = Valid Frame Sync (0000000000)
Frame Direction = Uplink (User)
Frame Type (Full Rate, 16kbps, C1-C5) = 001110 Adaptive Multi-Rate
Time Alignment (C6-C11) for TAC_AMR = 00000000 No change

Hex Dump of the Frame Data

```
00 00 98 00 83 3F FF FF FF FF FF F3 B1 E1 EE 28 +-----+
87 AF F8 0E E8 F0 8F 75 F0 1E F5 FF FF FF FF FF | 1?yyyyyotai(
FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF | 1e eslu8 0yyyyy
                                         00000000
```

Device #	Frame Count(Speech Frame Classification)
2	206
total 2	206

C:\Program Files\GL Communications\Inc\U\206 Frames

WGS TRAU Emulator - Untitled

Sl no	Xn Rate	Device No	Channel No	Sub Channel	Direction	Codec Type	Status
0	16kbps	1	0	1-2	UpLink	EFR	Stop
1	16kbps	2	1	1-2	UpLink	EFR	Stop

TX params: Source Type SEQNUM, Sink Type SEQNUM, Order MSB, Length 4, Start 0, Increment 1, Duration Spec: Continuous transmission.

RX params: Sink Type SEQNUM, Order MSB, Length 4, Start 0, Increment 1, Duration Spec: Continuous Reception.

TA type XT

TA Sequence Delay/Advance msec: 6.500

Interval for every TA: 10 frames

Repeat Sequence: 0 times

Transmit Frame with TA Delay/Advance

Enable

Impairment Duration: Repeat 1, Continuous OFF, Skip 1

Impairment Type: SYNC ERROR (selected), DUPLICATE, CRC ERROR, AND, OR, XOR

- Frames can be captured on the selected time slots (contiguous or non-contiguous), sub-channels or full bandwidth 32 or 24 channels
- Frames may also be captured based on bit inversion and user/network side options

Multilink Frame Relay Analysis

Frame Relay Protocol Analysis LAPF

File View Capture Statistics Database Call Detail Records Configure Help

GoTo: 0

Dev	TS...	Su...	Fra...	TIME (Relative)	Len	E	DLCI	DE	BECN	FECN	Sequ...	Sequ...
✓ 2	1-7		12...	00:00:17.0930...	20		56	0	0	0		
✓ 1	1-7		12...	00:00:17.0951...	20		40	0	0	0		
✓ 2	1-7		12...	00:00:17.0951...	20		40	0	0	0		
✓ 1	1-7		12...	00:00:17.0973...	16		0	0	0	0		
✓ 2	1-7		12...	00:00:17.0973...	16		0	0	0	0		
✓ 1	1-7		12...	00:00:17.0993...	20		56	0	0	0		
✓ 2	1-7		12...	00:00:17.0993...	20		56	0	0	0		

Card2 TimeSlots=1-7 Frame=12942 at 00:00:17.093000 OK Len=20
HDLC Frame Data + FCS
----- LAPF Layer -----
EA
C/R
DLCI
EA
DE
BECN
FECN
CRC16

Hex Dump of the Frame Data

0C 81 03 CF 00 01 03 08 00 75 95 01 01 00 03 02
F1 00 E7 BB

Running. Utilization 15.52% C:\Temp.Hdl

MFR Emulator - MFR Simulation - Untitled

File Action Simulation Help

Server Connection Status ●

MFR Bundles	Status
1	UP
2	UP

Link Name	Action	Status
#1:1..31	Close	Up

Protocol Capture Configuration

Save Load Default

Capture File Options
Card & Stream Selection
Capture Filter
Gui & Protocol Options

Bundle 1 Bundle 2

Card 1 Card 1 Card 1

Timeslot Selection

TS
21
22
23
24
25
26
27
28
29
30

Data Transmission Rate

Single Channel
 64 kbps
 56 kbps

Hyper-Channel
 Nx64 kbps
 Nx56 Kbps (bits 1-7)
 Nx56 Kbps (Bits 2-8)

Subchannels: 8-56 kbps
DSD bits
 8
 16
 24
 32
 40
 48
 56

All
 None

CRC

Bit Inversion (1 <-> 0)

Octet Bit Reversion (MSB <-> LSB)

Mfr Options
Maximum Differential Delay ms

Selected Links HC 1:1..10,HC 1:11..20,TS 1:21..30

Open Close

Statistics HDLC Statistics

Flags between Hdlic frames 100

Frame Relay Analysis

- Each MFR bundle is created by selecting groups of timeslots on various cards
- Supports reassembly and decoding of multiple MFR bundles simultaneously. Each MFR bundle will reassemble packets from FR links
- Streams can be captured on the selected time slots (contiguous or non-contiguous), sub-channels (fractional DS0 to DS1), hyper-channels($n \times 64$ kbps, or $n \times 56$ kbps), or full bandwidth (56kbps, or 64kbps)
- Frames may also be captured based on their FCS (16 bits, 32 bits, none), bit inversion, octet bit reversion, user/network side options
- Capture frames based on maximum differential delay
- Recorded trace file can then be analyzed offline, exported to ASCII file, or printed

ATM IMA Analysis and Emulation

- Supports 16 T1/E1 ports
- Support for Full or Fractional Timeslots for ATM Link
- Supports IMA Frame Length ranging from 32, 64, 128, or 256

The image displays two software windows. The top window, titled "ATM Protocol Analysis AAL2_5(UNI3.1)", shows a table of captured ATM frames. The bottom window, titled "IMA Emulator - IMA Simulation - Untitled", shows the configuration and status of an IMA link.

Dev	TScout	Frame#	TIME (Relative)	Len	Error	VPI	VCI	PT	HEC	OSF	AAL Type	Frame Type
✓ 1	31	27	00:00:00.005556	53		100	200	0	210			ATM-Cell
✓ 1	31	28	00:00:00.005770	53		100	200	0	210			ATM-Cell
✓ 1	31	29	00:00:00.005983	53		100	200	0	210			ATM-Cell
✓ 1	31	30	00:00:00.006197	53		100	200	0	210			ATM-Cell
✓ 1	31	31	00:00:00.006411	53		100	200	0	210			ATM-Cell
✓ 1	31	32	00:00:00.006625	53		100	200	0	210			ATM-Cell
✓ 1	31	33	00:00:00.006838	53		100	200	0	210			ATM-Cell
✓ 1	31	34	00:00:00.007052	53		100	200	0	210			ATM-Cell

Device1 TScout=31 Frame=27 at 00:00:00.00
ATM Frame Data
----- ATM Layer -----
GFC
VPI
VCI
PT
CLP
HEC

Hex Dump of the Frame Data

06 40 0C 80 D2 AB CD AB CD AB CD AB CD AB CD AB CD AB
CD AB CD AB CD AB CD AB CD AB CD AB CD AB CD AB CD AB
CD AB CD AB CD AB CD AB CD AB CD AB CD AB CD AB CD AB
CD AB CD AB CD

Running, Utilization 0.00% C:\Temp.F

IMA Emulator - IMA Simulation - Untitled
File Action Help
Server Connection Status: ●

IMA Group	Status
1	None
2	None

Link Name	Action	Status
#1:1..31	Open	Not In Group

IMA Id: 3
Add Delete
Open Close

SS1 Signaling Analysis and Emulation

The screenshot shows the SS1 Remote Analyzer interface. The main window displays a protocol tree with the following entries:

- 12:25:35 '23' TS=#1:1 dur=575
- +0.000 '2' TS=#1:1 dur=424
- +0.000 'SS1/mark' TS=#1:1 dur=104
- +0.104 'SS1/space' TS=#1:1 dur=40
- +0.144 'SS1/mark' TS=#1:1 dur=56
- +0.200 'SS1/space' TS=#1:1 dur=224
- +0.424 '3' TS=#1:1 dur=574
- +0.424 'SS1/mark' TS=#1:1 dur=104
- +0.528 'SS1/space' TS=#1:1 dur=40
- +0.568 'SS1/mark' TS=#1:1 dur=56
- +0.624 'SS1/space' TS=#1:1 dur=40
- +0.664 'SS1/mark' TS=#1:1 dur=54
- +0.718 'Idle' TS=#1:1 dur=280
- 12:24:29 '67' TS=#1:1 dur=982
- 11:52:03 '45' TS=#1:1 dur=768
- 11:51:31 '23' TS=#1:1 dur=572

Annotations on the left side of the image:

- Dial Code Record**: Points to the top entry '12:25:35 '23' TS=#1:1 dur=575'.
- Digit Record**: Points to the entry '+0.000 '2' TS=#1:1 dur=424'.
- Tone Record**: Points to the entry '+0.144 'SS1/mark' TS=#1:1 dur=56'.
- "Collapse" branches of the protocol tree by clicking on "-" boxes**: Points to the "-" icon next to the entry '+0.424 '3' TS=#1:1 dur=574'.
- "Expand" branches of the protocol tree by clicking on "+" boxes**: Points to the "+" icon next to the entry '12:24:29 '67' TS=#1:1 dur=982'.

The screenshot shows the SS1 Dialer #1:0 interface. The main window displays a list of dialing parameters:

- 18:49:51 '23' TS=#1:0 dur=950
 - +0.000 '2' TS=#1:0 dur=425
 - 0.000 'Mark' TS=#1:0 dur=100
 - +0.100 'Space' TS=#1:0 dur=42
 - +0.142 'Mark' TS=#1:0 dur=58
 - +0.200 'Space' TS=#1:0 dur=225
 - +0.425 '3' TS=#1:0 dur=525
 - 0.425 'Mark' TS=#1:0 dur=100
 - +0.525 'Space' TS=#1:0 dur=42
 - 0.567 'Mark' TS=#1:0 dur=58
 - +0.625 'Space' TS=#1:0 dur=42
 - 0.667 'Mark' TS=#1:0 dur=58
 - +0.725 'Space' TS=#1:0 dur=225
- 18:49:47 '45' TS=#1:0 dur=1350

The interface includes a numeric keypad, a Speed Dial list, and various control buttons:

- Speed Dial**: A list of 10 entries, with '23', '45', and 'Hank' populated.
- Run**, **Step**, **Load**, **Save**, **Clear Display**, **Clear Selection** buttons.
- Dial Mode**: Set to '2-Digit Direct Dial'.
- Mark** parameters: Frequency (2600 Hz), Initial Duration (100 ms), Nominal Duration (58 ms).
- Space** parameters: Frequency (2400 Hz), Nominal Duration (42 ms), Final Duration (225 ms).
- Power**: Set to -8 dBm.
- Tx Channel**: Port #1, Timeslot 0, VF Audio checked.
- Timeout**: Remote Timeout (6 Sec).
- Space Transmits as Tone** and **Space Transmits as Idle** options.
- Save Setup** and **Load Setup** buttons.

