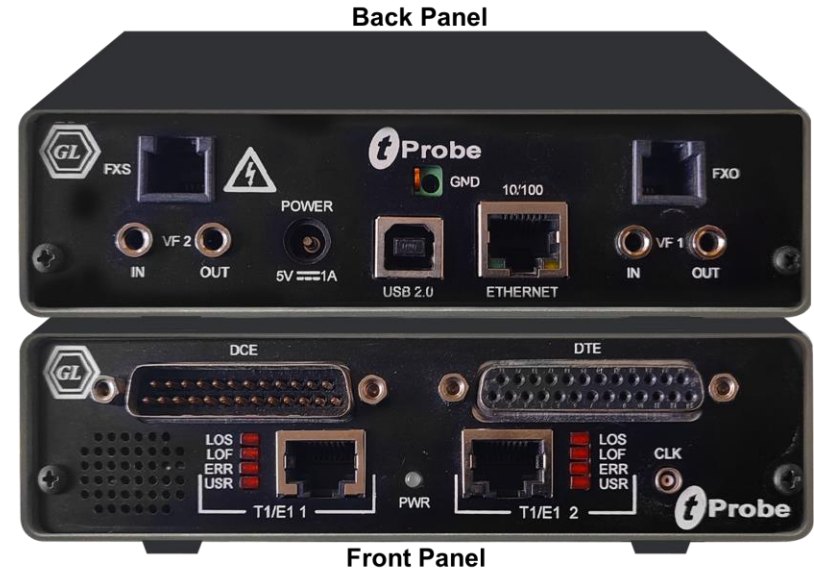

T1 E1 VF FXO/FXS and tProbe™ DataCom Analyzer



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Phone: (301) 670-4784 Fax: (301) 670-9187 Email: info@gl.com
Website: <https://www.gl.com>

tProbe™ Units

- tProbe™ T1 E1 is an enhanced USB Based T1 and E1 solution that is capable of both T1 and E1 interfacing
- Available with Dual T1 or E1, FXO, FXS, DTE, and DCE interfaces
- Forward thinking hardware design for future daughter board expansion applications
- Connects to a PC via a USB 2.0 port
- Access it remotely



Why the product is superior?

- Portable with advance test features such as Pulse Shape Analysis, Jitter Measurement and Analysis
- “Cross-port Through” Mode and “Cross-port Transmit” Mode – these settings make cabling with Drop/Insert and Fail-Safe Inline Monitoring very easy
- Enhanced VF Drop and VF Insert Capabilities (including 3.5mm or Bantam physical connection options)
- Improved circuitry for very accurate Digital Line Level measurements
- Forward thinking hardware design for future daughter board expansion applications
- Available with Dual T1 or E1, FXO, FXS, DTE, and DCE interfaces

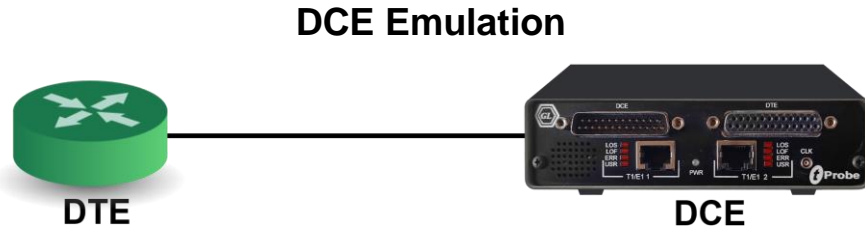
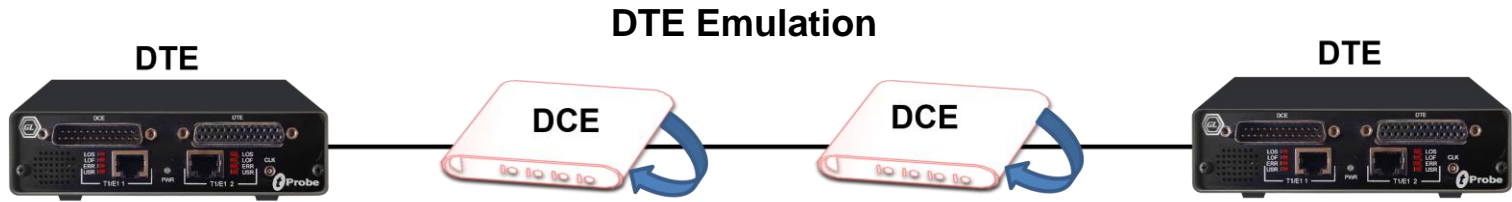
What the unit does ?

- Used for installation, test, and troubleshooting of T1 E1 lines - routine testing of errors, such as pulse testing, bit errors, frame errors, and bipolar violation
- Capability of T1 E1 PCM signal visualization, capture, storage, analysis, and emulation
- Includes BERT, voice band analysis, data, signaling, and protocol analyzer all in one
- Most all “[basic applications](#)” and “[special applications](#)” are available for tProbe™ T1 E1 analyzer including Comprehensive Analysis / Emulation of voice, digits, tones, fax, modem, raw data, and Echo Testing
- Capable of simulating as well as decoding and demodulating fax calls over T1 E1 lines using [Fax Simulator](#) and [FaxScan™](#)
- Compares incoming T1 (E1) pulses against the pulse shape mask specified by the ITU G.703 standard
- Emulates and decodes all 24 for T1 (32 for E1) channels simultaneously for signaling bits, power level, frequency, and multi-frame data

tProbe™ Datacom Analyzer

- Designed for the service installation, verification, and maintenance of data communications and telecommunication equipment
- Provides a software selectable interface to emulate DTE, DCE and monitor the Datacom lines for both synchronous (sync), and asynchronous (async) modes of operation
- Supported Line interfaces - V.35, RS-232, RS-449, RS-485, EIA-530 and EIA-530A
- Sync BER from 300 b/s to 16.384Mbps
- Async BER from 300 b/s to 115.2Kbps
- DTE or DCE emulation mode
- SYNC clock source and sense selection
- Frequency measurement

