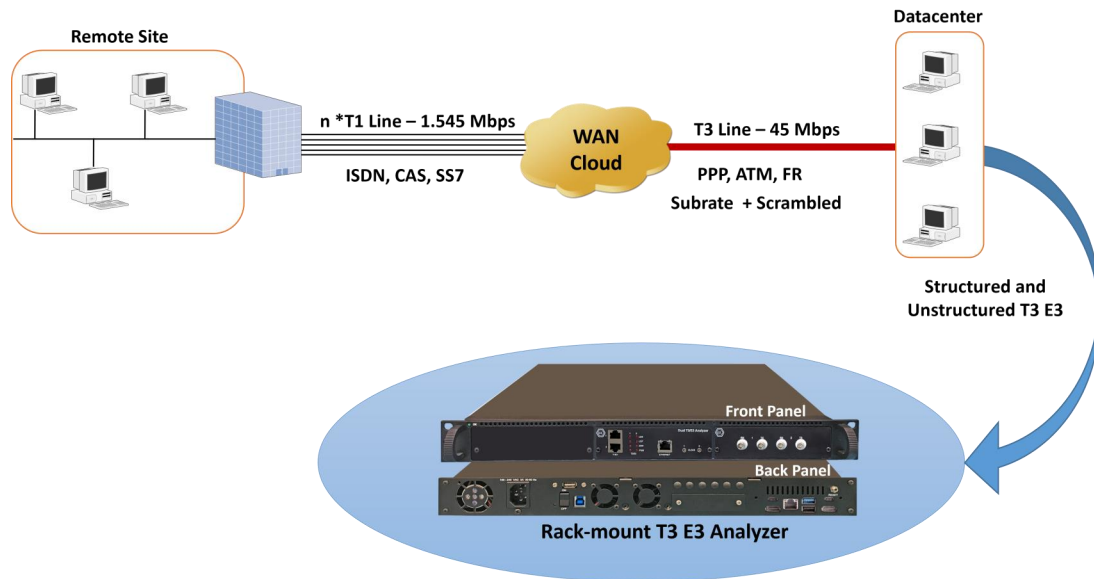


# Channelized USB T3 E3 T1 E1 Analyzer



## Overview

The T3 E3 hardware platform with associated **T1 E1 Send/Receive Server** and **Channelized T3 E3 Analyzer** software can transmit T1 or E1 frames and capture, record, and monitor multiple T1 or E1 channels over Channelized T3 or E3 links. It can perform analysis of various signal types including voice, digits, tones, fax, modem, and raw data.

T1 E1 Send/Receive Server application within Channelized T3 E3 Analyzer acts as software based Demultiplexer application that is capable of channelization of captured T3 E3 signals into 56 independent T1 channels or 32 E1 channels. The channelized streams are forwarded to T3 E3 Channelized T1 E1 Analyzer software for analyzing frames per port.

GL's mTOP™ rack can include multiple USB based Channelized T3 E3 Analyzer hardware units to form high-density form factor. The latest mTOP™ Probe unit includes single USB T3 E3 Analyzer hardware unit with necessary PC interface in a single box making it suitable for field testing.

For more information, please visit [Channelized USB T3 E3 T1 E1 Analyzer](#) webpage.

## Main Features

- Provides support for channelized T3 E3 to T1 E1
- Supports up to 56 T1s and 32 E1s channels per T3 E3 port
- Analysis of all 56 T1s (1.544 Mbps), E1 each), or 32 E1s (2.048 Mbps), each)
- Analysis of Fractional T1s and E1s, N x T1s or N x E1s
- Analysis of any combination of DS0s (64 kbps each) within the T1s or E1s, 56 x 24 = 1,344 DS0s for T1 or 32 x 32 = 1024 DS0s
- Supports structured and unstructured T1 E1 transmission and reception
- Supports all "[basic applications](#)" and "[special \(licensed\) applications](#)" for T1 or E1 channels
- Supports Protocol Analysis of structured protocols – HDLC, ISDN, CAS, and more
- Supports carrying T1 E1 alarms in channelized T3 or E3 lines.
- Comprehensive analysis / emulation of voice, data, fax, protocol, analog, and digital signals, including echo and voice quality testing
- Extracting T1s/E1s from multiple T3 E3 ports are supported
- User selectable T1 and E1 channels to multiplex. The channel numbering is same as in De-multiplexing
- Unused channels will be treated as unequipped
- Broadcasts the selected T1 E1 channel data on all the 32 E1's or 56 T1's