- Generate and introduce SS1 Dial Codes on Transmit Channels using SS1 Dialer
- Analyzer can capture either TDM or audio signals
- Analyzer can analyze either 2-digit or 3-digit dial codes
- Analyzer displays received dial codes, including the characteristics of the underlying tones

CAS Analysis and Simulator

CAS Protocol Analysis MFCR2 64-bit

File View Capture Statistics Database Call Detail Records Configure Help

Dev	TSlot	SubCh	Frame#	TIME (Relative)	Len	Error	Event Type CAS-MFCR2	Signal CAS-MFCR2	Type CAS-MFCR2	Digits CAS-MFCR2	Tone Type CAS-MFCR2
✓ 2	20		108	00:00:15.048000	2		Signal	1001 Idle Or ...			
✓ 2	21		109	00:00:15.048000	2		Signal	1000			
✓ 2	22		110	00:00:15.048000	2		Signal	1001 Idle Or ...			
✓ 2	23		111	00:00:15.048000	2		Signal	1010			
✓ 2	0		112	00:00:15.051000	2		Signal	0101 Answer			
✓ 2	1		113	00:00:15.051000	2		Signal	0100			

Card2 TimeSlot=20 Frame=108 at 00:00:15.048000 OK Len=2

Frame Data

```

===== CAS-MFCR2 Layer =====
0000 Event Type           = 00000001 Signal
0001 Signal               = ....1001 1001 Idle Or Clear Forward
    
```

Hex Dump of the Frame Data

```

01 09
    
```

Call ID	Call Status	Call Start Date & Time	Call Duration	DevNo	TS	Calling Number	Called Nu
A0	active	2018-03-27 15:39:21.555000	00:00:15.411000	2	0		
A1	active	2018-03-27 15:39:21.555000	00:00:15.411000	2	1		
A2	active	2018-03-27 15:39:21.555000	00:00:15.411000	2	2		
A3	active	2018-03-27 15:39:21.555000	00:00:15.411000	2	3		
A4	active	2018-03-27 15:39:21.555000	00:00:15.411000	2	4		
A5	active	2018-03-27 15:39:21.555000	00:00:15.411000	2	5		

Running. Utilization 0.00% C:\Program Files\GL Communici... Captured 1 233 frames

CAS Simulator T1; trunk 1

File Trunk Edit Manual Call Help

GL [Icons]

Signaling Settings Flash Hook

Global Start Global Stop

TimeSlot 0

Enable Signaling

Signaling Script
[E:\Program Files\GL Communications] Browse

Edit Signaling Script

0 Send Signaling (O-F) in Current Trunk

CAS Simulator Signaling Status

CAS Simulator Signaling Enabled
 CAS Simulator Signaling Activated

Display Binary

Hex 5 (0)	Hex 5 (8)	Hex 5 (16)
Hex 5 (1)	Hex 5 (9)	Hex 5 (17)
Hex 5 (2)	Hex 5 (10)	Hex 5 (18)
Hex 5 (3)	Hex 5 (11)	Hex 5 (19)
Hex 5 (4)	Hex 5 (12)	Hex 5 (20)
Hex 5 (5)	Hex 5 (13)	Hex 5 (21)
Hex 5 (6)	Hex 5 (14)	Hex 5 (22)
Hex 5 (7)	Hex 5 (15)	Hex 5 (23)

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

Events WCS Client Board Config

[49] (running) CMD monitor tones ("na.mtd", "dtmf.mtd", "qual40.mtd") #1:11;	IP Address: 192.168.1.58 Port: 17080 Message Type: <input checked="" type="radio"/> Binary <input type="radio"/> ASCII Message Version: <input type="radio"/> Version3 <input checked="" type="radio"/> Version4 Disconnect Send
[50] (done) CMD go 0,1,0,1 #1:11;	
[51] (running) CMD monitor signaling bits #1:12;	
[52] (running) CMD monitor tones ("na.mtd", "dtmf.mtd", "qual40.mtd") #1:12;	
[53] (done) CMD go 0,1,0,1 #1:12;	
[54] (running) CMD monitor signaling bits #1:13;	
[55] (running) CMD monitor tones ("na.mtd", "dtmf.mtd", "qual40.mtd") #1:13;	
[56] (done) CMD go 0,1,0,1 #1:13;	
[57] (running) CMD monitor signaling bits #1:14;	
[58] (running) CMD monitor tones ("na.mtd", "dtmf.mtd", "qual40.mtd") #1:14;	
[59] (done) CMD go 0,1,0,1 #1:14;	

T1 1:0 Call State: IDLE
Current Load Configuration:

- It 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

Key Features

- 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

CAS Simulator

The screenshot displays the CAS Simulator software interface. The main window, titled "CAS Simulator T1; trunk 1", features a menu bar (File, Trunk, Edit, Manual Call, Help) and a toolbar with icons for GL, a trash can, a snowflake, and a red X. The interface is divided into several sections:

- Signaling Settings:** Includes "Global Start" and "Global Stop" buttons, a "TimeSlot 0" dropdown menu, a checked "Enable Signaling" checkbox, a "Signaling Script:" field with a file path "C:\Program Files\GL Communications I" and a "Browse" button, an "Edit Signaling Script" button, and a "Send Signaling (0-F) in Current Trunk" button with a "0" input field.
- Flash Hook:** A tabbed section.
- CAS Simulator Signaling Status:** Shows "CAS Simulator Signaling Enabled" (checked) and "CAS Simulator Signaling Activated" (checked). A "Display Binary" button is present. Below this is a 3x8 grid of hex slots (Hex F (0) to Hex 0 (23)), all highlighted in green.
- Note:** "Right-click on timeslot to pop-up edit menu" and "Double-click on timeslot to start/stop".
- Events, WCS Client, Board Config:** Three tabs at the bottom of the main window.

Two smaller windows are open in the foreground:

- CAS Simulator Manual Call Generation (1):** Shows "Dial Number" 5551234, "1 sec Place Call Interval" checked, and buttons for "Place Call Trunk", "Answer Call Trunk", and "Release All Calls". Below is a grid of call functions for "T1; trunk 1" with various states like "Disconnect", "Place Call", and "Calling >>".
- CAS Simulator Manual Call Generation (2):** Shows "Dial Number" 5551234, "1 sec Place Call Interval" checked, and buttons for "Place Call Trunk", "Answer Call Trunk", and "Release All Calls". Below is a grid of call functions for "T1; trunk 0" with various states like "Disconnect", "Place Call", and "Answer Call".

Fax Simulator

```
Connected to GL Server on 'madhusudan'
run task "FaxSimulatorE1:StartFaxSim";
Task 1: Task 1 started
inform task 1 "START";
OK
inform task 1 "TXFAX #1:1 TIFF_FILE "WinClientServer\FAX Simulator\send\3.tif" CODEC_TYPE 2 MODEM_TYPE 16 MIN_RATE_TYPE 7 MAX_RATE_TYPE
16 PAGESIZE_TYPE 16 RESOLUTION_TYPE 16 ECMENABLED 0";
OK
inform task 1 "RXFAX #2:1 TIFF_FILE "WinClientServer\FAX Simulator\Recv\rcv.tif" CODEC_TYPE 2 MODEM_TYPE 16 MIN_RATE_TYPE 7 MAX_RATE_TYPE
16 PAGESIZE_TYPE 16 RESOLUTION_TYPE 16 ECMENABLED 0";
OK
Task 1: Fax Session Completed, PortNo: 1, TS: 1
Task 1: Fax Session Completed, PortNo: 2, TS: 1

/** FAX Simulator Commands */
/** Single FAX session in a task using A law codec type */
run task "FaxSimulatorE1:StartFaxSim";

inform task 1 "START";

inform task 1 "TXFAX #1:1 TIFF_FILE "WinClientServer\FAX Simulator\send\3.tif" CODEC_TYPE 2 MODEM_TYPE 16 MIN_RATE_TYPE 7 MAX_RATE_TYPE
16 PAGESIZE_TYPE 16 RESOLUTION_TYPE 16 ECMENABLED 0";

inform task 1 "RXFAX #2:1 TIFF_FILE "WinClientServer\FAX Simulator\Recv\rcv.tif" CODEC_TYPE 2 MODEM_TYPE 16 MIN_RATE_TYPE 7
MAX_RATE_TYPE 16 PAGESIZE_TYPE 16 RESOLUTION_TYPE 16 ECMENABLED 0";

inform task 1 "STOPFAX #1:1";
inform task 1 "STOPFAX #2:1";
end task;
```

Ready

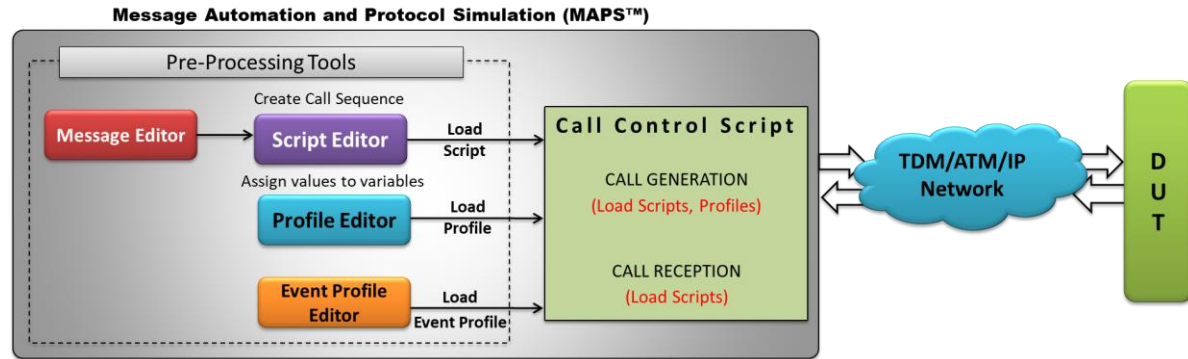
- High speed data transmission used for high transfer rates of High Speed (HS) fax page data (9600 to 14400 bps)
- High speed data transmission, fax page data (1200 to 2880 bps). Used for Sync/Async data transmission

MAPS™ – Script Based Emulation

- Script based protocol simulation and conformance test tool - covers solutions for both protocol simulation and protocol analysis
- Supports a variety of protocols such as ISUP, MAP, CAS, ISDN, MLPPP, GSM A, GSM Abis, etc.
- Includes various ready-to-use test plans and test cases to support the testing of a required real-time scenario
- Provides the unlimited ability to edit messages and control scenarios (message sequences)
- "Message sequences" are generated through scripts; Generate and respond to calls / messages
- Impairments can be applied to messages to simulate error conditions
- Supports transmission/detection of various TDM traffic such as, digits, voice file, single and dual tones

Working Principle

- The message templates form the backbone of MAPS™ application
- Message templates are created using an utility Message Editor with user-selected protocol fields and default values for each protocol field
- The protocol fields can be accessed by scripts as variables using import / export files
- Scripts comprises of sequence of commands that performs the required operation using pre-defined message templates
- Script Editor is another powerful utility of MAPS, in which sequences of message templates can be grouped together in an order to create call flow (scripts)



- Profile consists of values assigned to the variables. Profiles can be created using a utility called Profile Editor where the values can be assigned to the variables
- Event Profiles consists of values assigned to the variables during run-time. Event Profile Editor allows you to create Event Profiles for user-defined events in a script. The value in the profiles can be changed during script execution
- MAPS™ provides the ability to create any number of scripts to simulate a real-time scenario with MAPS™ and DUT

Supported Protocols

- MAPS™ – Script Based Emulation
- Testing binary based protocols over T1 E1
 - ISDN
 - SS7 (ISUP, INAP, MAP, CAP, IUP)
 - GSM A, Abis
 - MLPPP Conformance
 - CAS
- Testing protocols over IP
 - SIP, SIP-I
 - MEGACO, MGCP
 - ISDN SIGTRAN (ISDN over IP)
 - SS7 SIGTRAN (SS7 over IP)
 - GSMAoIP (GSM A over IP)
 - LTE (S1, eGTP)
 - UMTS (IuCS, IuH, IuPS)
 - UMTS GnGp