Datacom Analyzer



Monitoring Datacom Lines

Data Comm Rx Status

Ports			
	1	2	
RXD			
RXC			
TXC			
CTS			
RI			
DSR			
DCD			
TM			
Freq	16 383 928	16 383 928	

2-Wire FXO/FXS

- FXO port on tProbe™ allows to simulate a two-wire FXO device such as a telephone or a fax machine
- FXO port allows you to capture and analyze data from a two-wire telephone line, as well as to generate and transmit analog data onto that two-wire line
- The FXS port on tProbe™ emulates a two-wire FXS service such as a telephone wall jack
- This feature allows you to interface with an FXO device such as a telephone

2-Wire FXO/FXS (Contd.)

2-Wire FXS

2-wire FXS

Audio Selection: None VF FXS

Ports: 2

Audio In: Tx Insert, TS: 01, Gain: 0.000

Audio Out: Rx Drop, TS: 01, Gain: 0.000

Termination: 600

Polarity: Forward (Tip-Ring)

Encoding: A-law

Audio Out (Dual Tone): Freq 1 (Hz): 340, Freq 2 (Hz): 440, Level 1 (dB): -10.5, Level 2 (dB): -10.5

Ring: Freq (Hz): 20, Voltage: 63.1, Cadency (ms): On: 2000, Off: 4000

Battery Volt: 48.0

Monitoring: Dial Tone, Telephone icon

Apply Exit

2-Wire FXO

2-Wire FXO

Audio Selection: None VF FXO

Ports: 1

Signaling: on-hook, off-hook, monitor

Termination: USA

Start: ground

Encoding: A-law

Sample Rate: 8 kbps

Monitoring Information: Loop Current: 0.0 mA, Tip Ring Voltage: 0 V, Ring Detect Current: History: Clear

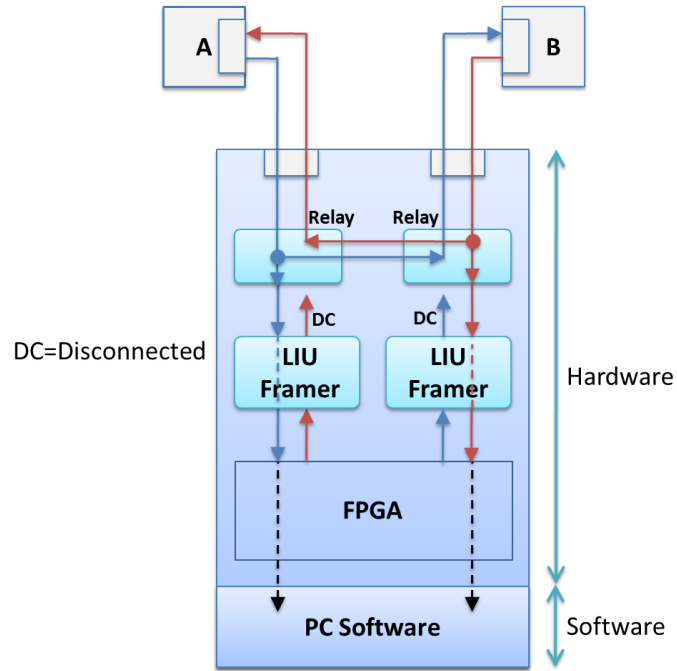
Caller ID: Clear

Default Exit

Benefits

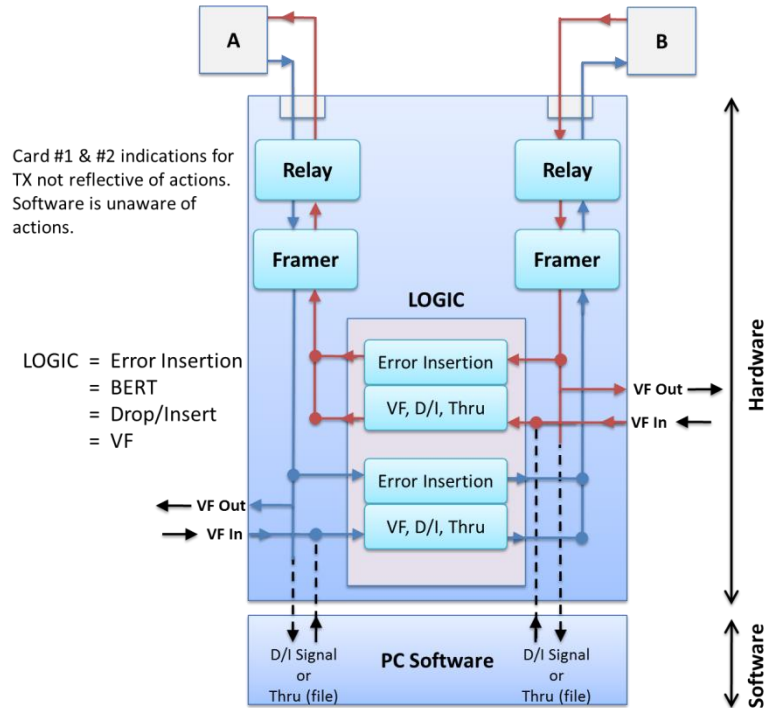
- Compatibility with Windows® operating systems and user-friendly real-time software
- Boards are significantly faster, and significantly more efficient
- CPU utilization with the newer boards is negligible
- Adjustable transmit clock frequency (+ / - 300ppm) for testing frequency lock sensitivity of T1 or E1 equipment
- Supports individual speakers per card
- VF Tx Gains for tProbe™ analyzer ranges from -12 dB to +59.5 dB in 0.5 dB steps
- VF Rx Gains for tProbe™ analyzer ranges from -63.5 dB to +9 dB in 0.5 dB steps
- VF Tx and Rx impedance is 135-, 150-, 600-, and 900-Ohm terminations, New High Impedance Monitor Termination (>25K Ohms), and Mic/HS impedance (Microphone Headset impedance is 1K Ohms)