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## Working Principle

The Channelized T3 E3 to T1 E1 solution, comprises of two modules, namely, the High-Speed T3 E3, and Low-Speed T1 E1 modules. These two modules are actually two separate processes running on the same computer. The High-Speed T3 E3 process is called as T1 E1 Send/Receive Server, as the name suggests it runs as a service and works with USB T3 E3 hardware. The Low-Speed T1 E1 module part is referred to as Channelized T3 E3 Analyzer software.

The USB T3 E3 hardware with associated T1 E1 Send/Receive Server and Channelized T3 E3 Analyzer software can send T1 E1 frames and capture, record, and monitor multiple T1 or E1 channels over Channelized T3 E3 links. The analyzer can perform analysis and emulation of various signal types including voice, digits, tones, fax, modem, and raw data.

The T1 E1 Send/Receive Server application within USB T3 E3 Analyzer acts as software based Multiplexer- Demultiplexer application capable of channelization of a T3 signal into 56 independent T1 channels and an E3 signal into 32 E1 channels. The channelized streams containing T1 E1 frames are forwarded to T3 E3 Channelized T1 E1 Analyzer software over UDP using GL Message Protocol for analyzing frames per channel.

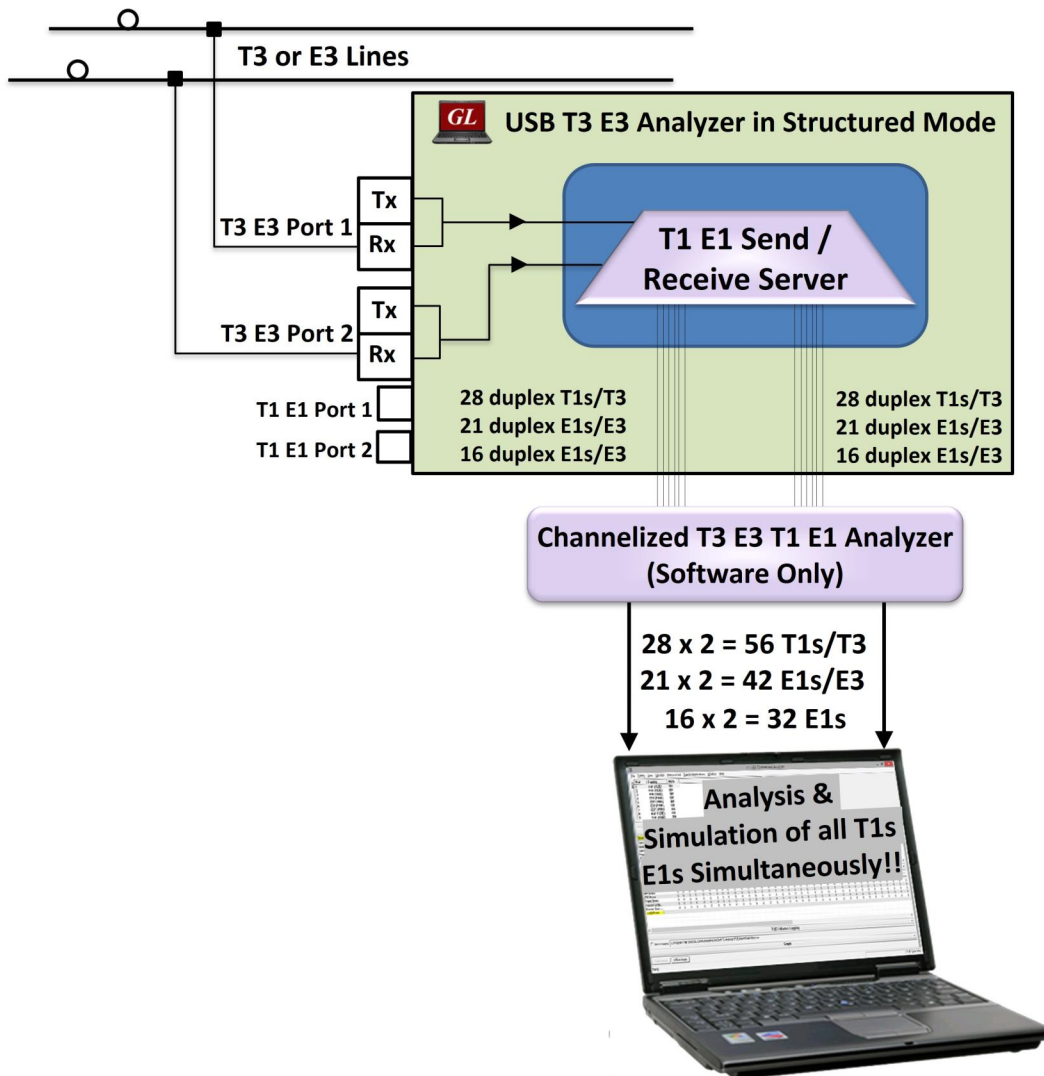