Call Generation

- Interactive GUI to view status, results, call information, total iterations to be done, and number of completed iterations
- Uses profiles to change the field values in the messages during the course of a call
- Events allow redirection of script execution on-the-go. The custom parameters in the events can also be changed during script execution using event profiles
- Impairments can be applied to messages to simulate error conditions
- Provides protocol trace with full message decoding, custom trace, and graphical ladder diagrams of call flow with time stamp while simulation is running
- Call flow graph allows to easily verify the messages exchanged between MAPS™ and DUT
- Support for Bulk Call Simulation with option to configure stress/load testing parameters such as Call per second (CPS), Busy hour call attempts (BHCA), Max Simultaneous Calls and Burst parameters
- Provides the associated captured events and error events during call simulation

Call Reception

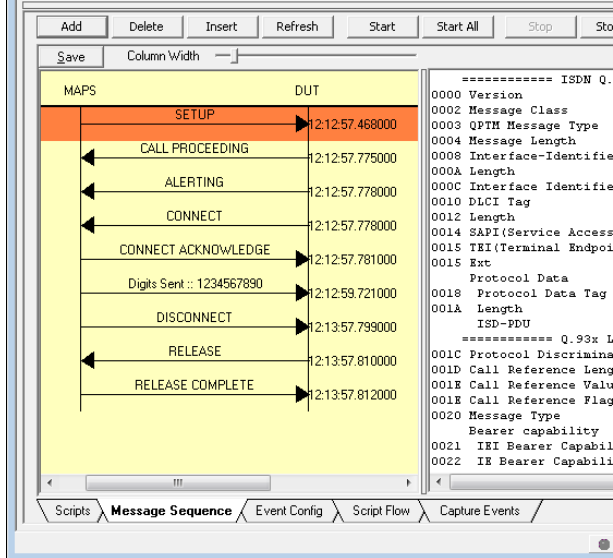
- Once the calls are successfully established, the received call instances are displayed in the Call Reception window automatically
- Triggers the execution on reception of pre-defined messages. To receive calls, the scripts are configured against the messages to be received
- Provide the result of the test with detail protocol decode and ladder diagram

Call Generation and Reception (ISDN-Sigtran ITU)

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

Configurations Emulator Reports Editor Windows Help

Sr...	Script Name	Profile	Call Info	Script Execution	Status	Events	E...	Result	Total Iterations	Completed Iterations
1	Placecall.gls	Card1TS01	1,1	Start	Call Released	None		Pass	1	1



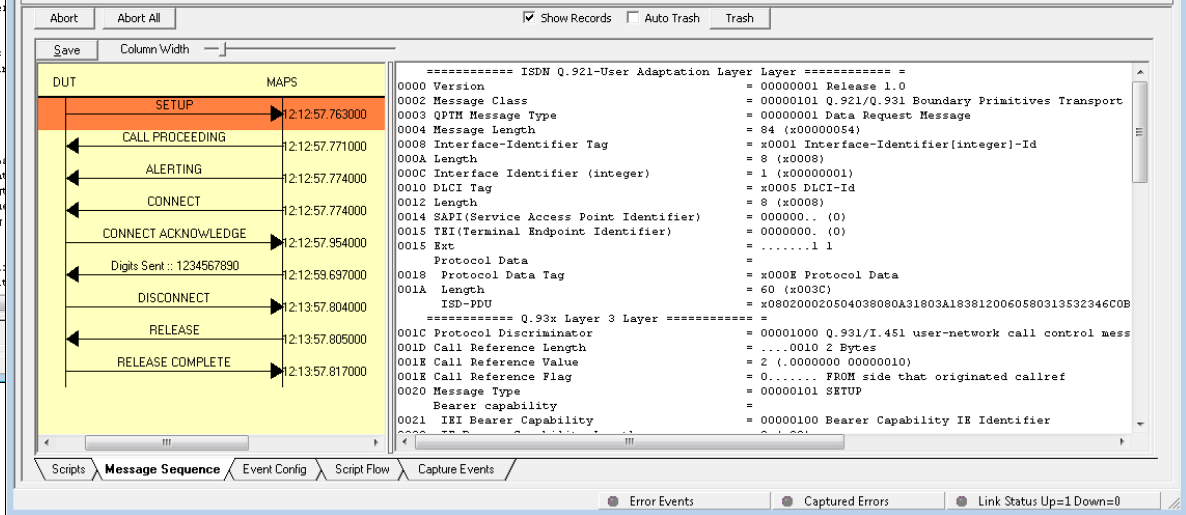
```

===== ISDN Q.931 User Adaptation Layer Layer =====
0000 Version = 00000001 Release 1.0
0002 Message Class = 00000101 Q.921/Q.931 Boundary Primitives Transport
0003 QPM Message Type = 00000001 Data Request Message
0004 Message Length = 84 (x00000054)
0008 Interface-Identifier Tag = x0001 Interface-Identifier(integer)-Id
000A Length = 8 (x0008)
000C Interface Identifier (integer) = 1 (x00000001)
0010 DLCI Tag = x0005 DLCI-Id
0012 Length = 8 (x0008)
0014 SAPI(Service Access Point Identifier) = 00000000 (0)
0015 TEI(Terminal Endpoint Identifier) = 00000000 (0)
001S Ext = .....1 1
0018 Protocol Data =
001A Length = x000E Protocol Data
001B Length = 60 (x003C)
001C ISD-PPDU = x080200020504038080A31803A1838120060580313532346C0B
===== Q.93x Layer 3 Layer =====
001C Protocol Discriminator = 00001000 Q.931/I.451 user-network call control mess
001D Call Reference Length = ...0010 2 Bytes
001E Call Reference Value = 2 (0.00000000 00000010)
001F Call Reference Flag = 0..... FROM side that originated callref
0020 Message Type = 00000101 SETUP
0021 Bearer capability =
0022 IE Bearer Capability = 00000100 Bearer Capability IE Identifier
    
```

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

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Call Info	Script Execution	Status	Events	Ev...	Results
1	Check_SCTP_Status.gls		Stop		None		Unknown
2	IUA.gls	1005	Stop	IUA Established	SendHeartbeat		Pass
3	IUAInterfaceMGMT.gls	1005.1.0	Stop	IUA Established	Send Release Indication		Unknown
4	Recvcall.gls	2,1	Completed	Call Released	None		Pass



Call Generation and Reception (ISUP Sigtran)

MAPS (Message Automation Protocol Simulation) (Isup-Sigtran ITU M3UA) - [Call Generation - CallGenDefault]

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Ev...	Result	Total Iterations	Completed Iterations
1	Isup_Call.gls	Card1TS01	1.1.1.2.2.2.1	Stop	Transmitting File	Terminate Call		Pass	1	0

Save Column Width

```

----- MTP3 User Adaptation Layer -----
0000 Version = 00000001 Release 1.0
0002 Message Class = 00000001 Transfer
0003 Transfer Message Type = 00000001 Payload Data
0004 Message Length = 52 (x00000034)
Protocol Data
0008 Tag = x0210 Transfer Protocol Data
000A Length = 44 (x002C)
000E Originating Point Code = 1.1.1(...01000 00001001)
0010 Destination Point Code = 2.2.2(...010000 00010010)
0012 Point Code = 2.2.2(...010000 00010010)
0014 Service Indicator = ...0101 ISDN User Part
0015 Network Indicator = .....00 International network
0016 Message Priority = .....00 Priority Code 0
0017 Signalling Link Selection = 1 (x01)
Pdu = x0100010000000000020907041024667305200A07011165-
----- ISUP Layer -----
    
```

Scripts | **Message Sequence** | Event Config | Script Flow

MAPS (Message Automation Protocol Simulation) (Isup-Sigtran ITU M3UA) - [Call Reception]

Sr No	Script Name	Call Info	Script Execution	Status	Events	E...	Results
1	Check_SCTP_Status.gls		Stop	ASP Active	None		Unknown
2	M3UA.gls	1	Stop		Send-ASPDown		Pass
3	Isup_Call.gls	2.2.2.1.1.1	Stop	Transmitting File	Terminate Call		Pass

Show Records
 Auto Trash

Save Column Width

```

----- MTP3 User Adaptation Layer -----
0000 Version = 00000001 Release 1.0
0002 Message Class = 00000001 Transfer
0003 Transfer Message Type = 00000001 Payload Data
0004 Message Length = 52 (x00000034)
Protocol Data
0008 Tag = x0210 Transfer Protocol Data
000A Length = 44 (x002C)
000E Originating Point Code = 1.1.1(...01000 00001001)
0010 Destination Point Code = 2.2.2(...010000 00010010)
0012 Point Code = 2.2.2(...010000 00010010)
0014 Service Indicator = ...0101 ISDN User Part
0015 Network Indicator = .....00 International network
0016 Message Priority = .....00 Priority Code 0
0017 Signalling Link Selection = 1 (x01)
Pdu = x0100010000000000020907041024667305200A07011165-
----- ISUP Layer -----
    
```

Scripts | **Message Sequence** | Event Config | Script Flow

Initialisation Errors
 Error Events
 Captured Errors
 Link Status: Up=1 Down=0

Call Generation and Reception (INAPIP ITU)

MAPS (Message Automation Protocol Simulation) gsmSSF (INAPIP ITU M3UA) - [Call Generation - Default]

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Ev...	Result	Total Iterations	Completed Iteratio...
1	INAP_VoiceCall_Service_SSF.gls	MSProfile001	0x00000002	Start	Call Released from both side	None		Pass	1	1
2	INAP_VoiceCall_Service_SSF.gls	MSProfile002	0x00000003	Start	Call Released from					
3	INAP_VoiceCall_Service_SSF.gls	MSProfile003	0x00000004	Start	Call Released from					

```

sequenceDiagram
    participant SSF
    participant SCF
    Note over SSF: Initial DP
    SSF->>SCF: 12:55:06.234000
    Note over SCF: Request Report BCSM Event
    SCF-->>SSF: 12:55:06.253000
    Note over SCF: Request Report BCSM Event
    SCF-->>SSF: 12:55:06.253000
    Note over SCF: Apply Charging
    SCF-->>SSF: 12:55:06.256000
    Note over SCF: Connect
    SCF-->>SSF: 12:55:06.293000
    Note over SSF: Event Report BCSM
    SSF->>SCF: 12:55:06.311000
    Note over SCF: Event Report BCSM
    SCF-->>SSF: 12:55:20.231000
    Note over SCF: Apply Charging Report
    SCF-->>SSF: 12:55:20.232000
    Note over SCF: Release Call
    SCF-->>SSF: 12:55:20.249000
    
```

MAPS (Message Automation Protocol Simulation) gsmSCF (INAPIP ITU M3UA) - [Call Reception]