Cross-port Through Mode



- This mode is similar to the standard “Outward Loopback” which allows monitoring T1 E1 lines “in-line” while still being protected from loss of power to the board

Cross-port Transmit Mode



- Used for Drop and Insert applications in which the board analyzes the traffic running between two pieces of T1 E1 equipment. This feature also eliminates complex cabling

T1 E1 Basic Software

- Board Configuration
- VF Options
- Monitoring Options
- Intrusive Testing
- Dual VF Tx Rx
- Windows Client / Server
 - Remote access to T1 E1 server
 - Clients - Python
- Configuration Options for T1, E1, Datacom, FXO, FXS
 - T1 E1 Configuration
 - Encoding Options – A-law, u-law, and Bit Inversion
 - URB Settings
 - WCS Configuration
 - 2-Wire FXO
 - 2-Wire FXS

T1 E1 Basic Software (Contd.)

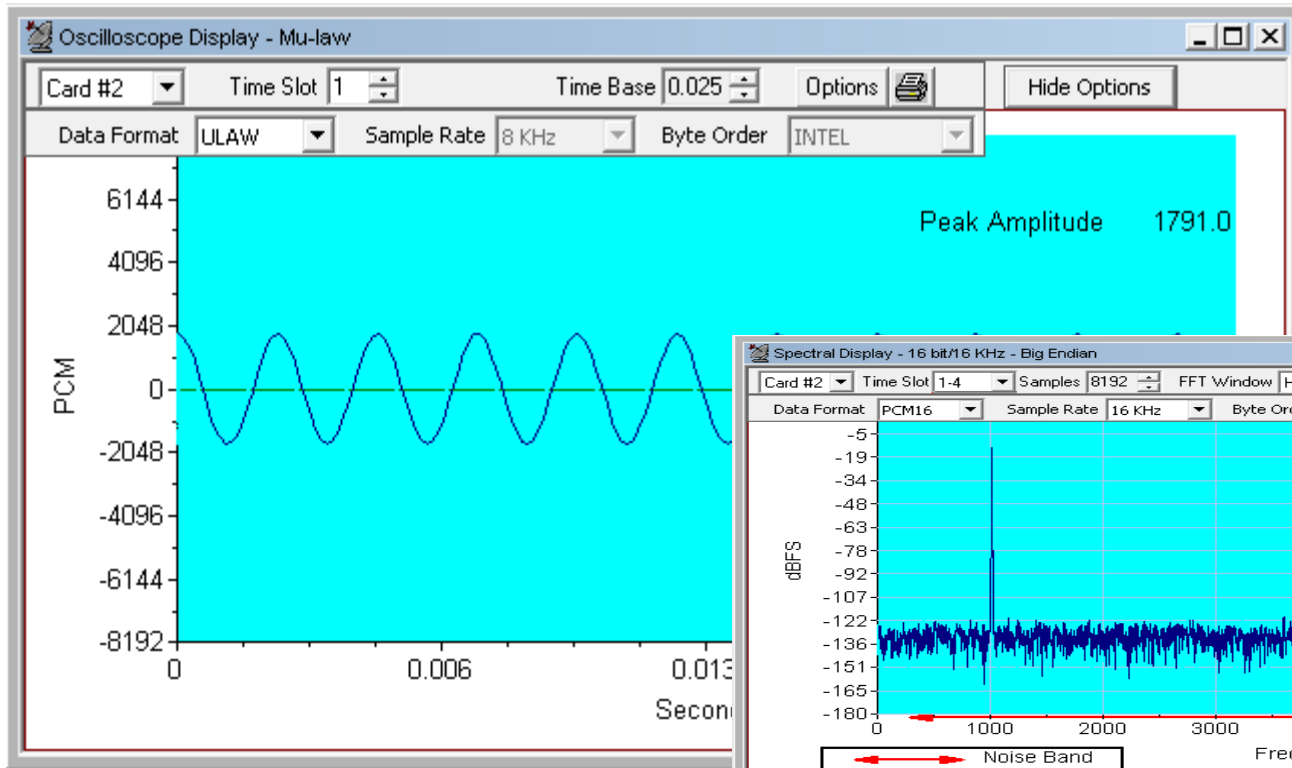
- VF Options
 - Speaker
 - Drop and Insert
 - VF In/Out TS settings
- Monitoring Features
 - Monitor T1 E1 Line
 - Byte Values and Binary Byte Values
 - Signaling bits, Power Level, DC Offset, and Frequency
 - Multiframe, and Real-time Multiframe
 - T1 E1 Data as Real-time Bitmap
 - Time-slot Window
- Monitoring Features
 - ASCII Timeslot Display
 - Oscilloscope and Power Spectral
 - Audio Monitoring
 - Active Voice Level
 - Jitter Measurement
 - Pulse Mask Display
 - Capture Dialed Digits
 - Realtime Strip Chart
 - Realtime Multichannel Audio Bridge
 - Signaling Bit Transitions

T1 E1 Basic Software (Contd.)