Figure: Working Principle

## SNMP DS1 traps (Requires Additional License)

Alarms monitored at the DS1 level are packetized and sent via TCP/IP to central database. These alarms can be sent in the form of SNMPv2 Traps via Simple Network Management Protocol (SNMP) to network operation center. The SNMP option with GL's Protocol Analysis is extremely useful for a large and dynamic networks with equipment from multiple vendors. Typically SNMP agents for alarms contains loopback, failure, received alarms and transmitted alarms information. Using SNMP monitoring you can monitor network availability, critical errors and alarms on your network.

Channelized T1 Analyzer units supports Management Information Base (MIB) modules that is compliant to the **SNMP v2c** for DS1 as per RFC 4805. It includes **SnmDS1.ini** file to configure SNMP DS1 traps, which can be sent to one or more SNMP notification receivers like **HP OpenView**.

For more information, please visit [SNMP Alarm Monitoring for Telecom Networks](#) webpage.

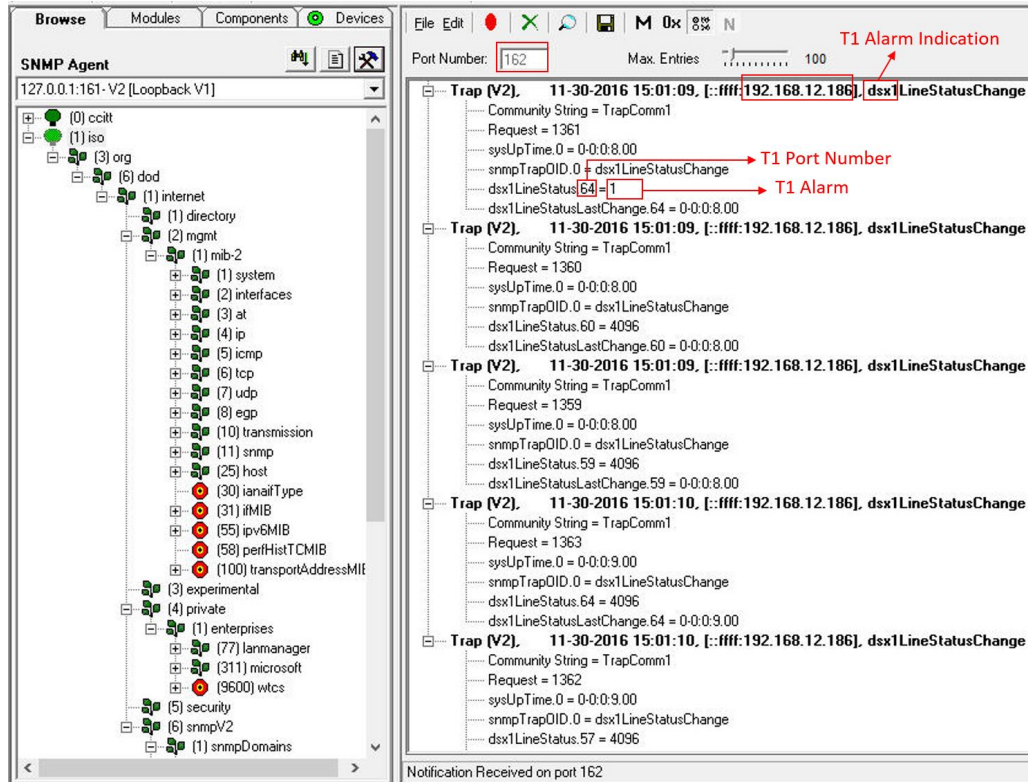


Figure: SNMP Monitoring in MIB Browser

## Basic Applications

### Configuration

Allows to switch between  $\mu$ -law and a-law encoding formats. Provides options to set the WCS Server to start with default values at analyzer start-up.