Sr No	Script Name	Call Info	Script Execution	Status	Events	Even...	Results
1	Check_SCTP_Status.gls		Stop		None		Unknown
2	M3UA.gls	1	Stop	ASP Active	SendHeartbeat		Pass
3	SCMG.gls	1	Stop	Subsystem-Allowed	Initiate SST		Pass
4	INAP_VoiceCall_Service_SCF.gls	0x00000002	Completed	Call Released			Pass
5	INAP_VoiceCall_Service_SCF.gls	0x00000003	Completed	Call Released			Pass
6	INAP_VoiceCall_Service_SCF.gls	0x00000004	Completed	Call Released			Pass

```

sequenceDiagram
    participant SSF
    participant SCF
    Note over SSF: Initial DP
    SSF->>SCF: 12:55:06.243000
    Note over SCF: Request Report BCSM Event
    SCF-->>SSF: 12:55:06.245000
    Note over SCF: Request Report BCSM Event
    SCF-->>SSF: 12:55:06.246000
    Note over SCF: Apply Charging
    SCF-->>SSF: 12:55:06.247000
    Note over SCF: Connect
    SCF-->>SSF: 12:55:06.284000
    Note over SSF: Event Report BCSM
    SSF->>SCF: 12:55:06.320000
    Note over SCF: Event Report BCSM
    SCF-->>SSF: 12:55:20.238000
    Note over SCF: Apply Charging Report
    SCF-->>SSF: 12:55:20.238000
    Note over SCF: Release Call
    SCF-->>SSF: 12:55:20.240000
    
```

```

MTP3 User Adaptation Layer
=====
0000 Version = 00000001 Release 1.0
0002 Message Class = 00000001 Transfer
0003 Transfer Message Type = 00000001 Payload Data
0004 Message Length = 124 (x0000007C)
Protocol Data =
0008 Tag = x0210 Transfer Protocol Data
000A Length = 108 (x006C)
000E Originating Point Code = 3.3.3(.011000 00011011)
Destination Point Code =
0012 Point Code = 2.2.2(.010000 00010010)
0014 Service Indicator = ...0011 SCCP
0015 Network Indicator = .....10 National Network
0016 Message Priority = .....00 Priority Code 0
0017 Signalling Link Selection = 1 (x01)
Pdu = x090003101D0D9312100C001100452351477504
Routing Context =
0074 Tag = x0006 Routing Context
0076 Length = 8 (x0008)
0078 Routing Context Value = 1 (x00000001)
===== SCCP Layer =====
0018 Message Type = 000011001 IMT userData
    
```

Call Generation and Reception (IUP)

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

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Recording File	Events	Events P...	Result	Total Iterations	Completed Iterations
1	IUP_Call.gls	Card1TS01	1.1.1.2.2.2.1	Abort	Pass		IUPTerminate		Pass	1	0
2	IUP_Call.gls	Card1TS02	1.1.1.2.2.2.2	Abort	Pass		IUPTerminate		Pass	1	0
3	IUP_Call.gls	Card1TS03	1.1.1.2.2.2.3	Abort	Pass		IUPTerminate		Pass	1	0
4	IUP_Call.gls	Card1TS04	1.1.1.2.2.2.4	Abort	Pass		IUPTerminate		Pass	1	0
5	IUP_Call.gls	Card1TS05	1.1.1.2.2.2.5	Abort	Pass		IUPTerminate		Pass	1	0
6	IUP_Call.gls	Card1TS06	1.1.1.2.2.2.6	Abort	Pass		IUPTerminate		Pass	1	0
7	IUP_Call.gls	Card1TS07	1.1.1.2.2.2.7	Abort	Pass		IUPTerminate		Pass	1	0
8	IUP_Call.gls	Card1TS08	1.1.1.2.2.2.8	Abort	Pass		IUPTerminate		Pass	1	0

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

Save Column Width

MAPS DUT

IUP Initial Address Message 16:37:16.243000

IUP Send N Digits 16:37:17.577000

IUP Subsequent Address Message 16:37:17.577000

IUP Send N Digits 16:37:18.917000

IUP Final Address Message 16:37:18.917000

IUP Additional Call Information - ACI Type 7 16:37:20.246000

IUP Additional Call Information - ACI Type 1 16:37:20.246000

IUP Additional Call Information - ACI Type 7 16:37:21.607000

IUP Additional Call Information - ACI Type 1 16:37:21.608000

```

----- MTP3 Layer -----
0000 Service Indicator = .....0100 Telephone User Part
0000 Priority Code = .....0000 Priority Code 0
0000 Sub-service field = 10..... National Network
0001 DPC = 2.....
0002 OPC =
Higher Layer Data
----- IUP Layer -----
0004 Circuit Identification Code = 1 (0001.... 00000000)
0004 Message Types = x00000001088013020798877605A04663476610
IAM/IFAM Message Indicators
0008 Calling Party Category (CPC) = .....00001 Ordinary (Residential)
0009 Calling Line Identity (CLI) Indicator = .....1... Calling Line Identity (CLI) incl
0009 CLI Blocking Indicator (CBI) = .....0... Network Number may not be disclo
0009 International Indicator (INT) = .....0... No further information on call or
0009 Interworking (IW) Indicator = .....0... No interworking involved
0009 Priority Access Indicator (PA) = .....0... Not a Priority Access call
0009 Meter Delay Guard Timeout Indicator (MDG) = .....0... No MDG timeout required
0009 Protection Indicator (PROT) = .....0... Non-priority, non-protected call
000A Invoke Basic (telephony) call pro = .....0000
000A Release Protocol Indicator (RPI) = .....0... Only CMA message supported
000A Long Propagation Delay Indicator-(LPD) = .....0... Long propagation delay path not s
000A NHL-Call Type Indicator Bit = .....1... NHL-Call Type Indicator Bit with
000B NHL-Call Type Indicator(CTI) = .....11... CCSS call
    
```

GL MAPS (Message Automation Protocol Simulation) (IUP UK) - [Call Reception]

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Call Info	Script Execution	Status	MTP3 Active	Events	Events...	Results
1	SLTM.gls	2.2.2.1.1.1	Abort	Pass		None		Pass
2	IUP_Call.gls	2.2.2.1.1.1	Abort	Fail	Digits Transmitted	IUPTerminate		Fail
3	IUP_Call.gls	2.2.2.1.1.2	Abort	Pass	Transmitting Tone	IUPTerminate		Pass
4	IUP_Call.gls	2.2.2.1.1.3	Abort	Pass	Transmitting Tone	IUPTerminate		Pass
5	IUP_Call.gls	2.2.2.1.1.4	Abort	Pass	Transmitting Tone	IUPTerminate		Pass

Abort Abort All Show Records Auto Trash Trash

Save Column Width

DUT MAPS

IUP Initial Address Message 16:40:32.237000

IUP Send N Digits 16:40:32.240000

IUP Subsequent Address Message 16:40:33.555000

IUP Send N Digits 16:40:33.556000

IUP Final Address Message 16:40:34.885000

IUP Additional Call Information - ACI Type 7 16:40:34.886000

IUP Additional Call Information - ACI Type 1 16:40:36.215000

IUP Additional Call Information - ACI Type 7 16:40:36.216000

IUP Additional Call Information - ACI Type 1 16:40:37.566000

IUP Address Complete Message 16:40:37.567000

```

----- MTP3 Layer -----
0000 Service Indicator = .....0100 Telephone User Part
0000 Priority Code = .....0000 Priority Code 0
0000 Sub-service field = 10..... National Network
0001 DPC = 2.2.(00010010 ..010000)
0002 OPC = 1.1.(01..... 00000010 .... 0010)
Higher Layer Data
----- IUP Layer -----
0004 Circuit Identification Code = 1 (0001.... 00000000)
0004 Message Types = x00000001088013020798877605A04663476610
IAM/IFAM Message Indicators
0008 Calling Party Category (CPC) = .....00001 Ordinary (Residential)
0009 Calling Line Identity (CLI) Indicator = .....1... Calling Line Identity (CLI) incl
0009 CLI Blocking Indicator (CBI) = .....0... Network Number may not be disclo
0009 International Indicator (INT) = .....0... No further information on call or
0009 Interworking (IW) Indicator = .....0... No interworking involved
0009 Priority Access Indicator (PA) = .....0... Not a Priority Access call
0009 Meter Delay Guard Timeout Indicator (MDG) = .....0... No MDG timeout required
0009 Protection Indicator (PROT) = .....0... Non-priority, non-protected call
000A Invoke Basic (telephony) call pro = .....0000
000A Release Protocol Indicator (RPI) = .....0... Only CMA message supported
000A Long Propagation Delay Indicator-(LPD) = .....0... Long propagation delay path not s
000A NHL-Call Type Indicator Bit = .....1... NHL-Call Type Indicator Bit with
000B NHL-Call Type Indicator(CTI) = .....11... CCSS call
    
```

Scripts Message Sequence Event Config Script Flow

Error Events Captured Errors Link Status Up=0 Down=1

Call Generation and Reception (GSMoIP)

MAPS (Message Automation Protocol Simulation) BSC (GsmAlp GSM900 M3UA) - [Call Generation - CallGenDefault]

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status
1	GSMa_Call.gls	MSProfile0001	IMSI: 90170000000638.TMSI: 0x58B9F47F	Start	SCCP Connection Released
2	GSMa_Call.gls	MSProfile0002		Start	
3	GSMa_Call.gls	MSProfile0003		Start	
4	GSMa_Call.gls	MSProfile0004		Start	
5	GSMa_Call.gls	MSProfile0005		Start	

Save Column Width Show Latest

BSC MSC

```

0041 LAC
      Mobile StationClassMark1
0043 RF powercapability
0043 A5/1
0043 ES IND
0043 Revision level
0044 Length of Mobile ID
0045 Type of identity
0045 Odd/Even Ind
0045 Identity
      Mobile ID
004D IE Identifier(MSC2)
004E Length Of Mobile Station Classmark2
004F RF powercapability
004F A5/1
004F ES IND
004F Revision level
0050 Frequency Capability (FC)
0050 VGCS
0050 VBS
0050 SM capability
0050 SS Screening Ind
0050 PS capability
0051 A5/2
0051 A5/3
0051 CMAP
0051 SolsA
0051 UCS2
    
```

Scripts Message Sequence Event Config Script Flow

Initialisation Errors Error Events

MAPS (Message Automation Protocol Simulation) MSC (GsmAlp GSM900 M3UA) - [Call Reception]

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events P...	Results
1	M3UA.gls		1001	Stop	ASP Active	SendHeartbeat		Pass
2	SCMG.gls			Stop	Subsystem-Allowed	Initiate SST		Pass
3	GSMa_Call.gls	MSProfile0001	IMSI: 90170000000638.TMSI: 0x58B9F47F	Completed	Call Released	None		Pass

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

Save Column Width Show Latest

BSC 0 MSC

```

      LOCATION UPDATING REQUEST 13:17:18.691731
    < CC connection confirm 13:17:18.7039
    < AUTHENTICATION REQUEST 13:17:18.7194
    < AUTHENTICATION RESPONSE 13:17:18.7797
    < CIPHER MODE COMMAND 13:17:18.776963
    < CIPHER MODE COMPLETE 13:17:18.834082
    < LOCATION UPDATING ACCEPT 13:17:18.841804
    < TMSI REALLOCATION COMPLETE 13:17:18.903566
    < CLEAR COMMAND 13:17:18.903418
    < CLEAR COMPLETE 13:17:18.973078
    < RLSd released 13:17:18.977487
    < RLC release complete
    
```

Scripts Message Sequence Event Config Script Flow

Initialisation Errors Error Events Captured Errors

```

===== MTP3 User Adaptation Layer =====
0000 Version = 00000001 Release 1.0
0002 Message Class = 00000001 Transfer
0003 Transfer Message Type = 00000001 Payload Data
0004 Message Length = 84 (x00000054)
      Protocol Data
0008 Tag = x0210 Transfer Protocol Data
000A Length = 75 (x004B)
000E Originating Point Code = 1.1.2(.001000 00001010)
      Point Code
0012 Destination Point Code = 2.2.1(.010000 00010001)
0014 Service Indicator = .....011 SCCP
0015 Network Indicator = .....00 International network
0016 Message Priority = .....00 Priority Code 0
0017 Signalling Link Selection = 1 (x01)
      Parameter Padding = x00
===== SCCP Layer =====
0018 Message Type = 00000001 CR connection request
      Mandatory Fixed Parameters
0019 Source Local Reference Parameter = .....0011 SCCP
      Source Local Reference = 3 (x000003)
      Protocol Class Parameter = .....0010 Class 2
001C Class = .....0010 Class 2
001D Message Handling (Class 0 and 1 only) = 0010... Spare
001D Pointer to Mandatory Parameter = Parm0 offset x02 (2)
001E Pointer to optional parameters = x06 (6)
    
```