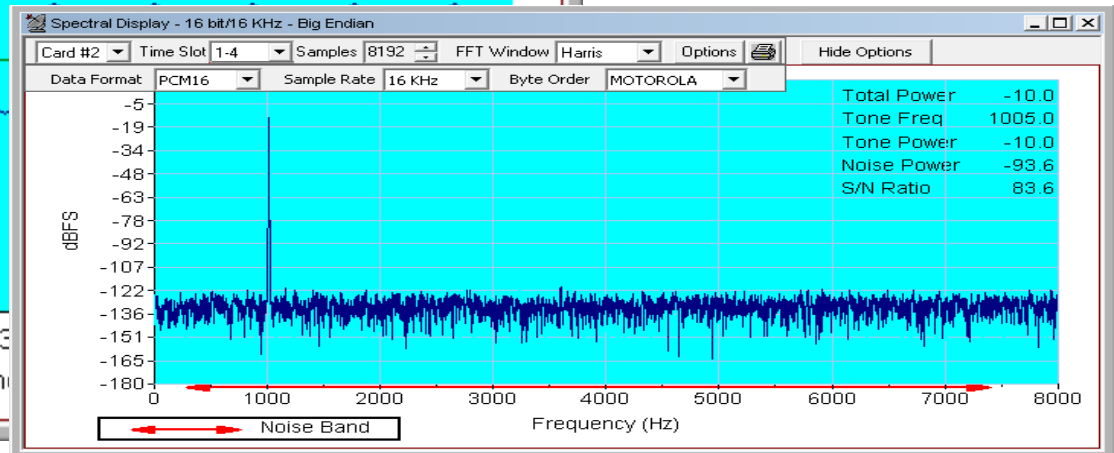
- Intrusive Tests
 - Bit Error Rate Test
 - Enhanced Bit Error Rate
 - ATM BERT
 - Transmit Tone
 - Transmit Gaussian Noise
 - Transmit Multiframe
 - Transmit Signaling Bits
 - Precision Delay Measurement
 - Rx-to-Tx Loop back
 - Error Insertion
 - Jitter Generation

Monitoring Features

Oscilloscope Display

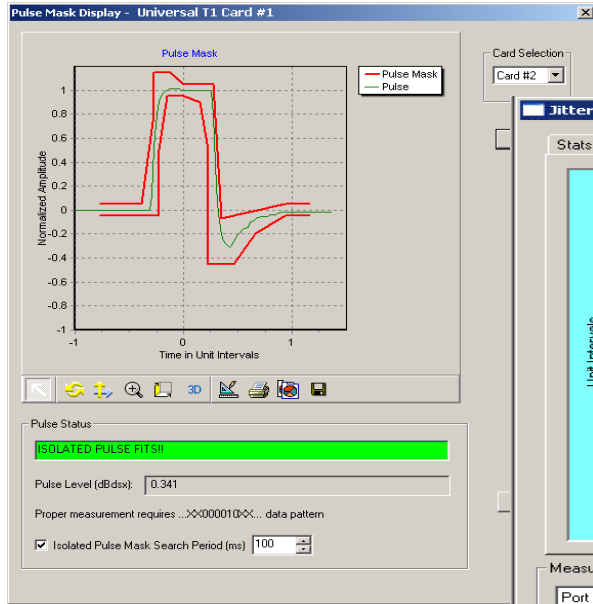


Spectral Display

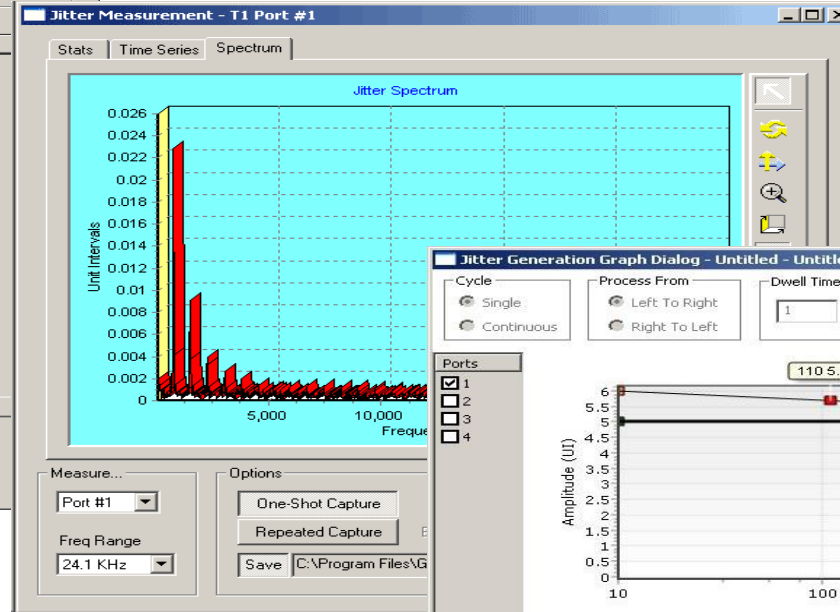


Jitter Measurement and Pulse Mask

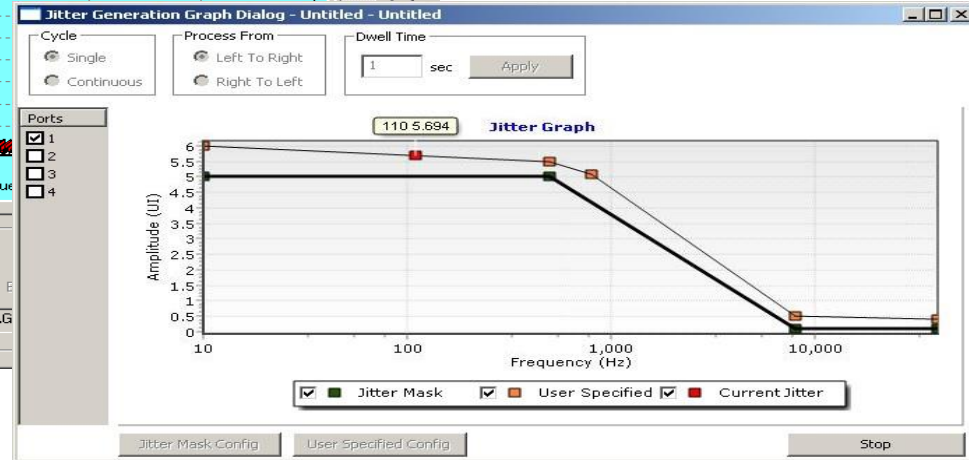
Pulse Shape Display



Jitter Measurement



Jitter Generation



Enhanced BERT and Tx Signaling BITS

Enhanced BERT

The screenshot shows the 'Enhanced BERT' software interface. The main window is titled 'Tx Rx Settings - Card #1'. It features several configuration panels:

- BER Patterns:** Includes a 'GRSS' dropdown set to '31', a 'User Defined Pattern' field with '0', and a 'Length' dropdown set to '32'. There are also 'All Ones', 'All Zeros', and 'All Bits Inverted' checkboxes.
- Timestamp Selection:** A grid for selecting time slots (TS) with a 'Control + click' instruction. The grid shows TS 1-31 with various bit patterns.
- Error Rate (Logic Error):** Includes a dropdown set to '10^-2', a 'User Defined Rate' field with '0.01', and a 'Single Error Insertion' section with 'Logic Error' and 'BPV' buttons.
- Sub Channel Selection:** A grid for selecting sub-channels, currently showing '0'.

Below the settings is the 'Graph - Online Display' section, which includes a 'Real-Time Display' checkbox, a 'Graph Duration' dropdown set to '1 min', and a 'Hide Legend' button. The graph shows 'Errors' over time, with a legend for LOGIC_ERROR (red), BPV (green), and FRAME_ERROR (blue).

T1 E1 Basic Software

The screenshot shows the 'Tx Signaling Bits' software interface. It displays a grid of signaling bits for 24 time slots (Ts# 00 to 23). Each time slot has four columns labeled A, B, C, and D, with checkboxes for each bit. The signaling bit patterns are listed in a dropdown menu on the right, ranging from '0000 A' to '1010 K'. The current selection is '0101 F'. Below the grid are buttons for 'Save', 'Deselect All', 'Transmit', 'Load', 'Select All', and 'Close'. A 'Device Selection' dropdown is set to 'Card #1'.

Ts#	A	B	C	D	Ts#	A	B	C	D	Ts#	A	B	C	D			
00	<input checked="" type="checkbox"/>	0	1	0	1	08	<input checked="" type="checkbox"/>	0	1	0	1	16	<input checked="" type="checkbox"/>	0	1	0	1
01	<input checked="" type="checkbox"/>	0	1	0	1	09	<input checked="" type="checkbox"/>	0	1	0	1	17	<input checked="" type="checkbox"/>	0	1	0	1
02	<input checked="" type="checkbox"/>	0	1	0	1	10	<input checked="" type="checkbox"/>	0	1	0	1	18	<input checked="" type="checkbox"/>	0	1	0	1
03	<input checked="" type="checkbox"/>	0	1	0	1	11	<input checked="" type="checkbox"/>	0	1	0	1	19	<input checked="" type="checkbox"/>	0	1	0	1
04	<input checked="" type="checkbox"/>	0	1	0	1	12	<input checked="" type="checkbox"/>	0	1	0	1	20	<input checked="" type="checkbox"/>	0	1	0	1
05	<input checked="" type="checkbox"/>	0	1	0	1	13	<input checked="" type="checkbox"/>	0	1	0	1	21	<input checked="" type="checkbox"/>	0	1	0	1
06	<input checked="" type="checkbox"/>	0	1	0	1	14	<input checked="" type="checkbox"/>	0	1	0	1	22	<input checked="" type="checkbox"/>	0	1	0	1
07	<input checked="" type="checkbox"/>	0	1	0	1	15	<input checked="" type="checkbox"/>	0	1	0	1	23	<input checked="" type="checkbox"/>	0	1	0	1

The screenshot shows the 'Signaling Bits' software interface for 'Card #2'. It displays a grid of signaling bits for 24 time slots (TS 0 to 23). Each time slot has two columns labeled TS and a signaling bit pattern. The signaling bit patterns are listed in a dropdown menu on the right, ranging from '0101' to '0101'. The current selection is '0101'.

TS	Signaling	TS	Signaling	TS	Signaling
TS 0	0101	TS 8	0101	TS 16	0101
TS 1	0101	TS 9	0101	TS 17	0101
TS 2	0101	TS 10	0101	TS 18	0101
TS 3	0101	TS 11	0101	TS 19	0101
TS 4	0101	TS 12	0101	TS 20	0101
TS 5	0101	TS 13	0101	TS 21	0101
TS 6	0101	TS 14	0101	TS 22	0101
TS 7	0101	TS 15	0101	TS 23	0101

