T1 E1 TESTERS

PCIe Based Octal and Quad
T1 E1 Boards

Back Panel

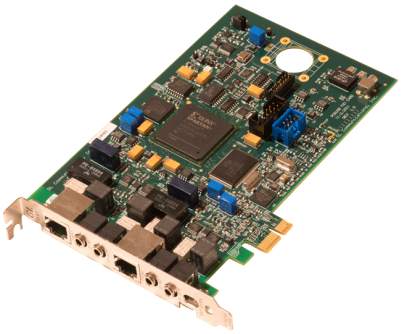
Front Panel

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

Front Panel

Back Panel

tScan16™
High-Density T1 E1 Board



Dual T1 E1
PCIe Express Boards

GL Communications Inc.

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T1 E1 Analyzers

(Available in two form-factors - PCI Boards or USB-based devices)

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 and 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 are possible. Its designed for the newer PCIe lanes for faster processing and scalability.

The USB-based *t*Probe™ 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.

For more information, please visit T1 E1 Testing webpage.

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, digits, tones, fax, modem, and raw data
- Call Recording, Generation, and Monitoring for hundreds to thousands of calls in one platform
- Supports pulse mask compliance testing, jitter generation, and analysis
- Adjustable transmit clock frequency for testing frequency lock sensitivity of tProbe™ and Universal T1 E1 equipment
- 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
- Transmit Gaussian noise, Error Insertion capabilities
- Compatible with Windows® 10 OS (Latest version) and user friendly real-time software

For more information, please visit Hardware Platforms webpage.

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Basic Applications

Configuration

Allows configuring the Tx/Rx parameters of the low level chip functions for dual T1/ E1 framers and drivers. It also allows to switch between µ-law and a-law encoding formats.

Monitoring Applications

Multiple applications are offered to monitor information received over T1 E1 lines. They cover information such as Byte Values, Binary Byte Values, Signaling Bits, DC Offset, Frequency, Power Level, Multi-frame Data, Timeslot Displays, ASCII Timeslot Display, Oscilloscope, Power Spectral, Audio (VF), and Active Voice Level Monitoring. Oscilloscope and Spectral Displays provide graphical analysis of signals.

VF monitoring application permits any single timeslot to be decoded to the VF Output jack, i.e. the PCM signal in a timeslot is converted to analog and fed to the VF Out jack. Similarly, an analog signal can be fed to the VF In jack for insertion into any timeslot. The applied signal can be attenuated or amplified before analog to digital conversion using the gain setting.

Intrusive Test Applications

The analyzers use a variety of intrusive testing applications to verify the working of T1 E1 lines such as BER Tester (Basic and Enhanced), ATM BERT, Transmit Tone, Transmit Gaussian Noise, Transmit Multiframe, Transmit Signaling Bits, Precision Delay Measurement, Rx-to Tx loopback, Error Insertion with Bulk Delay, and Round trip delay (RTD).

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 NetSurveryorWeb™ 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.

Jitter Generation, Jitter Measurement, and Pulse Mask

Jitter Generation generates jitter based on user defined frequency module and amplitude values. Jitter Measurement software allows one to accurately measure jitter associated with T1 or E1 signals. Pulse shape measurement software can determine if the pulse shape fits within a "pulse mask" as specified by standards ITU G.703 and ANSI T1.102-1993. Jitter Generation, Measurement, and Pulse Mask is available as a part of T1 E1 basic applications.

Windows Client/Server

Client / Server applications allow the user to operate analyzers remotely with an appropriate C++, VB, and TCL clients for automation, or provide multi client connectivity to a single T1 E1 analyzer. Almost every GUI application has a WCS counterpart.

Dual VF Tx Rx

The **Dual VF Tx Rx** (earlier called as Simplified Audio Client) is now a part of Basic Applications in T1 E1 Analyzer**.** It provides an alternate and simple GUI as against the T1 E1 Analyzer applications in basic software to perform analog Tx/Rx functions

Real-time Multi-Channel Audio Bridge audio streams between T1 E1 timeslots and a sound card. The sound-card aware applications such as Goldwave, Matlab, and so on can send and receive data to/from a T1 E1 timeslot. Real-time Multi Channel Audio Bridge is now available as a part of T1 E1 basic applications.