Call Generation and Reception (GSM Abis)

MAPS (Message Automation Protocol Simulation) BTS (GsmAbis GSM900) - [Call Generation - Master Configuration]

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Event...	Result	Total Iterations	Completed Iterations
1	BTS_MOC.gls	BTSProfile001	IMSI:40406000000001.TMSI...	Start	SMS Call Released	None	...	Pass	1	1
2	BTS_LUC.gls	BTSProfile002	IMSI:40406000000002.TMSI...	Start	Released Air Interface Resources	None	...	Pass	1	1

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

Save Column Width

MAPS DUT

- CHANnel ReQuireD → 11:10.16.892000
- ← Immediate Assignment 11:10.17.546000
- ← LOCATION UPDATING REQUEST 11:10.17.596000
- ← AUTHENTICATION REQUEST 11:10.17.898000
- ← AUTHENTICATION RESPONSE 11:10.17.899000
- ← CIPHERING MODE COMMAND 11:10.18.229000
- ← CIPHERING MODE COMPLETE 11:10.18.230000
- ← IDENTITY REQUEST 11:10.18.558000
- ← IDENTITY RESPONSE 11:10.18.559000
- ← LOCATION UPDATING ACCEPT 11:10.18.964000
- ← TMSI REALLOCATION COMPLETE

Scripts Message Sequence Event Config Script Flow

MAPS (Message Automation Protocol Simulation) BSC (GsmAbis GSM900) - [Call Reception]

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Call Info	Script Execution	Status	Events	Events...	Results
1	BSC_MOC.gls		Completed		None		Pass
2	BSC_MOC.gls		Completed		None		Pass
3	BSC_MOC.gls	IMSI:40406000000002.TMSI:0	Completed	Air Interface Resources Released	None		Pass

Abort Abort All Show Records Auto Trash Trash

Save Column Width

DUT MAPS

- CHANnel ReQuareD → 11:11.40.287000
- ← CHANnel ACTivation 11:11.40.288000
- ← CHANnel ACTivation ACKnowledge 11:11.40.626000
- ← Immediate Assignment 11:11.40.627000
- ← LOCATION UPDATING REQUEST 11:11.40.978000
- ← AUTHENTICATION REQUEST 11:11.40.981000
- ← AUTHENTICATION RESPONSE 11:11.41.319000
- ← CIPHERING MODE COMMAND 11:11.41.321000
- ← CIPHERING MODE COMPLETE 11:11.41.659000
- ← IDENTITY REQUEST 11:11.41.661000
- ← IDENTITY RESPONSE 11:11.41.990000

Scripts Message Sequence Event Config Script Flow Capture Events

```

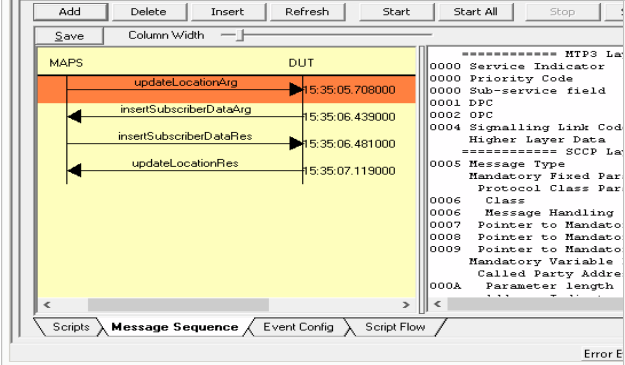
===== BTSM Layer =====
0000 T-bite
0000 Message Group
0001 Message Type
0001 Channel number
0002 IE Identifier (Ch No)
0003 Channel Type
0003 Time Slot #
0004 Request Reference
0004 IE Identifier (ReqRef)
0005 RA
0006 T3
0006 T1'
0007 T2
0008 Access Delay
0008 IE Identifier (AD)
0009 Access Delay
= 00000000 Non-Transparent Message
= 0000110 Common Channel Mgmt
= 00010011 CHANnel ReQuireD
= 00000001 Channel number
= 10001... Uplink CCCH (RACH)
= .....000 (0)
= 00010011 Request Reference
= 00000101 (S)
= 5 (...000 101....)
= 00101... (S)
= ...00101 (S)
= 00010001 Access Delay
= 55 (x37)
    
```

Error Events Captured Errors Link Status Up=1 Down=0

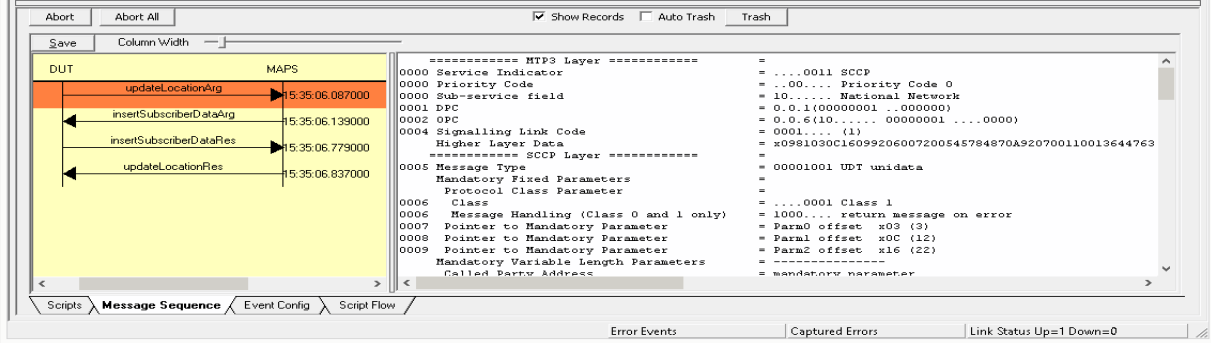
Call Generation and Reception (MAP)

MAPS (Message Automation Protocol Simulation) MSC (MAP 3GPP) - [Call Generation - CallGenDefault]

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Result	Total Iterations	Completed Iterations
1	UpdateLocationArg_MSC_VLR.gls	MSProfile04	9017000000006	Start	Location Update Completed	None	Pass	1	1
2	SendAuthenticationInfoArg_VLR.gls	MSProfile05	9017000000006...	Start	Authentication completed	None	Pass	1	1
3	AuthenticationFailureArg_MSC.gls	MSProfile06	9017000000006...	Start	Authentication Failure Report Res...	None	Pass	1	1
4	processUnstructuredSS-RequestArg_M...	MSProfile07	0a00000005	Start	Process USSD Response Receiv...	None	Pass	1	1
5	ReadyForSMArg_VLR.gls	MSProfile08	9017000000006...	Start	Ready For SMS	None	Pass	1	1
6	PurgeMSArg_MSC.gls	MSProfile09	9017000000006...	Start	purge MS Response Received	None	Pass	1	1



Sr No	Script Name	Call Info	Script Execution	Status	MTP3 Active	Events	Events ...	Results
1	SLTM.gls	0.0.1.0.0.6	Abort	Abort	MTP3 Active	Initiate SLTM		Pass
2	SCMG.gls	1	Abort	Abort	Subsystem Allowed	Initiate SST		Pass
3	UpdateLocationRes_HLR.gls		Completed	Completed		None		Pass
4	SendAuthenticationInfoRes_HLR.gls	901700000000627	Completed	Completed	Authentication Success	None		Pass
5	AuthenticationFailureReportRes_HLR.gls	901700000000628	Completed	Completed	Authentication Failure Report Response S...	None		Pass
6	processUnstructuredSS-RequestRes_H...	ProtScriptId_3174573-1543-4384	Completed	Completed	Process USSD Response Sent	None		Pass
7	readyForSMRes_HLR.gls	901700000000630	Completed	Completed	Ready For SMS	None		Pass
8	PurgeMSRes_HLR.gls	901700000000631	Completed	Completed	MS Purged	None		Pass



Call Generation and Reception (CAP)

MAPS (Message Automation Protocol Simulation) gsmSSF (CAMEL 3GPP) - [Call Generation - CallGenDefault]

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Event...	Result	Total Iterations	Completed Iterations
1	ApplyChargingGPRS_SSF.gls	MSProfile01	0x00000000	Start	Call Charging Report Sent	None	...	Pass	1	1
2	ApplyCharging_SSF.gls	MSProfile02	0x0000000F	Start	Call Released from both side	None	...	Pass	1	1
3	CameSMS_SSF.gls	MSProfile03	0x0000000A	Start	Call Released from both side	None	...	Pass	1	1
4	BalanceCheck_SSF.gls	MSProfile04	0x00000012	Start	Call Released from both side	None	...	Pass	1	1
5	ConnectToResource_SSF.gls	MSProfile05	0x00000010	Start	Call Released from both side	None	...	Pass	1	1
6	EstablishTemporaryConnection_SSF.gls	MSProfile06	0x00000011	Start	Call Released from both side	None	...	Pass	1	1

MAPS (Message Automation Protocol Simulation) gsmSCF (CAMEL 3GPP) - [Call Reception]

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Call Info	Script Execution	Status	Events	Events...	Results
1	SLTM.gls	3.3.3.2.2	Abort	MTP3 Active	Initiate SLTM		Pass
2	SCMG.gls	1	Abort	Subsystem-Allowed	Initiate SST		Pass
3	ApplyChargingGPRS_SCF.gls		Completed		None		Pass
4	BalanceCheck_SCF.gls	0x00000003	Completed	CAMEL Transaction Complete	None		Pass
5	CameSMS_SCF.gls	0x00000004	Completed	CAMEL Transaction Complete	None		Pass
6	BalanceCheck_SCF.gls	0x00000005	Completed	CAMEL Transaction Complete	None		Pass
7	BalanceCheck_SCF.gls	0x00000006	Abort	o Disconnect Reported	None		Unknown

MAPS DUT

Save Column Width

Message Sequence

- initialDPGPRS → 11:28:42.562000
- requestReportGPRSEvent ← 11:28:43.162000
- eventReportGPRS ← 11:28:43.173000
- continueGPRS ← 11:28:43.183000
- requestReportGPRSEvent ← 11:28:43.798000
- applyChargingGPRS ← 11:28:43.810000
- continueGPRS ← 11:28:43.832000
- applyChargingReportGPRS → 11:28:51.816000
- applyChargingGPRS ← 11:28:52.407000

