

# T1 E1 TESTERS

Back Panel

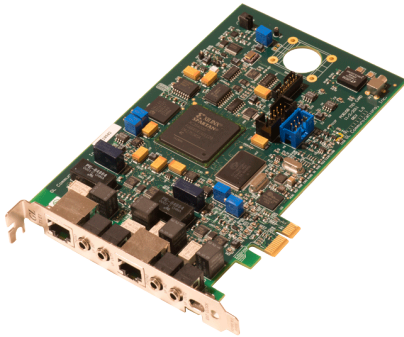


Front Panel

USB Based T1 E1 VF FXO FXS and Serial Datacom Analyzer Unit



PCle Based Octal and Quad T1 E1 Boards

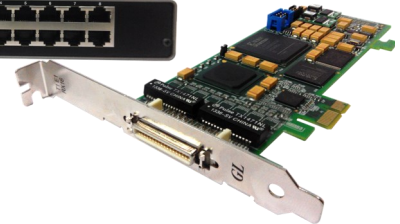


Dual T1 E1 PCIe Express Card

Front Panel



Back Panel



tScan16™ High-Density T1 E1 Board



**GL Communications Inc.**

818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A

(Web) [www.gl.com](http://www.gl.com) - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) [info@gl.com](mailto:info@gl.com)

# T1 E1 Analyzers

(Available in two form-factors – PCI Boards or USB-based portable units)

## Overview

T1 E1 carriers are used extensively throughout the world for carrying large volumes of call containing both voice and data. Their popularity can be attributed to their high reliability, manageability and flexibility. The available digitized channels, 24 for T1 and 32 for E1 can be used for carrying voice and/or data. Regardless of the form-factor you choose, GL's T1 E1 Analyzers provide a wide range of functionalities and testing capabilities.

GL's [tScan16™](#) is a high-density T1 E1 board with 16 ports and the newer PCIe (x1) bus interface. The sixteen T1 E1 ports are **Receive-only** ports optimized for high performance voice and data capture, monitoring, and analysis requirements. GL's [Octal & Quad T1 E1 Analyzer Boards](#) are high-density boards that provide Four (4) or Eight (8) RJ-48 T1 E1 ports and multiples thereof. With this, configurations of 8, 12, 16, ... 64 T1 E1s in a single rack-mount system are possible. It's designed for the newer PCIe lanes for faster processing and scalability.

The [USB-based tProbe™ T1 E1 VF and Serial Data Analyzer](#) units add new functionality and features not available with the “portable” T1 E1 USB-based Analyzer. The enhanced features and capabilities include pulse mask and jitter measurement and analysis, cross-port through and transmit modes, enhanced VF drop and insert capabilities. GL's tProbe™ also includes ability to add optional boards such as the [tProbe™ Datacom Analyzer](#) , and [tProbe™ FXO-FXS Board](#).

GL's new [Dual T1 E1 Express \(PCIe\) Cards](#) are high-density boards with newer PCIe bus interface. These cards are identical to the portable tProbe™ units, except for FXO FXS and Datacom functionality. Visit [T1 E1 Testing](#) for more details.

## Main Features

- Software Selectable T1 or E1 interfacing along with Drop and Insert
- Ability to monitor Power, Frequency, Signaling, Binary Byte Values, and DC Offset
- Monitor the T1 E1 line conditions such as frame errors, violations, alarms, frequency, power level, and clock (or frame/bit) slips
- Time and spectral graphical views of any channel or timeslot can be monitored
- Internal speaker for DS0 Monitoring, Data, Four Wire VF-Interface, Drop and Insertion of Analog and Digital Signals, Real-time Monitor and Time-Stamped Log of all alarms and abnormal events
- Comprehensive Analysis / Emulation of Voice, Data, Fax, Protocol, Analog, and Digital signals, including Echo and Voice Quality testing
- Call Recording, Generation, and Monitoring hundreds to thousands of calls in one platform
- Supports pulse mask compliance testing, jitter generation, and analysis
- Precision Delay Measurement, Unframed/Framed, Transmit/Receive Tone and signaling bits at user-defined frequency and power in one (or all) channels, and Tx/Rx loopback applications are provided for intrusive testing
- Supports Full/Fractional T1 E1 Bit Error Rate Testing with detailed logging
- Routing and Bridging emulation over Multi T1 E1 WAN interfaces using MLPPP (Multi Link PPP) and MFR (Multi Link Frame relay) protocols
- DTE-DCE Simulation to test and verify data communications equipment and circuits – specifically serial interfaces V.24, V.35, V.36, RS-449, RS-485, EIA-530 and EIA-530A interfaces
- Compatible with Windows® 11 64-bit operating systems and user friendly real-time software

For more details, visit [T1 E1 Applications](#) webpage.



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## T1 E1 Basic Applications

- Framing Formats
- Tx Rx Configurations
- Clock options: Internal, External, & Recovered
- Loop-backs: Framer, Driver, & Remote-loopback
- Connection Options: Terminate, Bridge, Monitor
- Cross-port Through and Transmit Mode

### Monitor Applications

- Monitor T1 E1 Line Status
- Monitoring VF Interfaces
  - VF Input/Output Interfaces for T1 E1 Products
  - 4-Wire VF Interface with Drop & Insert
- Bytes Values Display for all time slots
- Binary Byte Values Display for all time slots
- Monitor signaling bits
- Power Level Display for all time slots
- DC Offset Display for all time slots
- Frequency Display for all time slots
- Multiframe Byte Display
- Real Time Multiframe Monitoring
- Real Time Bitmap Monitoring
- Time Slot Byte Display
- ASCII Timeslot Display
- Signaling Transitions Recording
- Real Time Oscilloscope Display of DSO
- Real Time Power Spectral Display of DSO
- Real-time strip chart software
- Active Voice Level Monitoring
- Pulse Mask Compliance Testing
- Jitter Measurement
- Physical Layer Analysis
- Audio Monitoring
- Real-time Multi-Channel Audio Bridge
- Capture Dial Digits

### Intrusive Applications

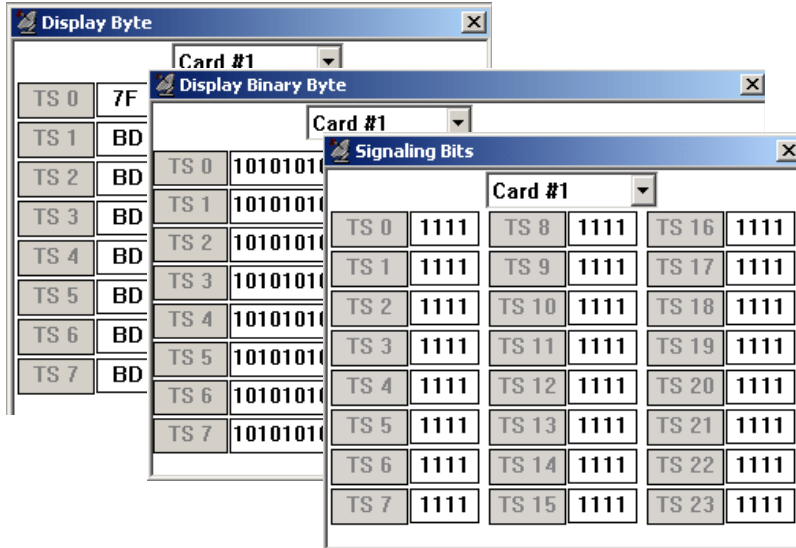
- Bit Error Rate Test
- Enhanced BERT
- ATM BERT
- Transmit Tone
- Transmit Gaussian Noise
- Transmit Multiframe
- Transmit Signaling Bits
- Precision Delay Measurement
- Rx-to-Tx-Loopback
- Error Insertion
- Jitter Generation

## Monitoring Applications

Multiple applications are offered to monitor information received over T1 E1 lines. They cover information such as **Byte Values**, **Binary Byte Values**, **DC Offset**, **Timeslot Displays**, **ASCII Timeslot Display**, **Oscilloscope**, **Power Spectral**, **Audio Monitoring**, and **Active Voice Level**. **Oscilloscope** and **Spectral Displays** provide graphical analysis of signals. The T1 (E1) analyzer emulates and decodes all 24 (32) channels simultaneously for **Signaling Bits**, **Power Level**, **Frequency**, and **Multi-Frame** data. **VF Interface** for monitoring and inserting audio with Drop and Insert are also provided.