Client Server

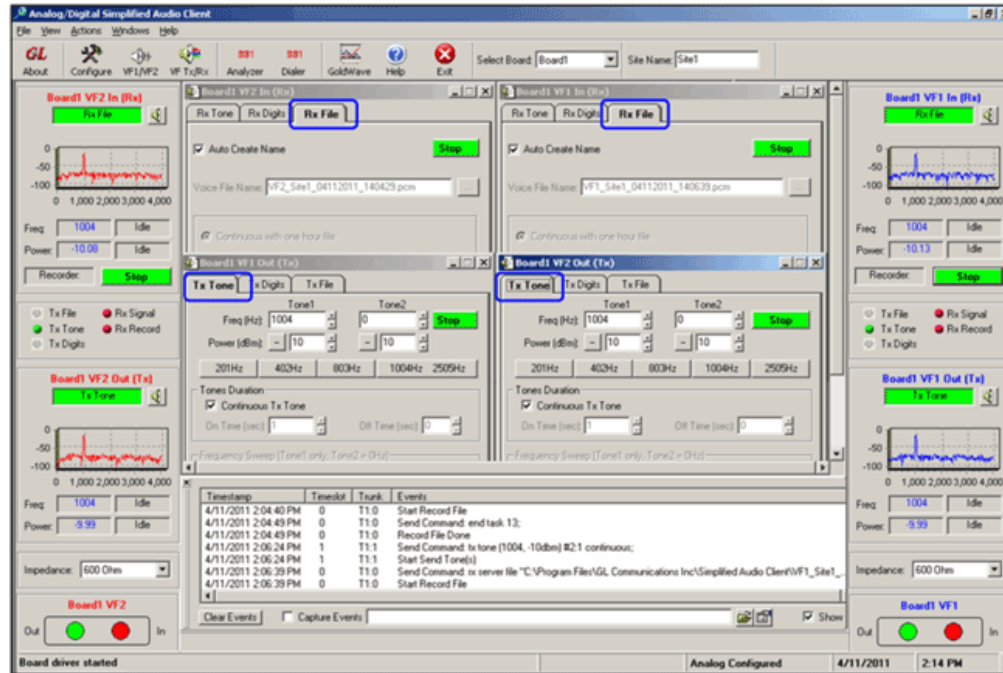
```
E1_Regressiontest.gls - GLClient
File Edit View Connect Script Log User Help
get board count;
board_count=2
get response;
response = 500.0
go 0,0,0,0 #1;
OK
get signaling bits #2:1..15;
#2:1.sig_bits=0,0,0,0
#2:2.sig_bits=0,0,0,0
#2:3.sig_bits=0,0,0,0
#2:4.sig_bits=0,0,0,0
#2:5.sig_bits=0,0,0,0
#2:6.sig_bits=0,0,0,0

// setting both the cards to cas mode to get all four signaling bits
//getting the signaling bits transmitted from card#1
//cross connect card 1 and 2
go 0,0,0,0 #1;
get signaling bits #2:1..15;
// transmitting different formats of signaling bits as mentioned before for time slots 1 to 15 only
go 0,0,0,1 #1;
get signaling bits #2:1..15;
wait 2000;
go 0,0,1,0 #1;
get signaling bits #2:1..15;
wait 2000;
go 0,0,1,0 #1;
get signaling bits #2:1..15;
Ready

Untitled - GL.Server
File Edit View Setup Help
Connected: client #404 at 192.168.1.63
404: set rx interface terminate #*;
404: set signaling mode cas #*;
404: set crc4 on#*;
404: set tx clock source internal #*;
404: set outward driver loopback off #*;
404: get tx clock source #*;
404: get outward driver loopback #*;
404: get rx line frequency #*;
404: get rx line level #*;
404: get all alarms #*;
404: get board count;
404: get response;
404: go 0,0,0,0 #1;
404: get signaling bits #2:1..15;
404: go 0,0,1,0 #1;
404: get signaling bits #2:1..15;
404: go 0,0,1,0 #1;
404: get signaling bits #2:1..15;
Ready
```

- Allow the user (with an appropriate client) to operate analyzers remotely, write scripts for automation, or provide multi client connectivity to a single T1 E1 VF Data analyzer

Dual VF Tx/Rx



- Performs non-intrusive and intrusive VF audio monitoring, VF audio recording, and testing easily
- Provides an alternate and simple GUI as against the T1 E1 Analyzer applications in basic software to perform analog Tx/Rx functions

T1 E1 Special Applications

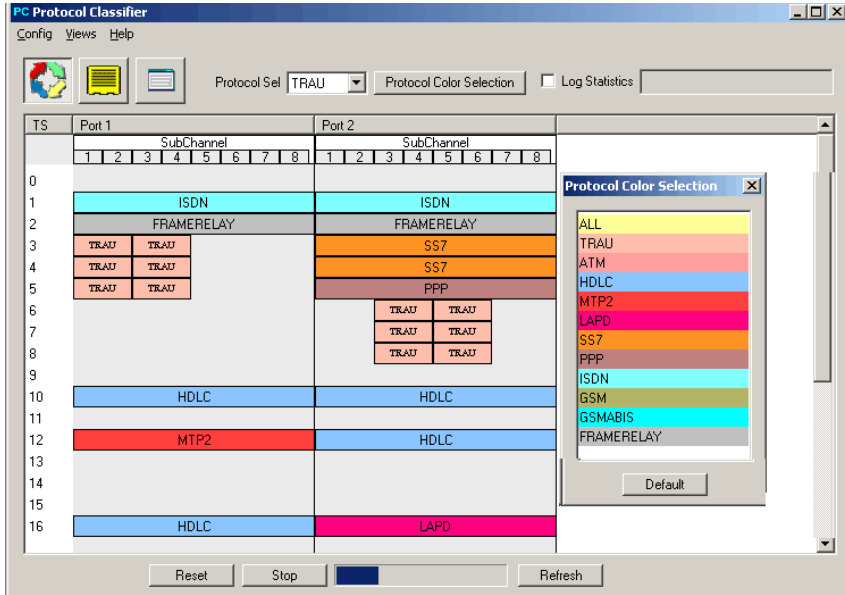
- Protocol Analysis
 - ISDN, HDLC, SS7, Frame Relay, TRAU, CDMA, DCME, T1 Facility Data Link,
 - E1 Maintenance Data Link, UMTS, PPP, ATM, GSM, V5.x, CAS, GPRS, GR303, SS1
- Protocol Emulation
 - ISDN, HDLC, MLPPP, MLPPP Conformance, CAS, TRAU, SS7
 - SS7 conformance suite, GSM A, GSM Abis, MAP, CAMEL, Frame Relay, ATM IMA, and SS1
- Capture, Analysis, and Emulation
 - BER, Playback
 - Manual and Automated Record/Playback files
 - Call Capture and Analysis (CCA)
 - Multiple Call Capture and Analysis

T1 E1 Special Applications (Contd.)