### 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.

### Intrusive Test Applications

The analyzers use a variety of intrusive testing applications to verify the working of T1 or E1 lines such as Transmit Tone, Transmit Gaussian Noise, Transmit Multiframe, Transmit Signaling Bits, and Rx-to Tx loopback.

## Optional Applications

[Capture 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.

[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.

[Call Capture and Analysis](#) application non-intrusively records calls directly from T1 or 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.

[Multiple Call Capture & Analysis](#) (Multi-CCA) is an analysis tool used to monitor hundreds of calls, capture the bidirectional data, signaling and traffic, simultaneously from multiple T1 or E1 lines, based on the user-defined trigger configurations.

[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,  $\mu$ -Law, 16-bit PCM (Intel), 16-bit PCM (Motorola) and MS Wave 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.

[Protocol Analysis](#)- Various TDM and wireless protocols can be analyzed in real-time / remote / offline. The available protocol analyzers: HDLC, SS7, ISDN, CAS, GSM, TRAU, SS1, Sa Bits HDLC, SSM, V5.x, DCME, FDL (T1 Interface only), ML-PPP, ML-Frame Relay, ATM IMA, GPRS (Gb), GPRS (IP Gx), UMTS, Physical Layer Analyzer.

### Connectors

T3 E3	2x DS3/E3 75Ω BNC (Tx, Rx) Ports
T1 E1	2x DS1/E1 RJ-48-c (Tx, Rx) for Drop/Insert
External Clock	2x MCX External Clock Ports
PC Interface	1x USB 2.0 for PC Interface
External Power	12 Volts (Medical Grade), 3 Amps
Ethernet	1x 1000 Mbps Ethernet Ports

### T3/E3 Line Interface

Output Amplitude	800mV +/- 50mV
Input Impedance	75 Ohms unbalanced (BNC)
Line Code	B3ZS (T3), HDB3 (E3)
Terminate Input Level	0.09Vp – 0.85Vp
Monitor Input Level	0.025Vp – 0.08Vp
Clock Source	Internal- +/- 1 PPM @25C [+/- 4.5 ppm (includes ageing, stability)]
Recovered	Clock recovered from receiver
External	TTL Level signal; High Speed: (T3 E3 Rate) Low Speed: (2KHz, 8KHz, 2MHz, 1.5MHz) Recovered from Inserted T1 E1

**T3 E3 Transmitter**

T3 E3 Payloads:	Framed T3 E3 Data, Unframed T3 E3, Idle, AIS
T3 Framing Modes:	Unframed, M13 (ANSI T1-107 – 1995) - Structured (Channelized), and Unstructured (Unchannelized) C-bit (ANSI T1-107 – 1990) - Structured (Channelized), and Unstructured (Unchannelized) Unchannelized T3 supports subrate and scrambling formats for Digital Link, ADC/ Kentrox, Larscom, Adtran, and Verilink data service units (DSUs)
E3 Framing Modes:	Unframed, E13 (for E3) - Structured (Channelized), and Unstructured (Unchannelized)
Framed T3 E3 Unstructured Payload:	Raw Data from File, ATM Cells (only for T3), HDLC Frames, BERT Patterns
Unframed E3 Payload:	Raw Data from File, BERT Patterns
Channel Structure:	T1, E1 (ITU-T G.747)
BERT Patterns:	QRSS, 2 <sup>6</sup> -1, 2 <sup>9</sup> -1, 2 <sup>11</sup> -1, 2 <sup>15</sup> -1, 2 <sup>20</sup> -1, 2 <sup>23</sup> -1, User Defined up to 32-bits, etc.,
T1 Payload:	Inserted T1, AIS, Loopback, BERT Patterns
E1 Payload:	Inserted E1, AIS, Loopback, BERT Patterns
Loopbacks:	Complete T3 E3 Signal, Selected T1s/E1s from incoming T3 E3