### Monitor Byte, Binary Byte, and Signaling Bits

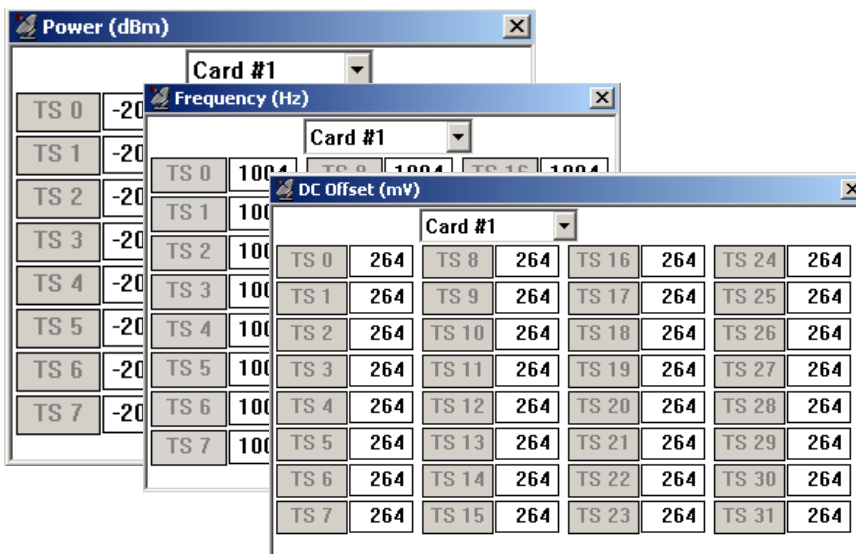
Displays the data values for each time slot in HEX and binary data format. Signaling bits associated with each timeslot are displayed in real-time



Monitor Byte, Binary Byte, and Signaling Bits

### Power Level, Frequency, and DC Offset

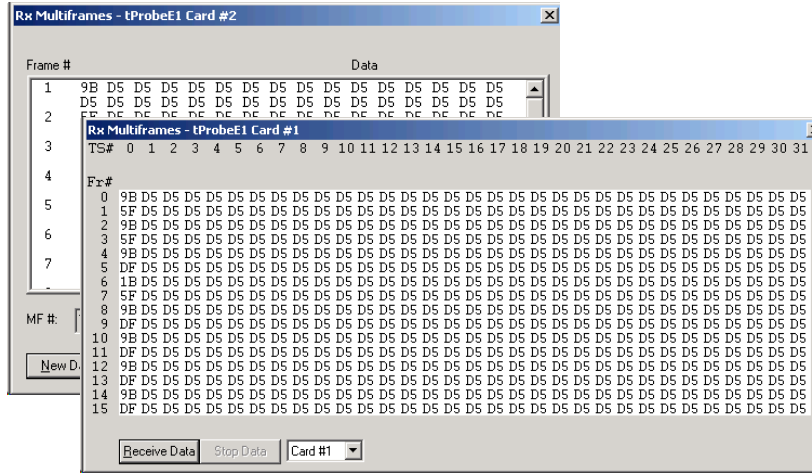
In Power Level for each timeslot is computed and continuously displayed in dBm. In frequency, a continuous display of the signal frequency in each timeslot is displayed. The DC Offset provides the capability to measure and display DC offsets for all timeslots.



Power Level, Frequency, and DC Offset

### Multi-frames and Real-time Multi-frames

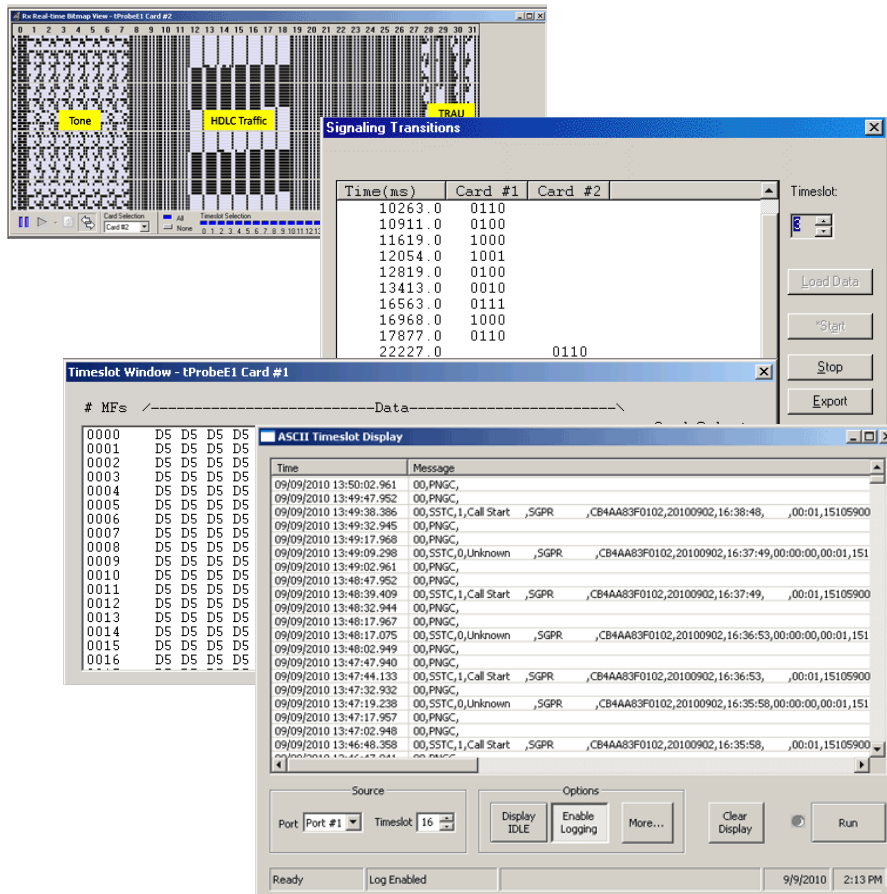
This application permits monitoring of multiframes for all timeslots and permits viewing of multi-frames in real-time.



Monitor Multiframes and Realtime Multiframes

### Realtime Bitmap, Timeslot, ASCII Timeslot, Signaling Transitions

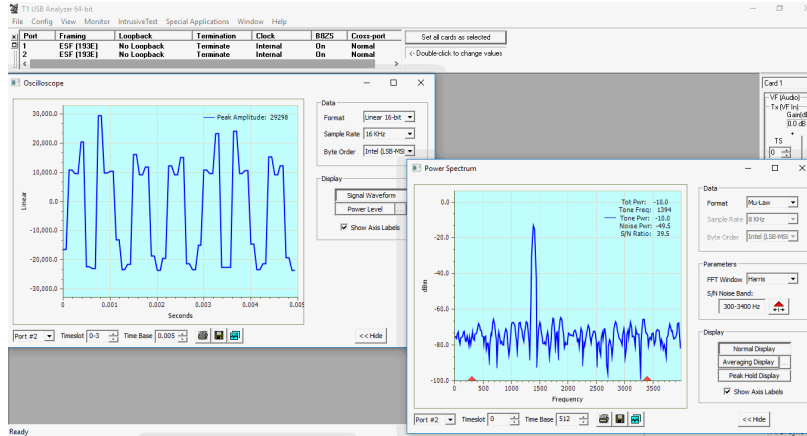
The Realtime Bitmap permits a graphical view of complete multi-frames. Timeslot window displays the timeslot value for about '2' second duration for a desired timeslot. ASCII Timeslot application permits viewing of real-time ASCII events that are present on the T1 or E1. The **Signaling Transitions** application display records of all signaling bit changes along with the time-stamped indications for each bit.



Bitmap, Timeslot, ASCII Timeslot, Signaling Transitions

## Oscilloscope and Spectral Display

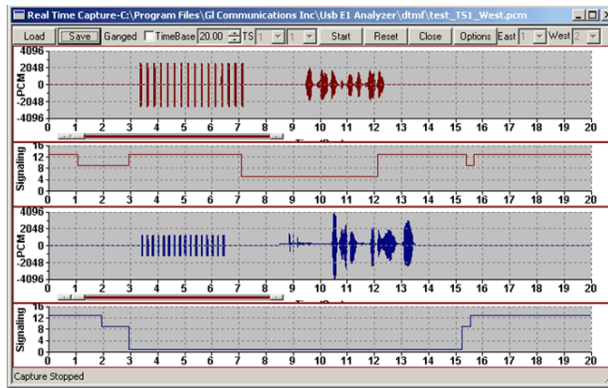
The linear codes and the data received on a specified timeslot can be viewed in the Oscilloscope and spectral domain.