Real-time Strip Chart 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 application is now available as a part of T1 E1 basic applications.

Capture/Transmit Dialed Digits application permits capturing and transmitting DTMF and MF (along with MFR2-forward and MFR2-backward) digits on one or more time slots. The application displays the various digits, and transmit/ receive events. Capture/Transmit Dialed Digits is now available as a part of T1 E1 basic applications.

Signaling Transitions records all signaling bit changes along with the time-stamped indications for each bit.

Optional Applications

Transmit (Playback) and Record application allows transmitting and recording the voice files. Files of any length can be transmitted continuously (without loss) in user selected contiguous timeslots, including repeated transmission of a single file.

Automated Record/Playback (ARP) is an extremely versatile application that runs several transmit or receive operation tasks simultaneously.

Automated Continuous Capture (ACC) application allows to capture seamless chunks of data in files of the same size.

Synchronous Trunk Record Playback is used to record live T1 E1 traffic and saves it to a file in FILE-TIME structure. It has both Record and Playback features that synchronously record any type of traffic (voice, digits, and tones) on many complete T1 or E1 line and playback recorded files to recreate the transmission exactly as it occurred.

Call Capture and Analysis application non-intrusively records calls directly from T1 E1 lines. Captures can be triggered with signaling, tone, ISDN with NFAS messages, SS7 messages, and traffic such as fax, modem, voice, and any signal based on power. It supports A-Law, µ-Law, 16-bit PCM (Intel, Motorola), MS Wave, G.726 (40 Kbps, 32 Kbps, 24 Kbps, and 16 Kbps), and G.722 (64 Kbps) file formats.

Multiple Call Capture and Analysis (Multi-CCA) is designed to perform the all of the CCA functions and run multiple capture instances simultaneously from multiple T1 E1 lines on a single GUI.

Call Data Records works with CCA and VBA (optional) to provide detail call records that contain call summary data, progression of supervisory and in-band events during the call and an overall summary of in-band measures for each direction.

Voice Band Analyzer (VBA) is an analysis tool for monitoring voice band traffic over VoIP, TDM and wireless networks. Built-in algorithms include ITU-T P.56 Active Voice Level analysis, Line Echo (Hybrid) analysis, and Traffic Classifier. It supports A-Law, µ-Law, 16 -bit PCM (Intel, Motorola), MS Wave, G.726 (40 Kbps, 32 Kbps, 24 Kbps, and 16 Kbps), and G.722 (64 Kbps) file formats. FaxScan™ module within VBA can be used to decode both 2-wire and 4-wire voice band captures to produce the Fax TIF image and other transmission information. VBA includes PKB070 Audio Processing Utility (APU).

Protocol Analysis and Emulation

Various TDM and wireless protocols can be analyzed in real-time / remote / offline. The following are the available protocol analyzers:

- Physical Layer Alarms and Errors
- GSM, TRAU, GPRS (Gb), UMTS, DDS
- ATM IMA, HDLC, SS7, ISDN, CAS, SS1
- ML-PPP, ML-Frame Relay,
- CDMA -A1 and A3 A7
- GR-303, V5.x, DCME (E1 Interface only)
- Sa Bits HDLC, SSM
- FDL (T1 Interface only)

Also available are the protocol emulators such as TRAU, ISDN, SS1, ISUP, MAP, CAS, GSM, HDLC, and MC-MLPPP for real-time simulation of corresponding networks.

Message Automation and Protocol Simulation (MAPS™) is GL's general purpose platform for emulation of communication protocols. A wide range of protocols has been added to its wide framework, including ISDN, APS, SS7 (ISUP, MAP, IUP), CAS, GSM A, GSM Abis, CAP, INAP, FXO FXS, and MLPPP. The **MAPS™** is a scripted automation tool designed for complete protocol analysis and simulation. The Conformance Test Suites are also available for ISDN, LAPD, and SS7 protocols.