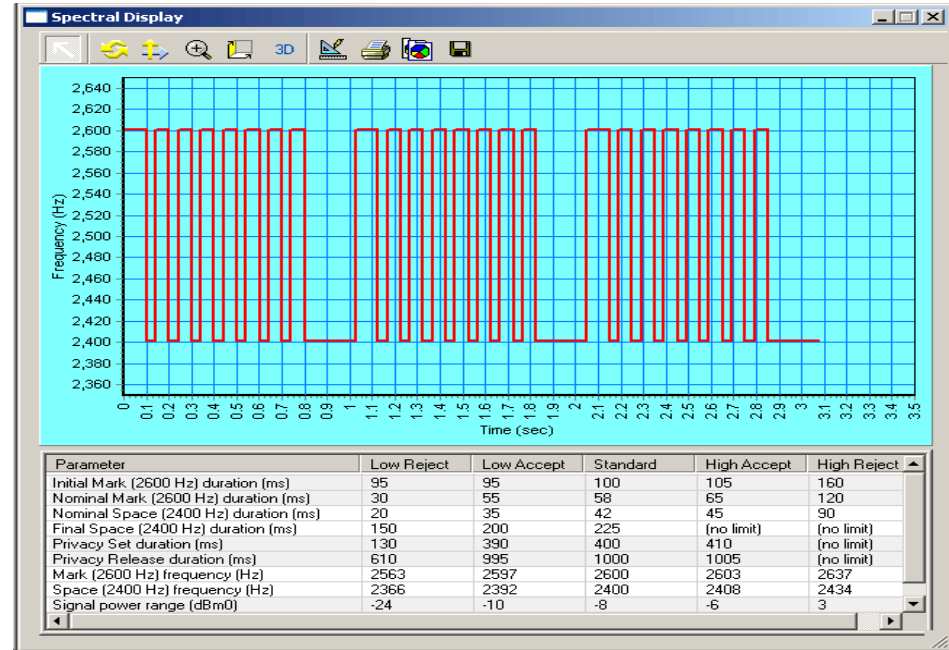
- Voice Band Analysis Software
 - Call Data Records (CDR)
 - Voice Band Analyzer (VBA)
- Fax Emulation and Analysis
 - Fax Simulator
 - Fax Analysis using GLInsight™ or FaxScan™
- Echo Cancellation Testing / Compliance
 - Manual
 - Semi-automated
 - Automated
- WCS Modules
 - Transmission/reception of files/digits
 - Multi-channel BERT
 - CAS Emulation
 - DSP operations, Dynamic DSP capability
 - SA Bits/ FDL/ HDLC/ TRAU/ MC-MLPPP/ SS7/ ISDN / ML Frame Relay
- Protocol Identifier
- Multi-Channel BERT
- Multiplex/Demultiplex Software
- Network Surveillance

Special Application

Protocol Identifier



SS1 Analyzer and Emulator



Call Capture and Analysis

Multiple Call Capture and Analysis

Multiple Call Capture - UsbE1 Card #1 and #2

File Capture Settings

Capture Directory: D:\CapturedFiles\ManualCall1210091146

Capture File #1: Dec10W01.000

Bytes Captured: 17024

Capture File #2: Dec10E01.000

Bytes Captured: 17024

Signaling File: Dec1001.0

Timeslot Activity: 01 02 03 04 05 06 07 08
16 17 18 19 20 21 22 23 24

Multi Call Capture for Manual - Untitled

File Edit Trigger Options Process

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\Dual Ultra HD T1 Analyzer	Edit	Abort
2	CCA2	1	2	0-23	C:\Program Files\GL Communications Inc\Dual Ultra HD T1 Analyzer	Edit	Abort
3	CCA3	1	2	0-23	C:\Program Files\GL Communications Inc\Dual Ultra HD T1 Analyzer	Edit	Abort
4	CCA4	1	2	0-23	C:\Program Files\GL Communications Inc\Dual Ultra HD T1 Analyzer	Edit	Abort

TS	TS Status	West Filename	Bytes Captured(West)	East Filename	Bytes Captured(East)
0	Capturing	C:\Program Files\GL Communications In...	742224	C:\Program Files\GL Communications Inc\Dual Ultra ...	742224
1	Capturing	C:\Program Files\GL Communications In...	742224	C:\Program Files\GL Communications Inc\Dual Ultra ...	742224
2	Capturing	C:\Program Files\GL Communications In...	742224	C:\Program Files\GL Communications Inc\Dual Ultra ...	742224
3	Capturing	C:\Program Files\GL Communications In...	742224	C:\Program Files\GL Communications Inc\Dual Ultra ...	742224
4	Capturing	C:\Program Files\GL Communications In...	742224	C:\Program Files\GL Communications Inc\Dual Ultra ...	742224
5	Capturing	C:\Program Files\GL Communications In...	742224	C:\Program Files\GL Communications Inc\Dual Ultra ...	742224

CCA Details Timeslots Map

Protocol Analysis

PPP Protocol Analysis

The screenshot shows the 'PPP Protocol Analysis' application window. The top menu includes File, View, Capture, Statistics, Database, Configure, and Help. Below the menu is a toolbar with various icons. The main window is divided into several sections:

- Packet List Table:** A table with columns: Dev, TSlot, SubCh, Fram..., TIME (Relative), Len, Error, PPP Layer, LCP Code, IPCP Code, BCF. It lists several captured packets with checkmarks in the 'Dev' column.
- Frame Details:** A section showing 'Card1 TimeSlots=1-31 Frame=0 at 00:00:00.000000 OK Len=14 HDLC Frame Data + FCS'. It details the 'PPP Link Layer' with fields like Address, Ctl, Protocol, and the 'Link Control Layer' with fields like Code, Identifier, Length, and Magic Number.
- Hex Dump:** A section titled 'Hex Dump of the Frame Data' showing the raw hexadecimal data: FF 03 C0 21 09 AC 00 08 09 DC 19 2E 85 63.
- Status:** At the bottom, it says 'Off-line Viewing' and 'D:\misc\MLPPP.hdl 23 726'.