Monitoring Applications

## Real-time Strip Chart (XX024 Included with Basic Analyzer)

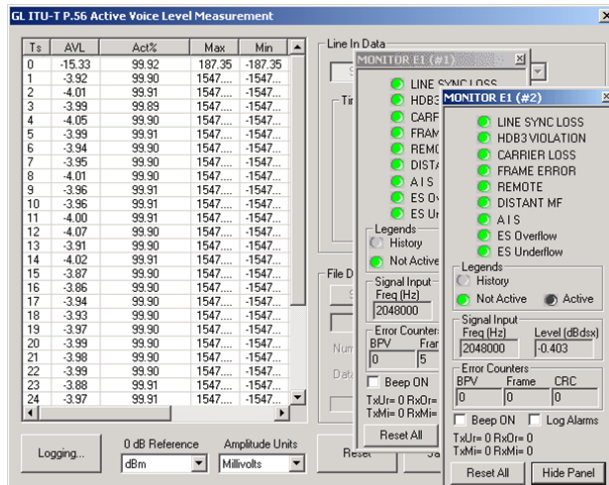
This application is used for analysis of CAS signaling, non-intrusive capturing of PCM data and signaling, and subsequent plotting of the same onto a strip chart format.



Real-time Strip Chart

## Active Voice level

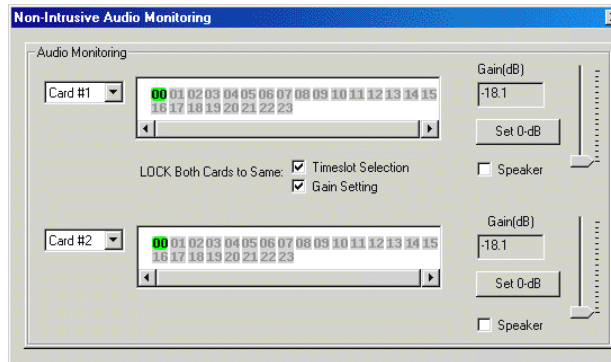
This application computes the active voice level of a signal according to the ITU-T P.56 specification. Users can obtain and analyze the source signal in real-time or can process signal data captured to files as an offline process.



Active Voice Level and Monitoring Cards

## Audio Monitoring

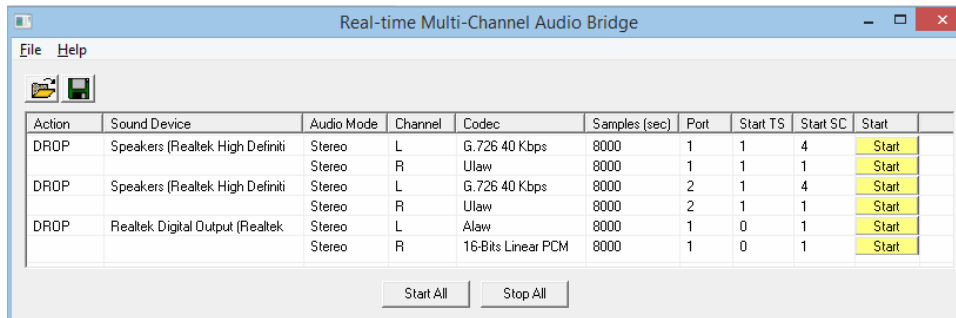
This application is used for analysis of CAS signaling, non-intrusive capturing of PCM data and signaling, and subsequent plotting of the same onto a strip chart format.



Audio Monitoring

## Real-time Multi-Channel Audio Bridge (XX017 Included with Basic Analyzer)

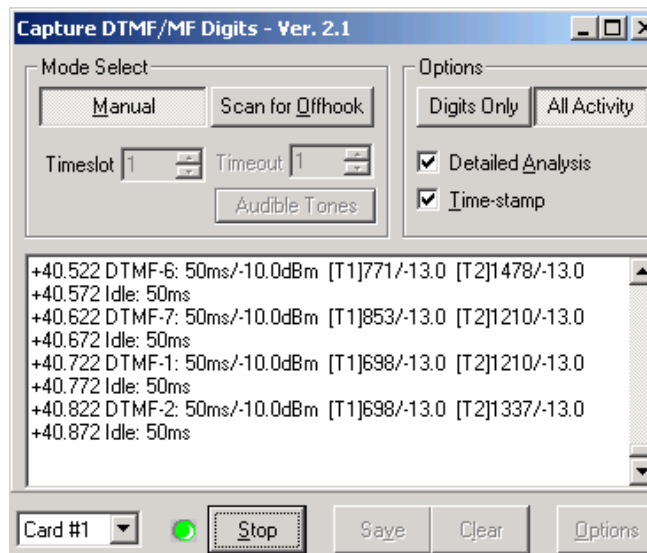
This ingenious software allows sound aware applications such as Goldwave, Matlab, Adobe Audition, Cool Edit, Audacity, and others to send and receive data to / from a T1 E1 timeslot or VF channel. It also sound card input to be connected to a timeslot.



Real-time Multi-Channel Audio Bridge

## Capture DTMF/MF (MFR2-F, MFR2-B) Digits (XX022 Included with Basic Analyzer)

The capture application includes Manual and Scan for offhook modes. In manual mode, the capture operation simply stays on the selected time slot, displaying the digits received. In scan for offhook mode, the scanning of successive time slots takes place; detection of an onhook to offhook transition at a time slot would mark the beginning of the capture activity.



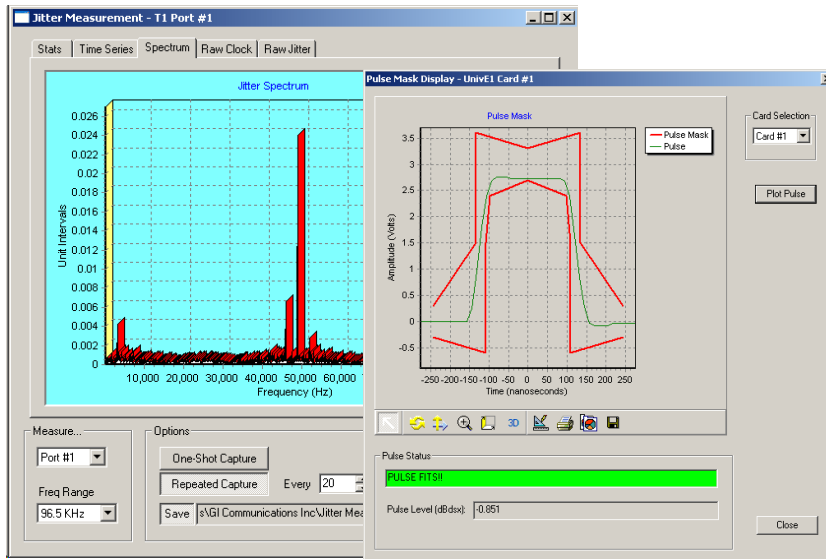
Realtime Multi-Channel Audio Bridge

**Jitter and Pulse Mask Measurement XX012 Included with Basic Analyzer)**

Pulse shape measurement software has been developed to determine if the pulse shape fits within a “pulse mask” as specified by standards ITU G.703 and ANSI T1.102-1993. The software is available in both visual and tabular formats. Tabular formats are convenient for automation and scripted test environments. Pulse Mask image can be saved to a file.

Jitter Measurement software allows one to accurately measure jitter associated with T1 or E1 signals. It also allows evaluation of the jitter on either a tick-by-tick or a cumulative basis.

The application recognizes the following groupings of clock deviations – Drift (Very slow variations in a clock signal (below 1 Hz), and Frequency Deviation (A permanent or steady-state difference in clock rates.