Protocol Identifier is capable of detecting various protocols and identifying their location within T1 E1 timeslots or sub channels.

Echo Test Solutions are a set of applications that measure and test line and acoustic echo in TDM and VoIP networks. Various applications are included to help users measure Loop Delay/ERL and echo return loss (ERL) on one or more time slots, apply delay, attenuation, and/or filtering to a received signal, and simulate a digital echo canceller. **Automated and Scripted G.168 and G.167 Compliance Test** solutions are also available.

Multi-channel Bit Error Rate Testing (MCBERT) measures correctness of data received on T1 E1 lines/timeslots with stored data in a reference file.

Optional Applications *(Contd.)*

WCS Modules

With additional licenses, WCS also supports transmission/reception of files/digits, Multi-channel BERT, CAS Emulation, DSP operations, Dynamic DSP capability, Emulation of SA Bits, FDL, HDLC, TRAU, MC-MLPPP, SS7, ISDN , Multilink-Frame Relay, and ATM, Pulse Mask and Jitter Testing, to name just a few. A separate brochure provides an overview of the server applications For more information, please visit Brochures webpage.

Multiplex/Demultiplex application provides the ability to multiplex files on different timeslots (up to 32 files) into one aggregate output file and to demultiplex one aggregate file into individual timeslots. Included with Record /Playback software (XX020).

The **Fax Emulation and Analysis** software can transmit and receive the fax information as electrical signals over the T1 E1 lines. The contents (text or images) are sent as a graphic image.

In order to fully support Fax Analysis, GL's GLInsight™ or GL FaxScan™ applications provides the ability to further analyze the fax sessions saved as PCM files. FaxScan™ application can decode fax image as TIFF files and produce detail call logs.

NetSurveyorWeb™

T1/E1/T3/E3 Probes are deployed in the field to monitor various protocols and conditions which are then collected at a central site into a database. Data records are stored into a centralized database (Oracle) using ODBC. With the use of web server, the remote / local monitoring can be accessed using simple web browser interface such as **NetSurveyorWeb™**.

GL's **Datacom Emulator/Analyzer** is an optional board available with GL's **tProbe™ T1 E1 Datacom Analyzer USB unit**. The **tProbe™ Datacom Analyzer** is designed for the service installation, verification, and maintenance of Datacom and telecom equipments. It supports V.24, V.35, V.36, RS-449, RS-485, EIA-530 and EIA-530A interfaces.

The **tProbe™ FXO-FXS Board** provides all the functionality to test 2-wire devices. Both types of analyzers sport features such as remote access, scripted control, and they can all support a vast array of optional applications.

Buyer's Guide

Item No	Related Software
XX010	Application Development Tool Kit (Programmer's Guide)
XX018	Multi-Channel BERT Software
XX019	Transmit/Receive File Utility Software
XX020	Record/Playback File Software
XX021	FDL Software for ESF (T1 only)
XX022	DTMF/MF Detector & Generator Software
XX023	T1 A-law or E1 µ-law Software
XX051	Synchronous Trunk Record Playback
XX031	Enhanced T1 / E1 Call Capture/Analysis Software
XX031	T1 or E1 Call Capture and Analysis Software w/ Traffic Activated Trigger Option
CDR032	Call Data Records
CMU031	Call Management Utility
VBA032	Voice Band Analyzer
VBA033	Two-Wire Echo Analysis for VBA
VBA036	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)
XX610	w/ File based Record/Playback
XX620	Transmit/Detect digits (included with basic software)
XX625	w/ CAS Simulator
XX626	w/ SS1 Signaling Analyzer and Dialer
XX629	w/ISDN Emulation
XX630	w/ DSP Capability
XX631	w/ Dynamic DSP Capability
XX634	High Throughput HDLC Tx/Rx Test
XX635	High Throughput PPP Tx/Rx Test
XX636	High Throughput MC-MLPPP Tx/Rx Test
XX640	File based HDLC Record/Playback