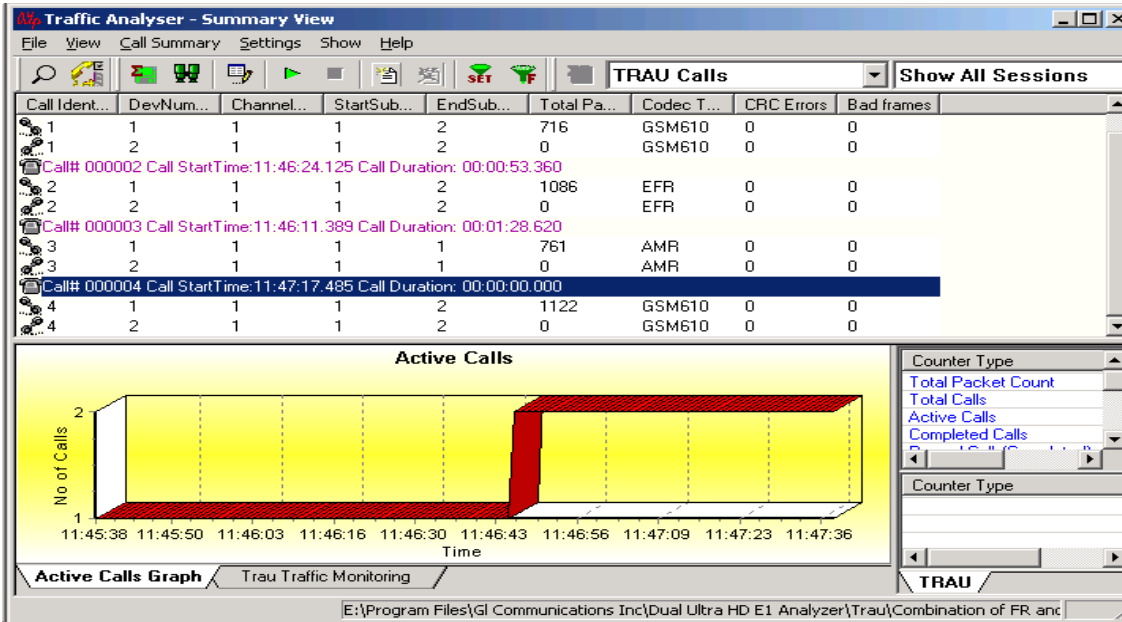
PPP Packet Data Analysis

The screenshot shows the 'Traffic Analyzer - Summary View' application window. The top menu includes File, View, Call Summary, Settings, and Help. Below the menu is a toolbar with various icons. The main window is divided into several sections:

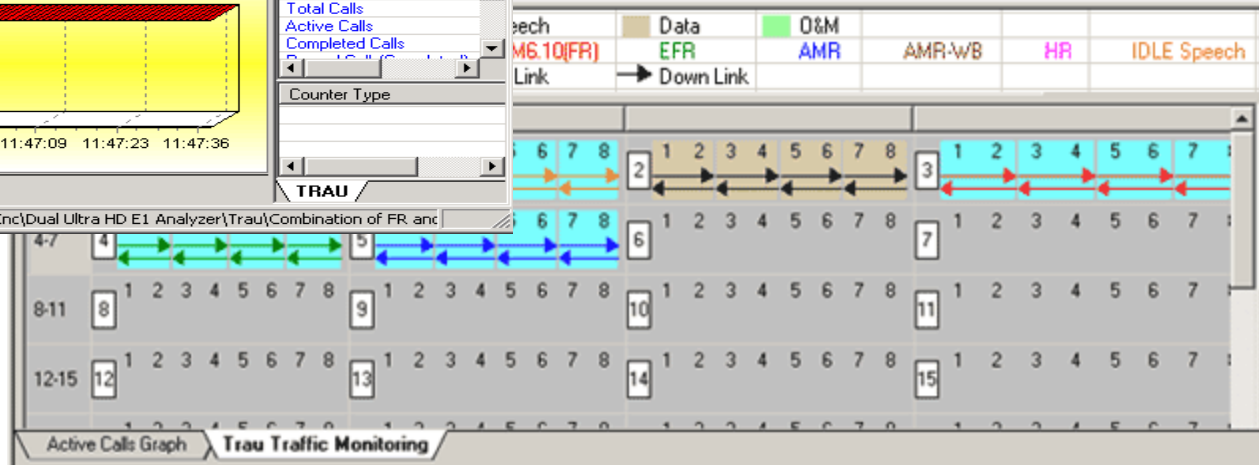
- Call Summary Table:** A table with columns: Call #, SSRC, Payload, Packet Received, Conversat MOS/R..., Listening MOS/R..., Packets Discard..., Missing Packets..., Duplicate Packets..., Out Of Sequen..., Average Gap(ms), Average Delay, Average Jitter, Average Inter A. It lists several active calls with their respective details.
- Active Calls Graph:** A 3D bar chart titled 'Active Calls' showing the number of active calls over time. The Y-axis is 'No of Calls' (0 to 1) and the X-axis is 'Time' (10:04:33 to 10:14:40). The graph shows several red bars representing active calls.
- Counter Type Summary:** Two summary tables on the right side of the window. The first table shows: Total Packet Count (8472), Total Calls (67), Active Calls (0), Completed Calls (24), Turned Calls(Completed) (n). The second table shows: Total SIP Packets (2904), SIP Calls (67), SIP Active Calls (0).
- Navigation:** At the bottom, there are navigation buttons for 'Active Calls Graph', 'Average Jitter Distribution', 'E-Model', 'RTP Packets Graph', and a dropdown menu for 'SIP \ H323 \ RTP \ MEGACO'.

Protocol Analysis (Contd.)

TRAU Packet Data Analysis - Active Calls Graphs



TRAU Traffic Monitoring



Thank you