**Jitter Measurement, and Pulse Shape**

**Monitor T1 E1 Lines**

Provides a detail description of all alarms and line conditions in the ‘Monitor’ panel for all the available T1 E1 Cards installed on local PC.

| T1/E1 Alarms   |           |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |
|----------------|-----------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|
| Reset          | All Ports | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | #9 | #10 | #11 | #12 | #13 | #14 | #15 | #16 |
| Sync Loss      | X         | X  | X  | H  | H  | X  | X  | X  | X  | X  | X   | X   | X   | X   | X   | X   | X   |
| HDB3 Violation | H         | X  | X  | H  | H  | X  | X  | X  | X  | X  | X   | X   | X   | X   | X   | X   | X   |
| Carrier Loss   | X         | X  | X  | H  | H  | X  | X  | X  | X  | X  | X   | X   | X   | X   | X   | X   | X   |
| Frame Error    | X         | X  | X  | H  | H  | X  | X  | X  | X  | X  | X   | X   | X   | X   | X   | X   | X   |
| Remote         | H         | X  | X  | H  | H  | X  | X  | X  | X  | X  | X   | X   | X   | X   | X   | X   | X   |
| Distant MF     | H         | X  | X  | H  | H  | X  | X  | X  | X  | X  | X   | X   | X   | X   | X   | X   | X   |
| AIS            | X         | X  | X  | H  | H  | X  | X  | X  | X  | X  | X   | X   | X   | X   | X   | X   | X   |

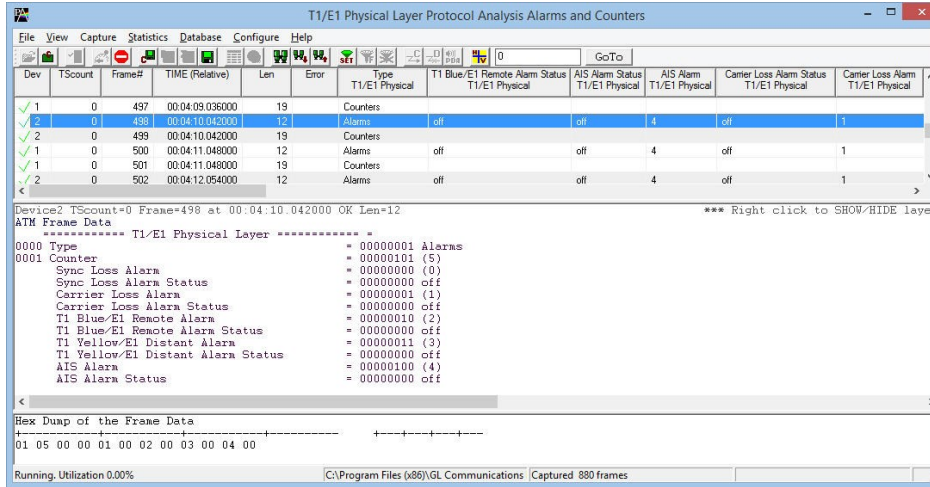
| T1/E1 Statistics    |         |   |         |        |         |   |         |   |         |   |         |   |         |   |         |   |
|---------------------|---------|---|---------|--------|---------|---|---------|---|---------|---|---------|---|---------|---|---------|---|
| Frequency (Hz)      | 2048003 |   | 2048003 |        | 2048003 |   | 2048003 |   | 2048003 |   | 2048003 |   | 2048003 |   | 2048003 |   |
| Level (dBdx)        | 0.000   |   | 0.000   |        | 0.000   |   | 0.000   |   | 0.000   |   | 0.000   |   | 0.000   |   | 0.000   |   |
| BPV Errors          | 0       | 0 | 267989  | 204551 | 0       | 0 | 0       | 0 | 0       | 0 | 0       | 0 | 0       | 0 | 0       | 0 |
| CRC Errors          | 0       | 0 | 1       | 0      | 0       | 0 | 0       | 0 | 0       | 0 | 0       | 0 | 0       | 0 | 0       | 0 |
| Frame Errors        | 0       | 0 | 0       | 0      | 0       | 0 | 0       | 0 | 0       | 0 | 0       | 0 | 0       | 0 | 0       | 0 |
| Transmit Under Run  | 0       | 0 | 0       | 0      | 0       | 0 | 0       | 0 | 0       | 0 | 0       | 0 | 0       | 0 | 0       | 0 |
| Receive Over Run    | 0       | 0 | 0       | 0      | 0       | 0 | 0       | 0 | 0       | 0 | 0       | 0 | 0       | 0 | 0       | 0 |
| dB/Frame Clock Slip |         |   |         |        |         |   |         |   |         |   |         |   |         |   |         |   |

**Monitoring T1 E1 Lines**

## Physical Layer Analysis

Used to monitor T1 E1 and T3 E3 line alarms. Helps to track the time at which alarms (T1 Alarms) occurred periodically and send this information to the central database over TCP/IP. GL's NetSurveyorWeb™ can fetch these records from the central database and allows centralized monitoring of physical layer status of T1 E1 line via simple web based clients.

Further, alarms monitored at the DS3 level and at the DS1 level can also be packetized and sent via SNMP to the network operation centers.

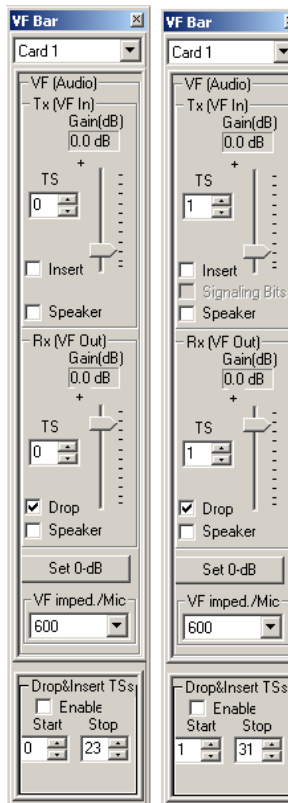


T1 E1 Physical Layer Analysis

## VF Options

When “Drop” option is enabled, the signal on the selected timeslot is dropped on to the VF Out port on the selected port.

When the “Insert” option is enabled, the incoming VF signal from the selected port is inserted to the selected timeslot.



T1

E1

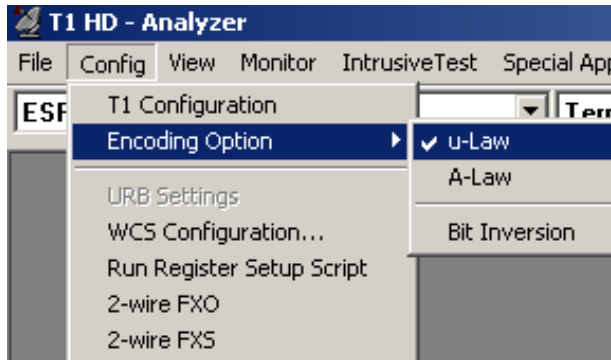
VF Dialog Bar

## Configuration

**Configuration** functionality provides various options to configure the Tx/Rx parameters of the low level chip functions for dual T1/ E1 framers and drivers. The **Encoding Option** in T1 E1 Analyzer software permits encoding and decoding using either a-law or u-law formats.

T1 E1 Encoding (XX023 Included with Basic Analyzer)

The companding (A and  $\mu$ ) laws are used for Audio level compression, which is used for many purposes. The mu-law algorithm ( $\mu$ -law) is a companding algorithm, primarily used in the digital telecommunication systems of North America and Japan. An a-law algorithm is a standard companding algorithm, used in European digital communications systems.