Abort Abort All Show Records Auto Trash Trash

Save Column Width

DUT MAPS

- initialDPGPRS → 17:40:41.852000
- requestReportGPRSEvent ← 17:40:41.922000
- continueGPRS ← 17:40:41.961000
- eventReportGPRS → 17:40:42.587000
- requestReportGPRSEvent ← 17:40:42.621000
- applyChargingGPRS ← 17:40:42.642000
- continueGPRS ← 17:40:42.645000
- applyChargingReportGPRS → 17:40:51.302000
- applyChargingGPRS ← 17:40:51.305000
- continueGPRS ← 17:40:51.307000

```

===== MTP3 Layer =====
0000 Service Indicator = .....0011 SCCP
0000 Priority Code = ..11.... Priority Code 3
0000 Sub-service field = 10..... National Network
0001 DPC = 3.3.3(00011011 ..011000)
0002 OPC = 2.2.2(10..... 00000100 ....0100)
0004 Signalling Link Code = 0001.... (1)
Higher Layer Data = x0900030E190B92933F11003141658575080B92923F11C
===== SCCP Layer =====
0005 Message Type = 00001001 UDT unidata
Mandatory Fixed Parameters =
Protocol Class Parameter =
0006 Class = .....0000 Class 0
Message Handling (Class 0 and 1 only) = 0000... No Special Options
0007 Pointer to Mandatory Parameter = Param0 offset x03 (3)
0008 Pointer to Mandatory Parameter = Param offset x0E (14)
0009 Pointer to Mandatory Parameter = Param2 offset x19 (25)
Mandatory Variable length Parameters =
Called Party Address = mandatory parameter
Parameter length = 11
Address Indicators =
000B Point Code Indicators = .....0 Address does not contain signalling p
000B SSN Indicators = .....1 Address contains subsystem number
000B Global Title Indicators = ..0100.. Global title includes translation typ
    
```

Script Message Sequence Event Config Script Flow

Error Events Captured Errors Link Status Up=1 Down=0

Call Generation and Reception (MLPPP)

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Profile	Result	Total Iterations	Completed Iterations
1	OpenStateTest.gls	MLPPPProfile01		Start	Opened	None	EventProfile.xml	Pass	1	1

Message Sequence Diagram:

- MAPS to DUT: Configure-Request (16:30:34.289000)
- DUT to MAPS: Configure-Ack (16:30:36.721000)
- MAPS to DUT: Configure-Request (16:30:39.855000)
- DUT to MAPS: Configure-Ack (16:30:39.856000)

```
===== PPP Link Layer =====  
0000 Address Compression Choice = 1111.... No Address Compression  
0000 Address = 11111111 Broadcast Address  
0001 Ctl = 00000011 UnSequenced Frame  
0002 Pj =  
0002 Pj =
```

Sr No	Script Name	Call Info	Script Execution	Status	Events	Results
1	TestLoopBackUsingPeerMagicNumber.gls		Completed		None	Pass

Message Sequence Diagram:

- DUT to MAPS: Configure-Request (18:32:49.251000)
- MAPS to DUT: Configure-Ack (18:32:49.252000)
- DUT to MAPS: Configure-Request (18:32:49.252000)
- MAPS to DUT: Configure-Nak (18:32:51.629000)

```
===== PPP Link Layer =====  
0000 Address Compression Choice = 1111.... No Address Compression  
0000 Address = 11111111 Broadcast Address  
0001 Ctl = 00000011 UnSequenced Frame  
0002 Protocol Field Selection = .....0 ProtocolField Two Octets  
0002 Protocol = 11000000 00100001 Link Control  
===== Link Control Layer =====  
0004 Code = 00000011 Configure-Nak  
0005 Identifier = 14 (x0E)  
0006 Length = 14 (x00E)  
= Magic-Number  
0008 II id = 00000101 Magic-Number  
0009 Length of Options = 6 (x06)  
000A Magic-Number = 31698 (x00007BD2)  
000E Max-Recv-Reconstructed-Unit = 0010001 Maximum-Receive-Reconstructed-Unit  
000F Length of Options = 4 (x04)  
0010 Maximum-Receive-Reconstructed-Unit = 1500 (x05DC)
```


Call Generation and Reception (CAS)

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

Configurations Emulator Reports Editor Windows Help

S...	Script Name	Profile	Call Info	Script Execution	Status	Events	Events...	Result	Total Iterations	Completed Iterations
1	T1_R1_Place Call.gls	Card1TS00	1,0	Abort	Transmitting File	OutboundReleaseCall	...	Pass	1	0
2	T1_R1_Answer Call.gls	Card2TS00	2,0	Abort	Transmitting File	InboundReleaseCall	...	Pass	1	0
3	T1_R1_Reset Timeslots.gls			Start	Timeslots Restarted	None	...	Pass	1	1

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

View Executing Line

Script Contents

```

//// MAPS CAS Emulator: R1 ////

//// Initialization ////
P="1, 1, 1, 1"; //P: Place //
A="1, 1, 1, 1"; //A: Answer //
PR="0, 0, 0, 0"; //PR: Place Release //
AR="0, 0, 0, 0"; //AR: Answer Release //
Idle="0, 0, 0, 0";
SeizureAck="0, 0, 0, 0";
WinkOn="1, 1, 1, 1";
WinkOff="0, 0, 0, 0";
    
```

Scripts Message Sequence Event Config Script Flow Capture Events Error Events

Events

Event Log Error Events Captured Errors

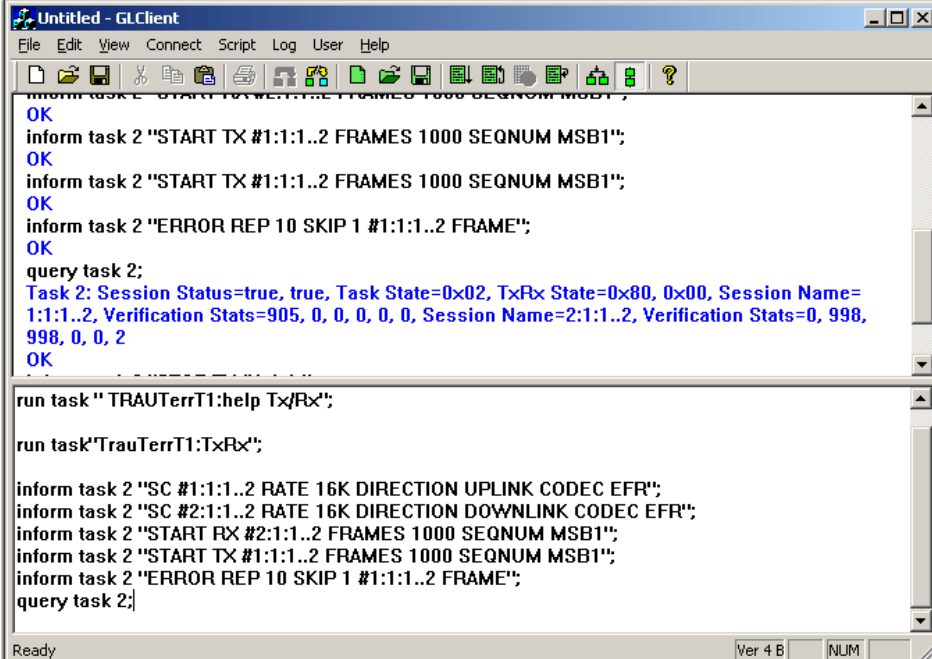
Date/Time	Captured Events	Call Trace Id	Script Name	Script Id
2014-8-27 12:57:21.596000	Timeslots Restarted		T1_FGD_Reset Timeslots.gls	CGProtScriptId_94501006-1989-3436
2014-8-27 12:57:49.862000	Timeslots Restarted		T1_R1_Reset Timeslots.gls	CGProtScriptId_94523274-1989-3436
2014-8-27 12:57:56.595000	P: Placing Call	1,0	T1_R1_Place Call.gls	CGProtScriptId_94535819-1991-3436
2014-8-27 12:57:56.611000	A: CASDetectedSignals = 0, 0, 0, 0	2,0	T1_R1_Answer Call.gls	CGProtScriptId_94535323-1990-3436
2014-8-27 12:57:57.089000	A: CASDetectedSignals = 1, 1, 1, 1	2,0	T1_R1_Answer Call.gls	CGProtScriptId_94535323-1990-3436
2014-8-27 12:57:57.089000	A: Seizure Detected	2,0	T1_R1_Place Call.gls	CGProtScriptId_94535323-1990-3436
2014-8-27 12:57:57.100000	P: CASDetectedSignals = 0, 0, 0, 0	1,0	T1_R1_Place Call.gls	CGProtScriptId_94535819-1991-3436
2014-8-27 12:57:57.102000	P: CASDetectedSignals = 1, 1, 1, 1	1,0	T1_R1_Place Call.gls	CGProtScriptId_94535819-1991-3436
2014-8-27 12:57:57.296000	A: Seizure Acknowledged	2,0	T1_R1_Answer Call.gls	CGProtScriptId_94535323-1990-3436
2014-8-27 12:57:57.603000	P: CASDetectedSignals = 0, 0, 0, 0	1,0	T1_R1_Place Call.gls	CGProtScriptId_94535819-1991-3436
2014-8-27 12:57:57.603000	P: Seizure Acknowledged	1,0	T1_R1_Place Call.gls	CGProtScriptId_94535819-1991-3436
2014-8-27 12:57:57.603000	RndDialDigitsDID = 5551809	1,0	T1_R1_Place Call.gls	CGProtScriptId_94535819-1991-3436
2014-8-27 12:57:57.603000	RndDialDigitsANI = 4441809	1,0	T1_R1_Place Call.gls	CGProtScriptId_94535819-1991-3436
2014-8-27 12:57:57.603000	P: Dialing	1,0	T1_R1_Place Call.gls	CGProtScriptId_94535819-1991-3436
2014-8-27 12:58:02.096000	A: Digit Type=DTMF	2,0	T1_R1_Answer Call.gls	CGProtScriptId_94535323-1990-3436
2014-8-27 12:58:02.096000	A: digit=5551809*4441809	2,0	T1_R1_Answer Call.gls	CGProtScriptId_94535323-1990-3436
2014-8-27 12:58:02.096000	A: Alerting	2,0	T1_R1_Answer Call.gls	CGProtScriptId_94535323-1990-3436
2014-8-27 12:58:05.188000	A: Call Connected	2,0	T1_R1_Answer Call.gls	CGProtScriptId_94535323-1990-3436
2014-8-27 12:58:05.188000	RndFileSel = 7	2,0	T1_R1_Answer Call.gls	CGProtScriptId_94535323-1990-3436
2014-8-27 12:58:05.188000	A: Tx-FileName: mu-law samples\kerrec...	2,0	T1_R1_Answer Call.gls	CGProtScriptId_94535323-1990-3436
2014-8-27 12:58:05.603000	P: CASDetectedSignals = 1, 1, 1, 1	1,0	T1_R1_Place Call.gls	CGProtScriptId_94535819-1991-3436
2014-8-27 12:58:05.603000	P: Remote User Answered Call	1,0	T1_R1_Place Call.gls	CGProtScriptId_94535819-1991-3436