**T3/E3 Receiver**

T3 Framing Format:	M13 (ANSI T1-107 – 1995), C-bit (ANSI T1-107 – 1990), Unframed, Structured (Channelized), and Unstructured (Unchannelized)
E3 Framing Format:	E13, Unframed, Structured (Channelized), and Unstructured (Unchannelized)
Channel Structure:	T1 E1 (ITU-T G.747)
Framed T3 E3 Unstructured Payload:	Raw Data Captured to File, ATM Analysis (only for T3), HDLC Frames Analysis, BERT Patterns Measurement
Framed T3 E3 Structured Payload:	Raw Data Captured to File, BERT Patterns Measurement, Drop Selected T1(s)/E1(s)

## T1 E1 Transmit / Receiver

- Bit error rate testing (BERT) pattern generation and detection per channel
- Transmit Tone, Transmit Gaussian Noise, Transmit Multiframe
- Transmit Signaling Bits, and Rx-to-Tx loopback

Compliance	G.703 Physical/Electrical Characteristics
	GR-499-CORE Physical/Electrical Characteristics
	G.821 Bert Analysis
	G.742 Multiplexing
	G.751 Multiplexing

## Miscellaneous

T3 E3 Line Rate Offset:	+/- 50 PPM in 1 ppm Steps
Level Measurement:	Supported
Frequency Measurement:	+/- 1 PPM
T3 Error Add:	Payload Bit, Frame Errors, P-bit, C-bit, EXZ (for T3)
E3 Error Add:	Payload Bit, Frame Errors, Code Violation (CV) Error, EXZ, FAS
T3 Alarm Generation:	LOS, OOF, AIS, RAI (X-bit), Idle, FEAC Codes (Loopback and alarm/status codes)
E3 Alarm Generation:	LOS, OOF, RAI (X-bit);
E3 Alarm Monitoring:	LOS, LOF, AIS, RAI (X-bit), EXZ
T3 FEAC Codes:	Alarm status codes, loopback codes with channel indicator for T1
LED Indicators:	LOS, LOF, ERR, PGM
T1 E1 Alarm Generation	Sync Loss, HDB3 Violation, Carrier Loss, Frame Error, Remote, Distant MF, AIS, BPV Errors, CRC Errors, Frame Errors, Transmit Under Run, Receive Over Run

## Supported Protocols

Channelized Protocols	<p>High-Level Data Link Control (HDLC)</p> <p>Point-to-Point Protocol (PPP), RFC 1662, Multilink PPP (MLPPP), RFC 1990</p> <p>Frame Relay, RFC 1490</p> <p>Multilink support over Frame Relay (FRF.12) and MLPPP</p> <p>ATM IMA</p> <p>GSM, TRAU, GPRS, UMTS over ATM</p> <p>SS7, ISDN, CAS, SS1, SSM</p> <p>V5.x, DCME, FDL (T1 Interface only)</p>
UnChannelized Protocols (Unstructured)	PPP, ATM, Frame Relay

## Mechanical

Dimensions	1.6" high, 9.25" deep, 5.5" wide
Weight	1.75 lbs
Power Supply	Input: 12 Volts (Medical Grade), 3 Amps
Operating temperature	0 C deg to 40 C deg
Storage temperature	- 10 C deg to 70 C deg
Relative humidity	10 % min, 90 % max, non-condensing

## Functional Specifications

DS3/E3 multiplexing from T1 E1

DS3/E3 Playback and Capture

DS3/E3 Protocol Analysis

DS3/E3 Bert Analysis

### For T3 Signal

Up to 56 T1 per unit ( or 2\* 28 )

Up to 42 E1 per port ( or 2\* 21)

For E3 Signal - Up to 32 E1 ( or 2\* 16)

## Buyer's Guide

Item No	Product Description
<a href="#">TT3200</a>	Channelized T3 License for T1
<a href="#">TT3210</a>	Channelized T3 License for E1
<a href="#">EE3200</a>	Optional Channelized E3 license for E1
<a href="#">TE3001</a>	Portable (USB) Dual T3 E3 / T1 E1 Hardware Unit - requires TT3001 or EE3001
<a href="#">TT3001/ EE3001</a>	w/ Analyzer Basic Software
<a href="#">TE3005</a>	Rack Enclosure for T3 E3 System – up to 6 T3 E3s

For more information, please visit [Channelized USB T3 E3 T1 E1 Analyzer](#) webpage.



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