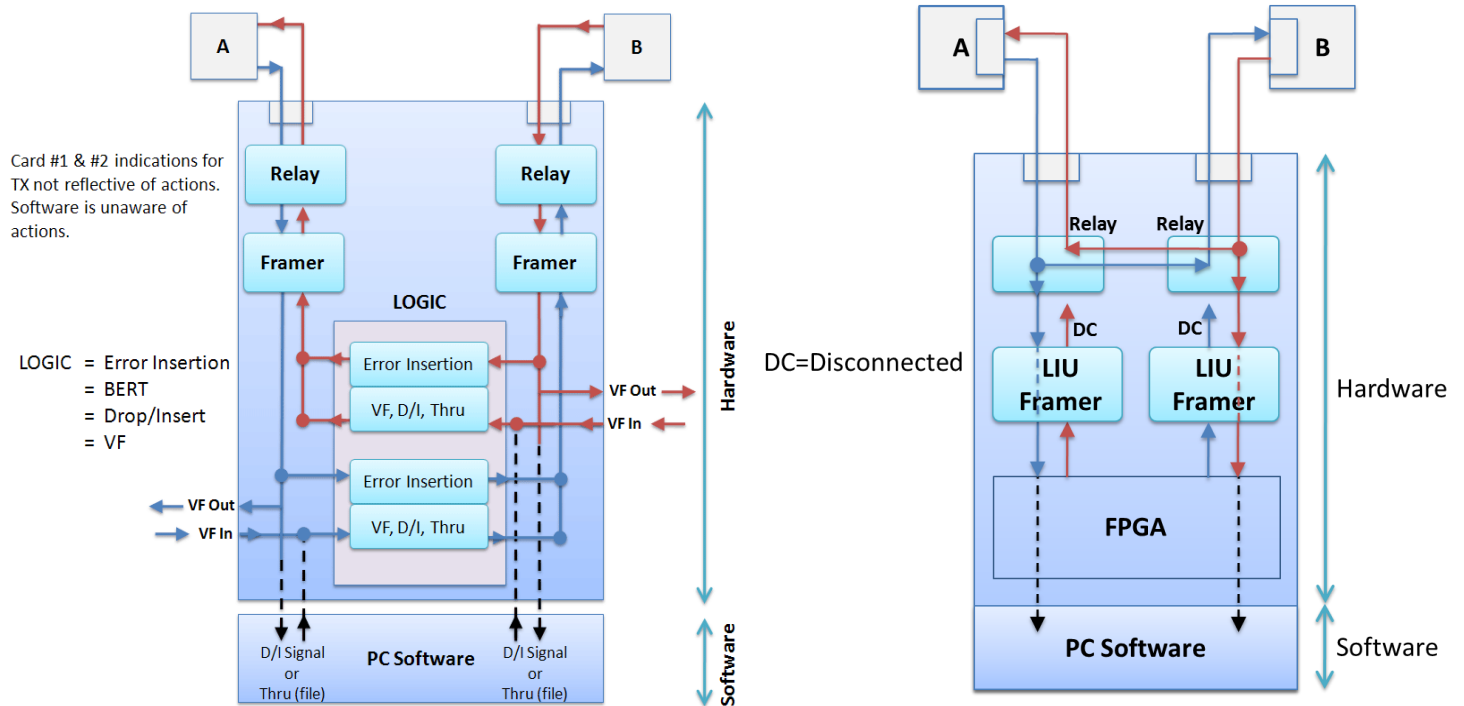


Encoding Options

## Cross Port Transmit and Through Mode

In cross-port transmit mode, the data that would normally be transmitted on Card 1 (Port 1) is diverted and transmitted on Card 2 (Port 2) and the data that would normally be transmitted on Card 2 (Port 2) is diverted and transmitted on Card 1 (Port 1). The receive paths are completely unaffected. This feature also eliminates complex cabling.

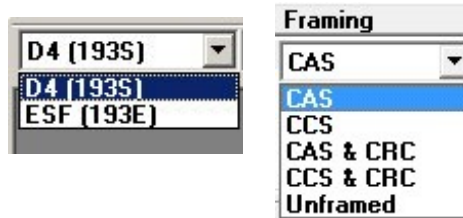
In cross-port through mode data is passed thru seamlessly and monitored simultaneously. It acts like outward loopback on the different port. Signal received on port 1 is transmitted out on thru port 2 and vice versa. Irrespective of the interface setting (Terminate, Monitor, Bridge), data is passed thru. Connection is not disrupted even if the PC loses power.



Cross Port Transmit and Through Mode

## Framing Formats for T1 E1 Systems

Provides options to select D4, ESF, CAS, CCS, CAS & CRC, CCS & CRC, and Unframed T1 E1 framing formats.

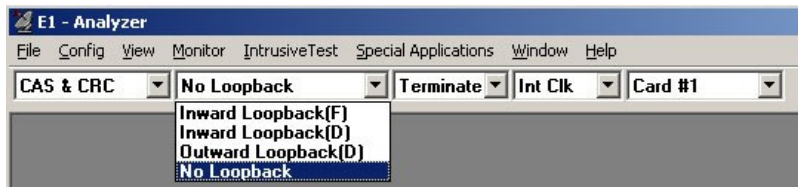


T1 and E1 Framing Format

## Loopbacks

Three separate hardware loopbacks are provided on the T1 E1 Cards:

- Inward framer loopback (Inward Loopback (F))
- Inward driver loopback (Inward Loopback (D))
- Outward driver loopback (Outward Loopback (D))
- An additional software loopback called "Rx-to-Tx Loopback" is also provided. In software loopback, the received data is looped back to transmit data by the PC software



Loopback Settings

## Terminate, Bridge, and Monitor Modes

The T1 E1 input signal may be terminated using impedance, monitored, or bridged depending on user requirements.

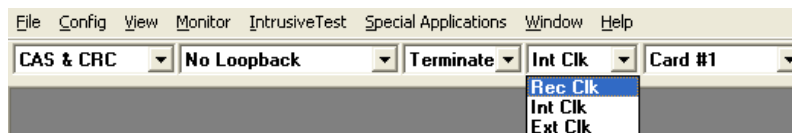


Connection Options

## Clock Options

The T1 E1 analyzer has 3 clock options to choose.