Save Events

Clear Capture Events to file

Protocol Emulation using Client-Server Scripts

- Provides various modules for analysis and emulation of protocols such as CAS, SS7, ISDN, HDLC, Multilink PPP, TRAU, ATM IMA, and Multi-Link Frame Relay
- Best suited for remote script-based operations
- Easy control of T1/E1 servers through software clients via TCP/ IP / UDP



```
Untitled - GLClient
File Edit View Connect Script Log User Help
[Icons]
inform task 2 "START TX #1:1:1..2 FRAMES 1000 SEQNUM MSB1";
OK
inform task 2 "START TX #1:1:1..2 FRAMES 1000 SEQNUM MSB1";
OK
inform task 2 "START TX #1:1:1..2 FRAMES 1000 SEQNUM MSB1";
OK
inform task 2 "ERROR REP 10 SKIP 1 #1:1:1..2 FRAME";
OK
query task 2;
Task 2: Session Status=true, true, Task State=0x02, TxRx State=0x80, 0x00, Session Name=
1:1:1..2, Verification Stats=905, 0, 0, 0, 0, 0, Session Name=2:1:1..2, Verification Stats=0, 998,
998, 0, 0, 2
OK
run task " TRAUerrT1:help Tx/Rx";

run task'TrauerrT1:TxRx';

inform task 2 "SC #1:1:1..2 RATE 16K DIRECTION UPLINK CODEC EFR";
inform task 2 "SC #2:1:1..2 RATE 16K DIRECTION DOWNLINK CODEC EFR";
inform task 2 "START RX #2:1:1..2 FRAMES 1000 SEQNUM MSB1";
inform task 2 "START TX #1:1:1..2 FRAMES 1000 SEQNUM MSB1";
inform task 2 "ERROR REP 10 SKIP 1 #1:1:1..2 FRAME";
query task 2;

Ready Ver 4 B NUM
```

Measure Loop Delay/ERL

- Capability to measure and display loop delay and echo return loss (ERL) on one or more time slots
- Non- Intrusive and Intrusive modes of operations

Delay/ERL

Original Data Card #1 Return Data Card #1

	Delay	ERL		Delay	ERL		Delay	ERL		Delay	ERL
0	...	...	8	...	...	16	...	...	24	...	...
1	...	...	9	...	...	17	173	-15.4	25	173	-15.4
2	...	...	10	173	-15.4	18	173	-15.4	26	173	-15.4
3	...	...	11	173	-15.4	19	173	-15.4	27	173	-15.4
4	173	-15.4	12	173	-15.4	20	173	-15.4	28	173	-15.4
5	173	-15.4	13	...	...	21	173	-15.4	29	...	...
6	173	-15.4	14	...	...	22	...	...	30	...	...
7	173	-15.4	15	...	...	23	...	...	31	...	...

Select All Timeslots Deselect All Timeslots Refresh (Sec) 1

Parameters

Delay: Minimum 0 ms Maximum 200 ms
ERL: Minimum 6 dB Maximum 60 dB

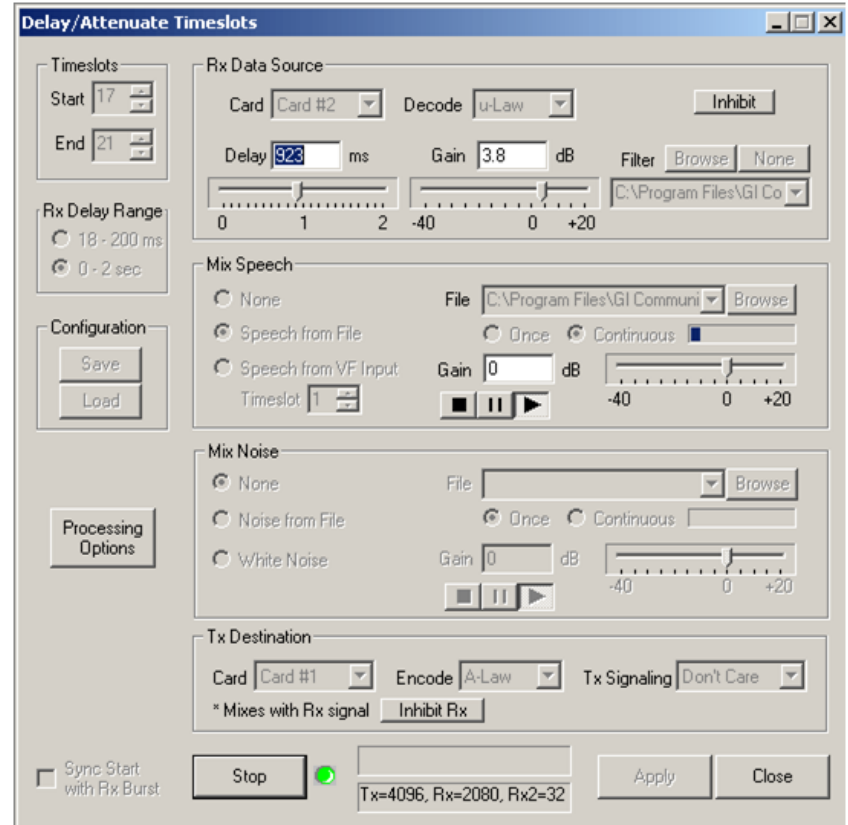
Original Data Source

E1 Input Only when Off Hook
 Gaussian Noise -10 dBm Signaling Don't Care
 File A-Law Samples\2x2lcq1a.pcm

Stop

Delay Attenuate Timeslots

- Apply delay, attenuation, and/or filtering to a received signal on any number of timeslots
- Mix in additional signals (Speech and/or Noise) from a number of sources (Files, VF input, internal generation)



Delay Attenuate - Single Channel

Delay/ERL

Original Data Card #1 Return Data Card #2

Delay	ERL	Delay	ERL	Delay	ERL	Delay	ERL
0	...	8	...	16	...	24	...
1	46 -12.5	9	...	17	...	25	...
2	...	10	...	18	...	26	...
3	...	11	...	19	...	27	...
4	...	12	...	20	...	28	...
5	...	13	...	21	...	29	...
6	...	14	...	22	...	30	...
7	...	15	...	23	...	31	...

Select All Timeslots Deselect All Timeslots Refresh (Sec) 1

Parameters

Delay: Minimum 10 ms Maximum 96 ms
ERL: Minimum 12 dB Maximum 60 dB

Original Data Source

E1 Input Only when Off Hook
 Gaussian Noise -10 dBm Signaling Don't Care
 File A-Law Samples\Samp_est.pcm

Stop

Delay/Attenuate - Single Timeslot

Process Receive Signal Data

Card Card #2 Timeslot 0 Decode A-Law

Filter Disable Filter
Type CSS/Tone
None 1

Delay 10.000 ms Gain -12.0 dB

0 32 64 -40 0 +20

Add Speech From VF Input

Use the "Insert" and "Gain" controls, on the Tx section of the VF toolbar to add speech from VF input

Add Application Data

Timeslot 1

Tx Destination

Card Card #2 Timeslot 1 Encode u-Law

Capture To Receive Buffer

Configuration

Save Load Stop Apply Close

Rx Signal #2:0

10.000 Delay
A-Law Decode
-12.0 Gain

VF Input

Appl. Data

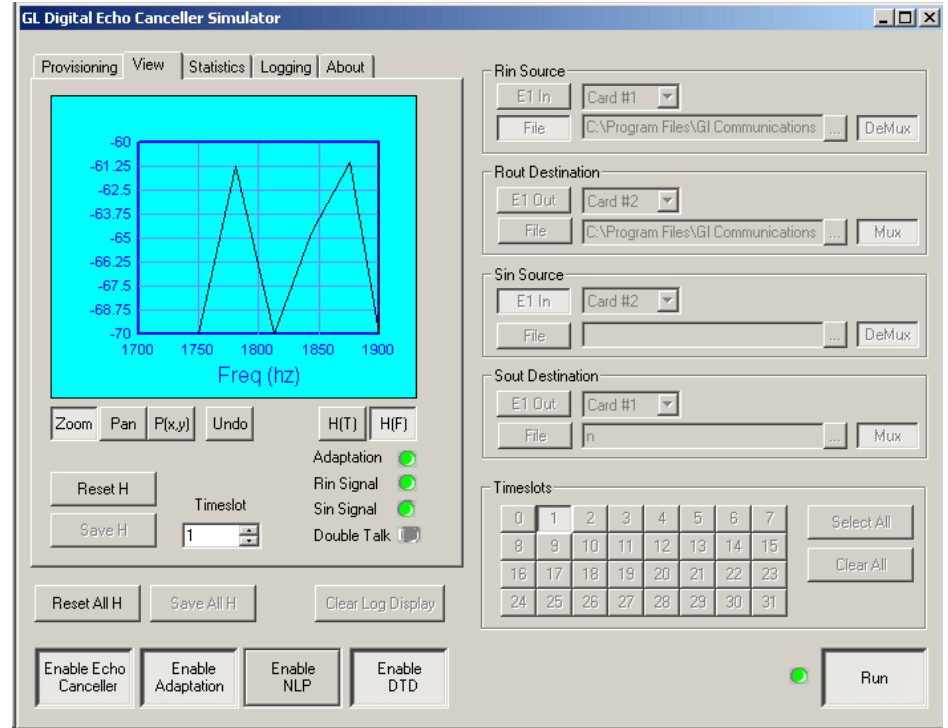
u-Law Encode

Tx Signal #2:1

- Transmission of data, voice or file on single timeslot
- Receive and transmit on only one of the boards; launch multiple instances to work on a second card

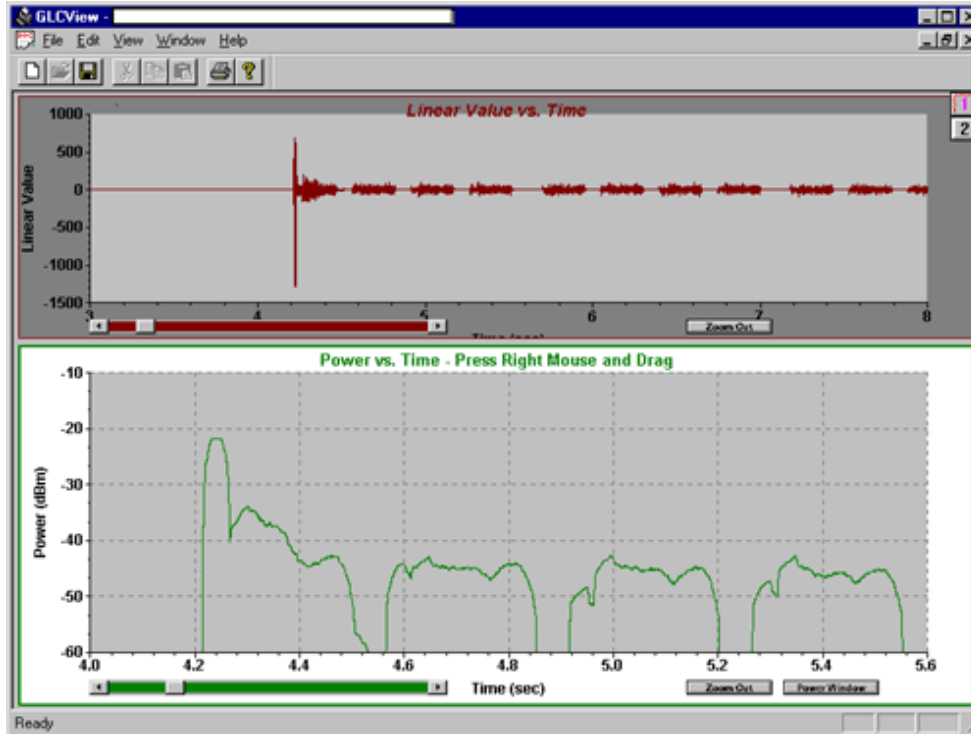
DEC Simulator

- Supports bidirectional voice traffic between the two ends of a connection
- Interfaces directly with A-Law or μ -Law encoded signals
- Continuous reporting of echo path delay, ERL, and dispersion



GLC View

- View pre-captured raw data files



Protocol Identifier

- Classifies frames into different protocols based on signaling over unknown T1/E1 lines

The screenshot shows the 'PC Protocol Classifier' software interface in 'Graphical View'. The main window displays a table with two columns for 'Port 1' and 'Port 2', each with sub-columns for 'SubChannel' (1-8). The rows represent time slots (TS) from 0 to 16. The protocols identified are: ISDN (cyan), FRAMERELAY (grey), TRAU (orange), SS7 (dark orange), PPP (brown), HDLC (blue), MTP2 (red), and LAPD (magenta). A 'Protocol Color Selection' dialog box is open on the right, listing the protocols with corresponding color swatches. The dialog box includes a close button (X) and a list of protocols: ALL, NONE, TRAU, ATM, HDLC, MTP2, LAPD, SS7, PPP, ISDN, GSM, GSMABIS, and FRAMERELAY. At the bottom of the main window, there are buttons for 'Reset', 'Stop', and 'Refresh'.