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XX641	File based HDLC Remote Record/Playback
XX643	w/ MTP2 Emulation
XX646	w/High Throughput TRAU Tx/Rx Test
XX647	Scripted ISUP Conformance Testing (MAPS™ SS7 Conformance)
XX648	Scripted ISDN Simulator (MAPS™ ISDN)
XX649	Scripted ISUP Emulation (MAPS™ SS7)
XX694	Scripted MAP Emulation (MAPS™ MAP)
XX651	w/ SA bits Encode/Decode
XX696	Scripted CAMEL AP Emulation (MAPS™ CAP)
XX624	Scripted FXO FXS Emulation using MAPS™ (MAPS™ FXO FXS)
XX652	Scripted CAS Simulator (MAPS™ CAS)
XX654	Scripted MLPPP Conformance Testing (MAPS™ MLPPP)
XX650	Inverse Multiplexing for ATM Emulation
XX655	MultiLink Frame Relay Emulation w/ Tx/Rx Test
XX660	w/ FDL
XX670	w/Multi-Channel Rx BERT
XX680	w/Traffic Classifier
XX690	SS7 Protocol Decode Agent
XX691	ISDN Protocol Decode Agent
XX692	Scripted GSM A Interface Emulation (MAPS™ GSM A)
XX693	Scripted GSM Abis Interface Emulation (MAPS™ GSM Abis)
XX003	Timeslot Delay Loopback for T1 (Currently implemented in Octal T1/E1 Analyzer) Timeslot Delay Loopback for E1 (Currently implemented in Octal T1/E1 Analyzer)
XX062	Echo Path Delay/Loss Simulation Software
XX063	Echo Path Delay/Loss Measurement Software
XX065	G.168 Test Suite for T1 & E1 Echo Cancellers (Manual Testing Software and Procedures)
XX066	Digital Echo Canceller
XX067	Automated Echo Canceller Testing w/o VQT
XX068	Semi-Automated and Scripted Echo Canceller Testing Suite w/ C++ Client w/ LabView Client w/ Matlab Client

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

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XX155 OLV155	T1 or E1 Real-Time GPRS Protocol Analyzer Offline GPRS Analyzer
XX160 OLV160 XX162	T1 or E1 Real-Time ATM Analyzer Offline ATM Analyzer ATM BERT
XX165	UMTS Analyzer
PKV170	NetsurveyorWeb™ (Perpetual License, Unlimited Users/Nodes)
PKV169	NetsurveyorWeb™ Lite
PKV171	NetSurveyor Agent Toolkit
DC007	DCME Test & Analysis Software w/Desktop PC
DC008	DCME Test & Analysis Software w/Portable PC
SA048	Goldwave Software
STE40	Mux/Demux Software
STE50	Sample Traffic Files

Buyer's Guide

Item No	Related Hardware
XTE001	Dual T1 E1 Express (PCIe) Boards (requires additional licenses)
XUT001	Dual T1 E1 Express Card Basic T1 Software (includes xx600, xx605)
XUE001	Dual T1 E1 Express Card Basic E1 Software (includes xx600, xx605)
FTE001	QuadXpress T1 E1 Main Board (Quad Port™ requires additional licenses)
ETE001	OctalXpress T1 E1 Main Board plus Daughter Board (Octal Port™ requires additional licenses)
ETA001	Basic Software for T1 (includes xx600, xx605) (zero dollar, but required with appropriate licenses)
EEA001	Basic Software for E1 (includes xx600, xx605) (zero dollar, but required with appropriate licenses)
XX003	Timeslot Delay Loopback for T1 (Currently implemented in Octal T1/E1 Analyzer) Timeslot Delay Loopback for E1 (Currently implemented in Octal T1/E1 Analyzer)
PTE001	tProbe™ T1 E1 Base Unit
PTA001	tProbe™ Basic T1 Software (includes xx600, xx605)
PEA001	tProbe™ Basic E1 Software (includes xx600, xx605)
PTE015	w/ 2Wire FXO and FXS Optional Board
PTE025	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.

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