- Internal Clk
- Recovered Clk
- External Clk

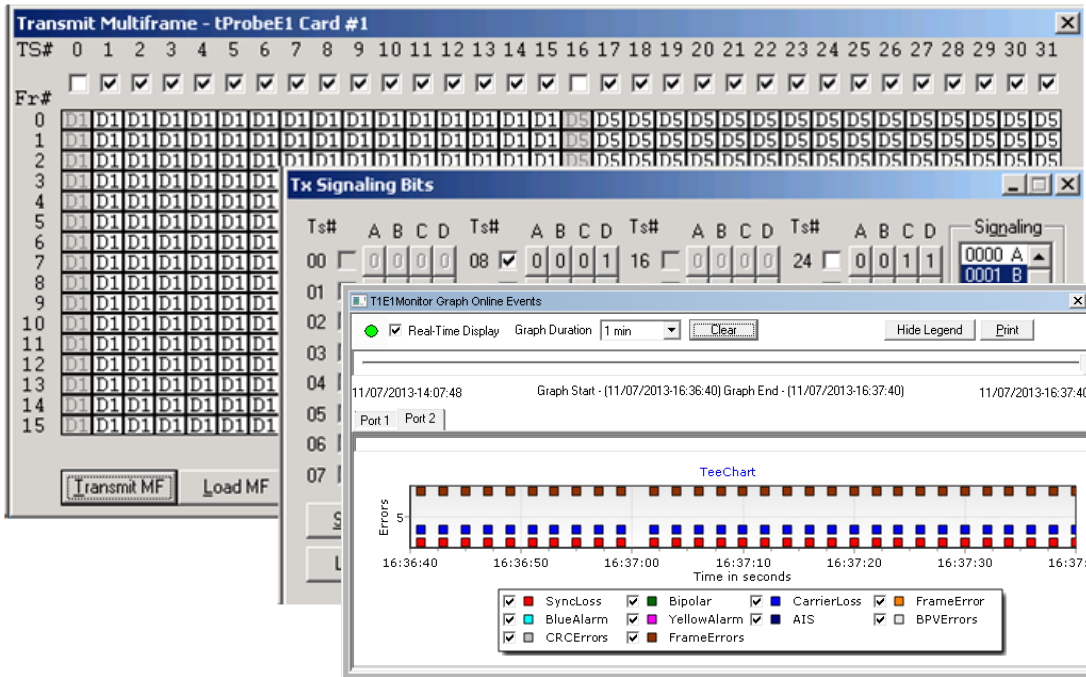


Clock Options

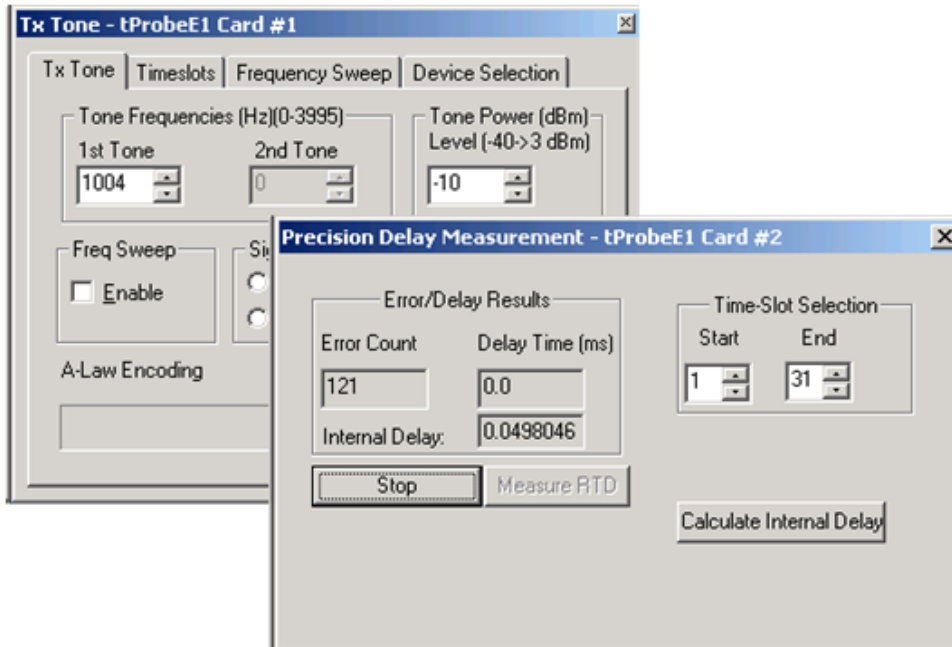
## Intrusive Test Applications

The analyzers use a variety of intrusive testing applications to verify the working of T1 E1 lines. The Basic and Enhanced **BER Testers** generate / detect framed, unframed, fractional, and sub-channel BER patterns with 16 different static patterns. Enhanced BERT also offers online / offline views of events through a powerful graphic viewer. **ATM Bit Error Rate Test (BERT)** application permits BER testing over the ATM layer. **Precision Delay Measurement** measures the round trip delay of a system with accuracy at the microsecond level. **Tone / Multiframe / Noise** generation and detection, **Signaling Bits** manipulation and recording, including error insertion features, provide complete signaling ability for the T1 E1 Analyzers. The **Error Insertion** application permits single, fixed, automatic, and random error insertion into the incoming bit stream, including Bulk Delay feature .

**Note:** Bulk delay for error insertion is not available on Octal/Quad T1 /E1 Analyzers.



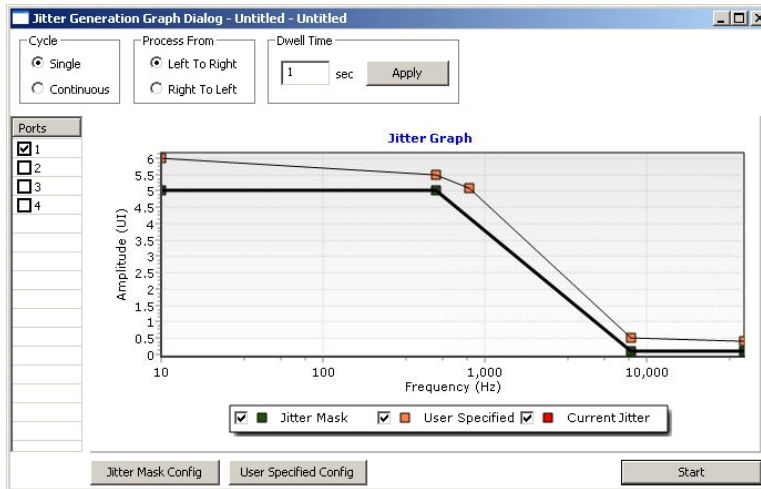
Transmit Multiframe, Transmit Signaling Bits



Transmit Tone and Precision Delay Measurement

### Jitter Generation (XX012 Included with Basic Analyzer)

Jitter Generation generates jitter based on user defined frequency module and amplitude values.

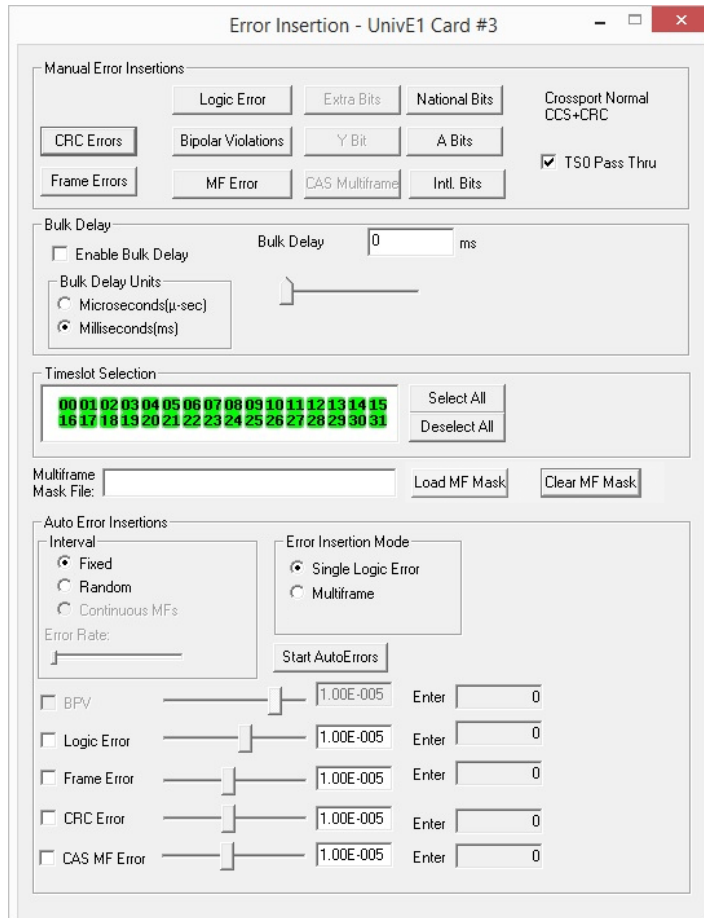


**Jitter Generation**

### Error Insertion

The Error Insertion application permits inserting single, fixed, automatic, random, and burst error into the incoming bit stream.

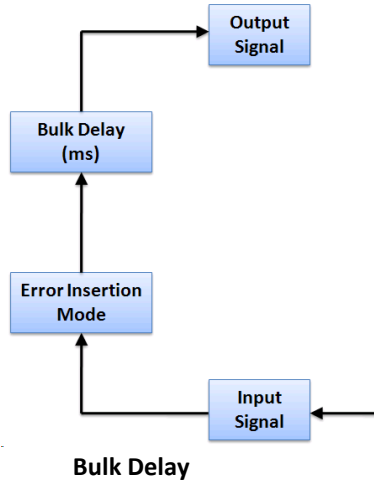
The application allows to manually insert CRC, Framing, International bits, National bits, A Bits, CAS Multi-frame, Logic Error, and Bipolar Violations.



**Error Insertion**

## Bulk Delay

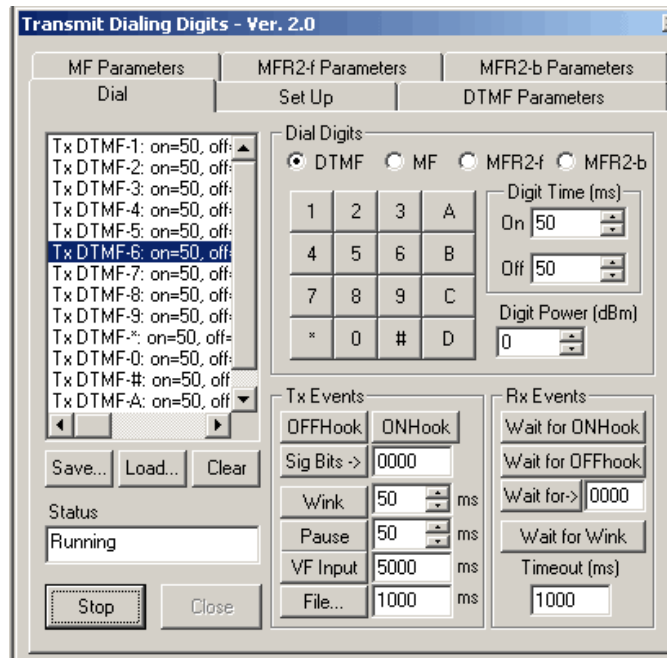
Bulk delay is an added feature in Error insertion application that allows users to apply Bulk delay on the entire T1 E1 trunk (full multi-frame) of 1.544Mbps (T1) pipe or 2.048 Mbps (E1) pipe. This helps to simulate network delay along the T1 E1 links. After selecting or adjusting the delay, the Delay will fill a buffer and begin transmitting the signal; this will cause the T1 or E1 multi-frame signal to briefly lose sync when applying the delay.