TS	Port 1								Port 2							
	SubChannel								SubChannel							
0																
1	ISDN								ISDN							
2	FRAMERELAY								FRAMERELAY							
3	TRAU	TRAU							SS7							
4	TRAU	TRAU							SS7							
5	TRAU	TRAU							PPP							
6									TRAU	TRAU						
7									TRAU	TRAU						
8									TRAU	TRAU						
9																
10	HDLC								HDLC							
11																
12	MTP2								HDLC							
13																
14																
15																
16	HDLC								LAPD							

Multichannel BERT

- Measures the correctness of data transmitted and received on T1/E1 lines according to the repetitive pattern file
- Works real-time with data currently being received on T1/E1 lines, or off-line with a data stream that has been captured

Bit Error Rate Test

Total Info Summary	All Sync Status	Sync Ch Count	Error Ch Count	Logic Error Count	Test Start	Test Duration
All channels ->	All SYNC	48	0	0	18:06:05	00:00:34

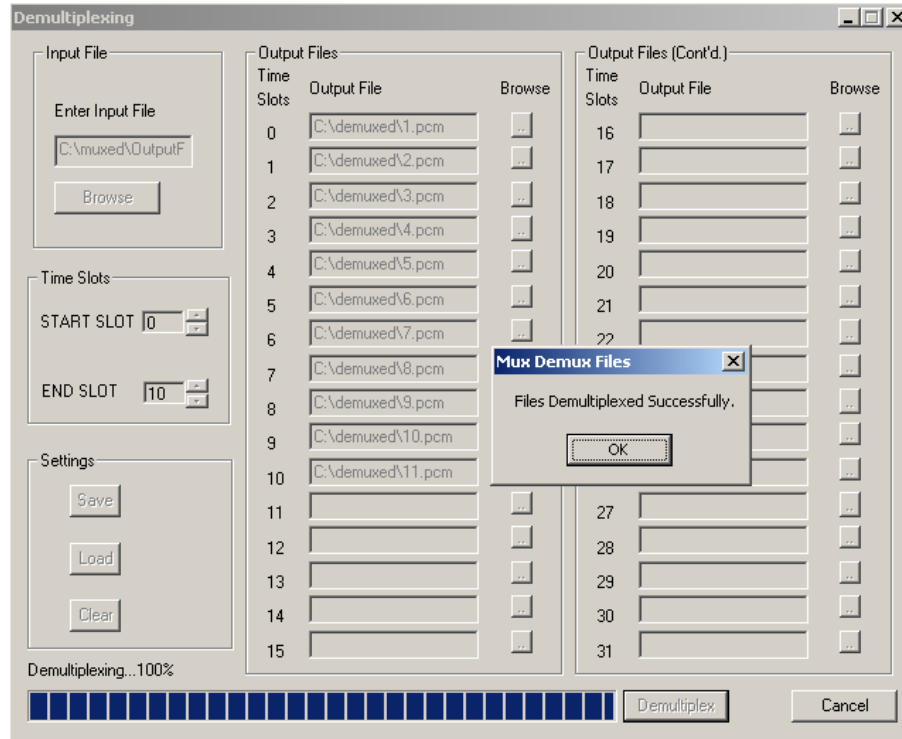
Right click to insert errors or resize columns

Dev	TS	SCh	Average Bit Error Rate	Current Bit Error Rate	Error Status	SyncLoss Count	Error Count	Error Free Seconds	Error Seconds	SyncLoss Seconds	Severely Err Seconds	Available Seconds	Unavailable Seconds
1	0		0	0	SYNC	0	0	34	0	0	0	34	0
1	1		0	0	SYNC	0	0	34	0	0	0	34	0
1	2		0	0	SYNC	0	0	34	0	0	0	34	0
1	3		0	0	SYNC	0	0	34	0	0	0	34	0
1	4		0	0	SYNC	0	0	34	0	0	0	34	0
1	5		0	0	SYNC	0	0	34	0	0	0	34	0
1	6		0	0	SYNC	0	0	34	0	0	0	34	0
1	7		0	0	SYNC	0	0	34	0	0	0	34	0
1	8		0	0	SYNC	0	0	34	0	0	0	34	0
1	9		0	0	SYNC	0	0	34	0	0	0	34	0
1	10		0	0	SYNC	0	0	34	0	0	0	34	0
1	11		0	0	SYNC	0	0	34	0	0	0	34	0
1	12		0	0	SYNC	0	0	34	0	0	0	34	0
1	13		0	0	SYNC	0	0	34	0	0	0	34	0
1	14		0	0	SYNC	0	0	34	0	0	0	34	0
1	15		0	0	SYNC	0	0	34	0	0	0	34	0
1	16		0	0	SYNC	0	0	34	0	0	0	34	0
1	17		0	0	SYNC	0	0	34	0	0	0	34	0
1	18		0	0	SYNC	0	0	34	0	0	0	34	0
1	19		0	0	SYNC	0	0	34	0	0	0	34	0

Rx, Tx, or Both: Rx & Tx, Insert Error, Pattern: QRSS, Tx Underrun Count: 0, Configuration, Bit Shift Subchan: User Pattern, Exit

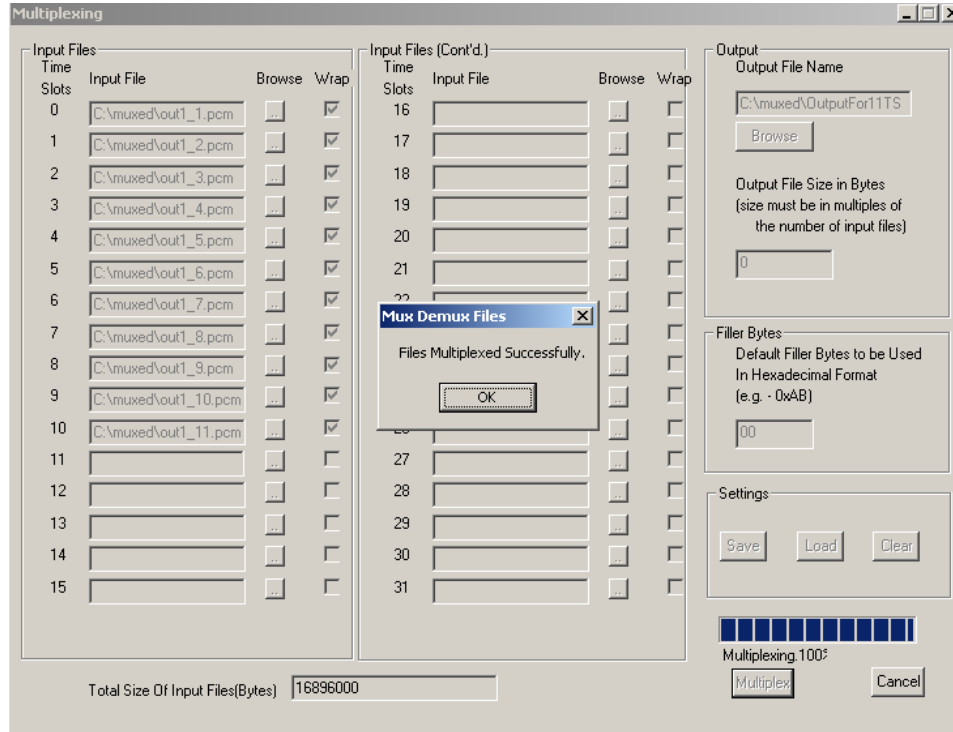
Multiplex / Demultiplex

- De-multiplex one aggregate file into individual timeslots



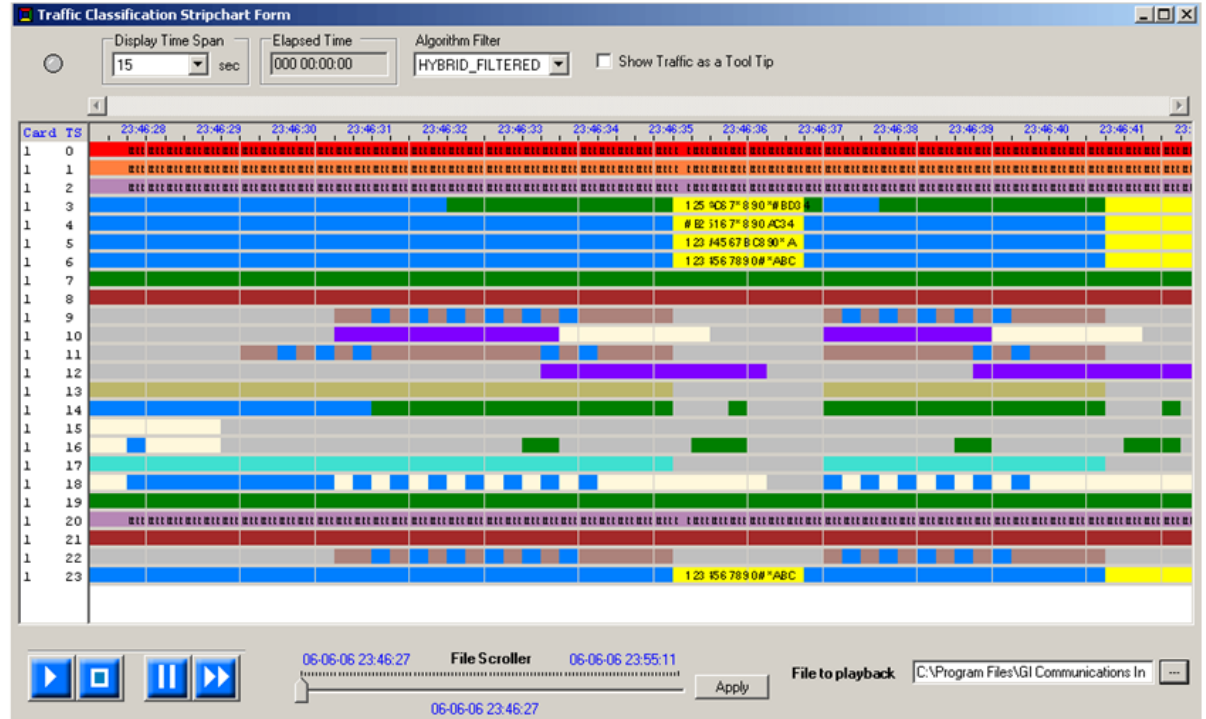
Multiplex / Demultiplex (Contd.)

- Multiplex files on different timeslots (up to 32 files) into one aggregate output file



Traffic Classifier

- Traffic Classifier is an application that can analyze the traffic on a T1 or E1 line
- It can analyze and classify various traffics such as voice, fax, data, tones (dial tone, ring-back tone, busy tone etc) as well as identify dialing digits and other events happening on a T1/E1 network



Thank you