- Bulk delay can be applied in either microseconds or milliseconds units
- Delay can be varied from 0 to 169.77mSec or 69 to 169845  $\mu$ Sec in T1 and 0 to 127.99mSec or 46 to 128042 $\mu$ Sec in E1 with an accuracy of +/- 10uSec
- By cascading E1s one can achieve larger delays >127 ms
- The delay resolution is based on the byte increments of T1 or E1 (8 bits at a time)

## Transmit DTMF/MF (MFR2-F, MFR2-B) Digits (XX022 Included with Basic Analyzer)

The transmit applications provide the ability to transmit DTMF, MF, MFC-R2-forward and MFC-R2-backward digits on one or more time slots. The application displays call script window to view the various digits, and transmit/ receive events. The call-script 'save' feature allows the script display to be saved as a text file, and the 'load' feature allows the scripts to be loaded from a file.



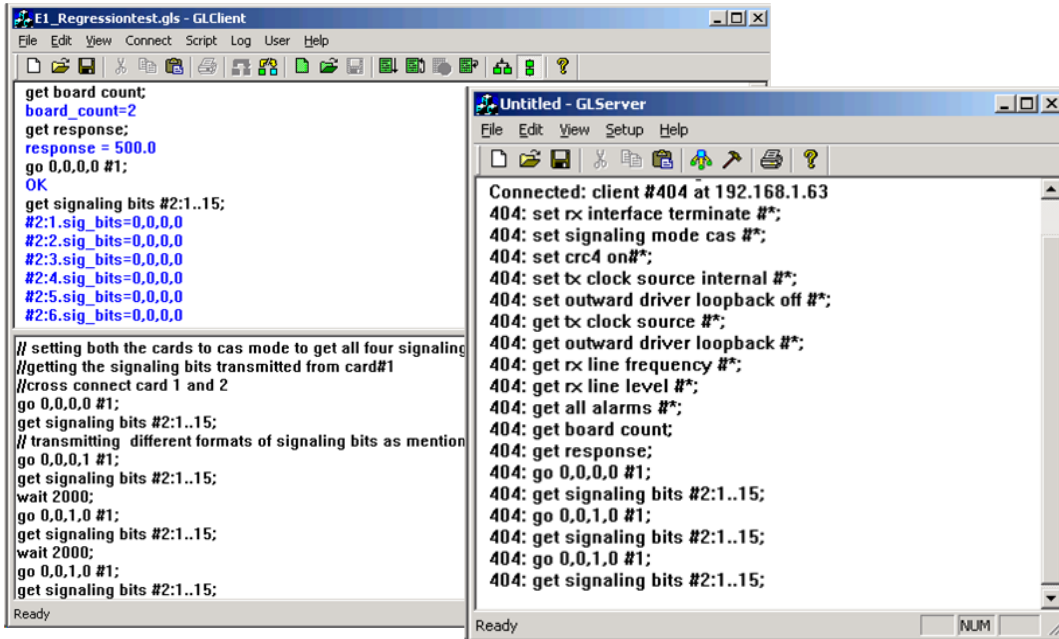
**Transmit Dialed Digit**

### Windows Client-Server (XX600 Included with Basic Analyzer)

Client / Server applications 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. Almost every GUI application has a WCS counterpart. Now, Windows Client / Server available as a part of Basic Applications in T1 E1 Analyzer.

GL provides sample-working clients in C++, VB, and TCL along with the server.

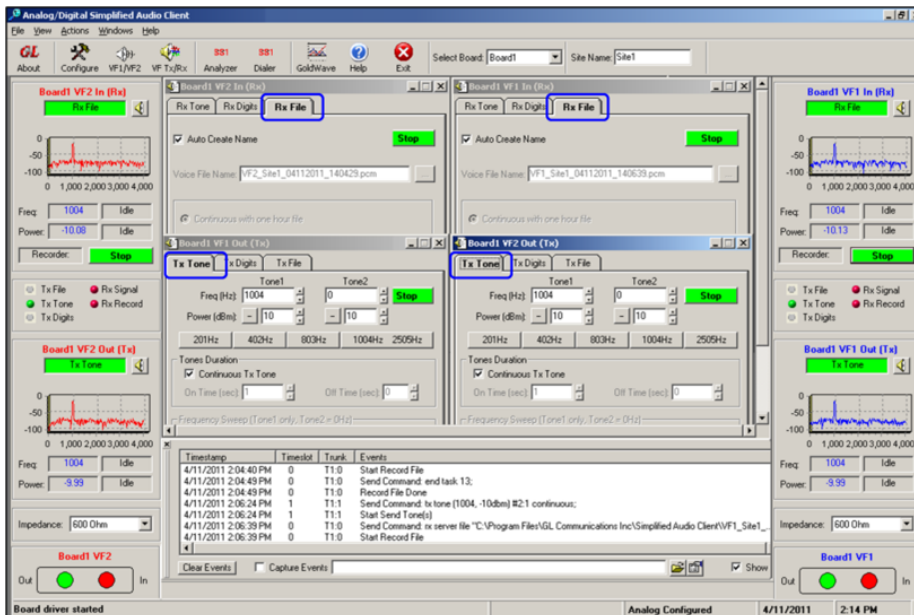
With additional licenses, various modules can be obtained to suit the testing requirements. Refer to WCS Modules.



GL Client-Server

### Dual VF Tx Rx – (XX605 Included with Basic Analyzer)

The Dual VF Tx Rx (earlier called as Simplified Audio Client) is now a part of Basic Applications in T1 E1 Analyzer. This application is designed exclusively to perform non-intrusive and intrusive VF audio monitoring, VF audio recording, and testing easily. SAC provides an alternate and simple GUI as against the T1 E1 Analyzer applications in basic software to perform analog Tx/Rx functions.



Simplified Audio Client Analog Configuration

## Buyer's Guide

| Item No                | Related Software  |
|------------------------|---|
| <a href="#">XX010</a>  | Application Development Tool Kit (Programmer's Guide)                           |
| <a href="#">XX018</a>  | Multi-Channel BERT Software   |
| <a href="#">XX019</a>  | Transmit/Receive File Utility Software  |
| <a href="#">XX020</a>  | Record/Playback File Software   |
| <a href="#">XX021</a>  | FDL Software for ESF (T1 only)  |
| <a href="#">XX022</a>  | DTMF/MF Detector & Generator Software   |
| <a href="#">XX023</a>  | T1 A-law or E1 $\mu$ -law Software  |
| <a href="#">XX051</a>  | Synchronous Trunk Record Playback   |
| <a href="#">XX031</a>  | Enhanced T1 / E1 Call Capture/Analysis Software                                 |
| <a href="#">XX031</a>  | T1 or E1 Call Capture and Analysis Software w/ Traffic Activated Trigger Option |
| <a href="#">CDR032</a> | Call Data Records   |
| <a href="#">VBA032</a> | Voice Band Analyzer   |
| <a href="#">VBA033</a> | Two-Wire Echo Analysis for VBA  |
| <a href="#">VBA036</a> | Traffic Analysis for VBA  |
| VBA038                 | Fax Demodulator / Decoder   |
| XX600                  | Basic Client/Server Scripted Control Software (Included with Basic Software)    |
| XX605                  | Dual VF Tx Rx (Only for tProbe) (Included with Basic Software)                  |
| XX606                  | Pulse Shape & Jitter Measurement (Included with Basic Software)                 |
| <a href="#">XX610</a>  | w/ File based Record/Playback   |
| <a href="#">XX616</a>  | T1 E1 WCS Client Python Module  |
| <a href="#">XX620</a>  | Transmit/Detect digits (included with basic software)                           |
| <a href="#">XX625</a>  | w/ CAS Simulator  |
| <a href="#">XX626</a>  | w/ SS1 Signaling Analyzer and Dialer  |
| <a href="#">XX629</a>  | w/ISDN Emulation  |
| <a href="#">XX630</a>  | w/ DSP Capability   |
| <a href="#">XX631</a>  | w/ Dynamic DSP Capability   |
| <a href="#">XX634</a>  | High Throughput HDLC Tx/Rx Test   |
| <a href="#">XX635</a>  | High Throughput PPP Tx/Rx Test  |
| <a href="#">XX636</a>  | High Throughput MC-MLPPP Tx/Rx Test   |
| <a href="#">XX640</a>  | File based HDLC Record/Playback   |



818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A  
 (Web) [www.gl.com](http://www.gl.com) - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) [info@gl.com](mailto:info@gl.com)

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| Item No               | Related Software   |
|-----------------------|--|
| <a href="#">XX641</a> | File based HDLC Remote Record/Playback   |
| <a href="#">XX643</a> | w/ MTP2 Emulation  |
| <a href="#">XX646</a> | w/High Throughput TRAU Tx/Rx Test  |
| <a href="#">XX647</a> | Scripted ISUP Conformance Testing (MAPS™ SS7 Conformance)  |
| <a href="#">XX648</a> | Scripted ISDN Simulator (MAPS™ ISDN)   |
| <a href="#">XX649</a> | Scripted ISUP Emulation (MAPS™ SS7)  |
| <a href="#">XX694</a> | Scripted MAP Emulation (MAPS™ MAP)   |
| <a href="#">XX651</a> | w/ SA bits Encode/Decode   |
| <a href="#">XX696</a> | Scripted CAMEL AP Emulation (MAPS™ CAP)  |
| <a href="#">XX624</a> | Scripted FXO FXS Emulation using MAPS™ (MAPS™ FXO FXS)   |
| <a href="#">XX652</a> | Scripted CAS Simulator (MAPS™ CAS)   |
| <a href="#">XX654</a> | Scripted MLPPP Conformance Testing (MAPS™ MLPPP)   |
| <a href="#">XX650</a> | Inverse Multiplexing for ATM Emulation   |
| <a href="#">XX655</a> | MultiLink Frame Relay Emulation w/ Tx/Rx Test  |
| <a href="#">XX660</a> | w/ FDL   |
| <a href="#">XX670</a> | w/Multi-Channel Rx BERT  |
| <a href="#">XX680</a> | w/Traffic Classifier   |
| <a href="#">XX690</a> | SS7 Protocol Decode Agent  |
| <a href="#">XX691</a> | ISDN Protocol Decode Agent   |
| <a href="#">XX692</a> | Scripted GSM A Interface Emulation (MAPS™ GSM A)   |
| <a href="#">XX693</a> | Scripted GSM Abis Interface Emulation (MAPS™ GSM Abis)   |
| <a href="#">XX003</a> | Timeslot Delay Loopback for T1 (Currently implemented in Octal T1 E1 Analyzer)<br>Timeslot Delay Loopback for E1 (Currently implemented in Octal T1 E1 Analyzer) |
| <a href="#">XX062</a> | Echo Path Delay/Loss Simulation Software   |
| <a href="#">XX063</a> | Echo Path Delay/Loss Measurement Software  |
| <a href="#">XX065</a> | G.168 Test Suite for T1 & E1 Echo Cancellers (Manual Testing Software and Procedures)  |
| <a href="#">XX066</a> | Digital Echo Canceller   |
| XX067                 | Automated Echo Canceller Testing w/o VQT   |
| <a href="#">XX068</a> | Semi-Automated and Scripted Echo Canceller Testing Suite<br>w/ C++ Client<br>w/ LabView Client<br>w/ Matlab Client   |



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| Item No   | Related Software  |
|---|---|
| <a href="#">PKB070</a>                          | Audio Processing Utility  |
| PKB080  | Automated Echo Canceller Testing TDM-VoIP   |
| PKB081  | Automated Acoustic Echo Canceller Compliance Testing (Partial Tests)                                      |
| AEC001  | AutoEC Test Viewer  |
| <a href="#">EMU037</a>                          | Echo Measurement Utility (EMU) Software   |
| <a href="#">XX089</a>                           | Protocol Identifier   |
| <a href="#">XX090</a><br>OLV090                 | T1 or E1 Real-Time HDLC Analysis/Playback/Simulate Software<br>Offline/ Remote HDLC Analyzer              |
| <a href="#">XX095</a><br><a href="#">OLV095</a> | E1 Real-Time SA Bit HDLC Analysis<br>Offline SA Bit HDLC Analyzer   |
| <a href="#">XX100</a><br>OLV100                 | T1 or E1 Real-Time ISDN Protocol Analyzer<br>Offline / Remote ISDN Analyzer                               |
| <a href="#">XX105</a>                           | T1 or E1 Real-Time ISDN Protocol Emulator   |
| <a href="#">XX110</a><br>OLV110                 | E1 Real-Time V5.x Protocol Analyzer<br>Offline / Remote V5.x Analyzer                                     |
| <a href="#">XX120</a><br><a href="#">OLV120</a> | T1 or E1 Real-Time SS7 Protocol Analyzer<br>Offline / Remote SS7 Analyzer                                 |
| <a href="#">XX130</a><br>OLV130                 | T1 or E1 Real-Time Frame Relay Protocol Analyzer<br>Offline/ Remote Frame Relay Analyzer                  |
| <a href="#">XX135</a><br>OLV135                 | ML-PPP Analyzer<br>Offline ML-PPP Analyzer  |
| <a href="#">XX136</a><br>OLV136                 | PPP and MLPPP Packet Analysis<br>Offline PPP and ML-PPP Packet Analysis                                   |
| <a href="#">XX140</a><br>OLV140                 | T1 or E1 Real-Time GR303 Protocol Analyzer<br>Offline/ Remote GR303 Analyzer                              |
| <a href="#">XX142</a><br>OLV142                 | CDMA2000 Protocol Analyzer<br>Offline CDMA2000 Analyzer   |
| <a href="#">XX150</a><br>OLV150                 | T1 E1 Real-Time GSM Protocol Analyzer<br>Offline GSM Analyzer   |
| <a href="#">XX151</a><br>OLV151                 | w/Motorola Mobis Decode<br>with Motorola Mobis decodes  |
| <a href="#">XX153</a><br><a href="#">OLV153</a> | T1 E1 Real-Time TRAU Protocol Analyzer<br>TRAU Traffic Playback<br>TRAU Toolbox™<br>Offline TRAU Analyzer |



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| Item No                                  | Related Software  |
|--|---|
| <a href="#">XX155</a><br>OLV155          | T1 or E1 Real-Time GPRS Protocol Analyzer<br>Offline GPRS Analyzer  |
| <a href="#">XX160</a><br>OLV160<br>XX162 | T1 or E1 Real-Time ATM Analyzer<br>Offline ATM Analyzer<br>ATM BERT |
| <a href="#">XX165</a>                    | UMTS Analyzer   |
| <a href="#">PKV170</a>                   | NetsurveyorWeb™ (Perpetual License, Unlimited Users/Nodes)          |
| <a href="#">PKV169</a>                   | NetsurveyorWeb™ Lite  |
| PKV171                                   | NetSurveyor Agent Toolkit   |
| <a href="#">DC007</a>                    | DCME Test & Analysis Software w/Desktop PC                          |
| <a href="#">DC008</a>                    | DCME Test & Analysis Software w/Portable PC                         |
| <a href="#">SA048</a>                    | Goldwave Software   |
| <a href="#">STE40</a>                    | Mux/Demux Software  |
| STE50                                    | Sample Traffic Files  |

| Item No  | Related Hardware   |
|--|--|
| <a href="#">XTE001</a><br>XUT001<br>XUE001   | Dual T1 E1 Express (PCIe) Boards (requires additional licenses)<br>Dual T1 E1 Express Card Basic T1 Software (includes xx600, xx605)<br>Dual T1 E1 Express Card Basic E1 Software (includes xx600, xx605)  |
| <a href="#">FTE001</a><br><a href="#">ETE001</a><br><a href="#">ETA001</a><br><a href="#">EEA001</a>                           | QuadXpress T1 E1 Main Board (Quad Port™ requires additional licenses)<br>OctalXpress T1 E1 Main Board plus Daughter Board (Octal Port™ requires additional licenses)<br>Basic Software for T1 (includes xx600, xx605) (zero dollar, but required with appropriate licenses)<br>Basic Software for E1 (includes xx600, xx605) (zero dollar, but required with appropriate licenses) |
| <a href="#">XX003</a>  | Timeslot Delay Loopback for T1 (Currently implemented in Octal T1 E1 Analyzer)<br>Timeslot Delay Loopback for E1 (Currently implemented in Octal T1 E1 Analyzer)   |
| <a href="#">PTE001</a><br><a href="#">PTA001</a><br><a href="#">PEA001</a><br><a href="#">PTE015</a><br><a href="#">PTE025</a> | tProbe™ T1 E1 Base Unit<br>tProbe™ Basic T1 Software (includes xx600, xx605)<br>tProbe™ Basic E1 Software (includes xx600, xx605)<br>w/ 2Wire FXO and FXS Optional Board<br>Data Communications Board for Interfaces RS-232, RS-449, EIA-530, V.35, and many others  |

**Note:** PCs which include GL hardware/software require Intel or AMD processors for compliance.

For more information, please visit [T1 E1 Testing](#) webpage.



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