

Tx/Rx Traffic types - Voice, Digits, Tones, Multiframes, Noise, Signaling bits

Active Voice Level Measurement

Oscilloscope and Spectral Views

Precision Delay Measurement Full/Fractional Bert

Error Insertion/Impairment

Record/Playback voice files

Call Capture and Analysis

Automatic/Semi-Automatic Echo Canceller Testing

HDLC Impairment Utility

Protocol Analysis- SS7, ATM, GSM, GPRS, Frame Relay, GR-303, CDMA2000, PPP and UMTS.

Windows Client Server for remote analysis-C++, VB, TCL, C# clients

Emulators- ISDN, HDLC, TRAU

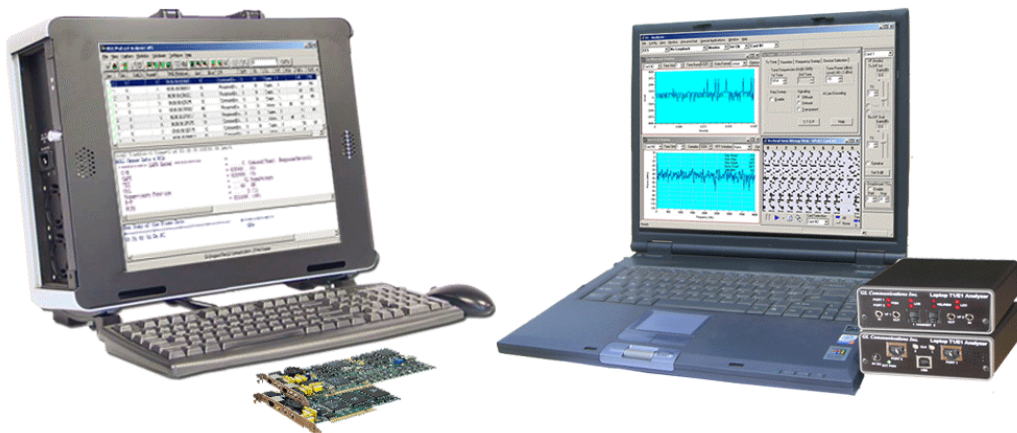
Real-time Strip Chart

Complete Voice Quality Testing solutions

Facility Data Link Analysis

## T1/E1 Analyzer

(Available as USB-Laptop Units & PCI Boards)



### Overview

T1/E1 carriers are more reliable and are used extensively to manage long distance voice traffic/large volume of calls. The available channels (24/32 digitized channels) in a T1/E1 carrier may be either used separately for data, and voice transmissions, or may even be combined for more transmission bandwidth. GL's T1/E1 analyzer provides a wide range of testing equipment and solutions in the form of PCI cards, HD boards, and USB-based portable units. The new generation T1 and E1 (HD versions) can process hundreds of channels or timeslots simultaneously on T1 and E1 lines. These boards are smaller, more efficient, and significantly faster as compared to older PCI versions. USB-based portable units provide convenient features such as portability, USB interface, remote-ability, and scripting. Switch Control feature provides Switch – over ability from T1 or E1.

### Main Features

- Windows 2000/XP operating system support with user-friendly GUI.
- Profile feature allows user to save (store in registry) several user-defined application windows for repeated use, such as a given combination of T1/E1 application windows, sizes, positions, etc. Profiles can be loaded in command line.
- Ability to monitor Power, Frequency, Signaling, Binary Byte Values, and DC Offset.
- 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.
- Supports Active Voice Level measurement on single / multiple timeslots and Non Intrusive Audio Monitoring.
- Precision Delay Measurement, Unframed/Framed, Full/Fractional T1/E1 Bit Error Rate Testing with Detailed Logging, 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.
- Transmit Gaussian Noise, Error Insertion Capabilities.

The following additional features are integrated with T1/E1 analysis (require separate licenses):

- Voice band analysis and emulation across the traffic types (Voice, Digits and tones)
- Protocol analysis and emulation like HDLC, CAS, ISDN, SS7, GSM, GPRS, CDMA etc
- Complete Voice Quality Testing solutions.
- Various Echo testing solutions, Multiplex/Demultiplex and Call Capture Analysis are also available.



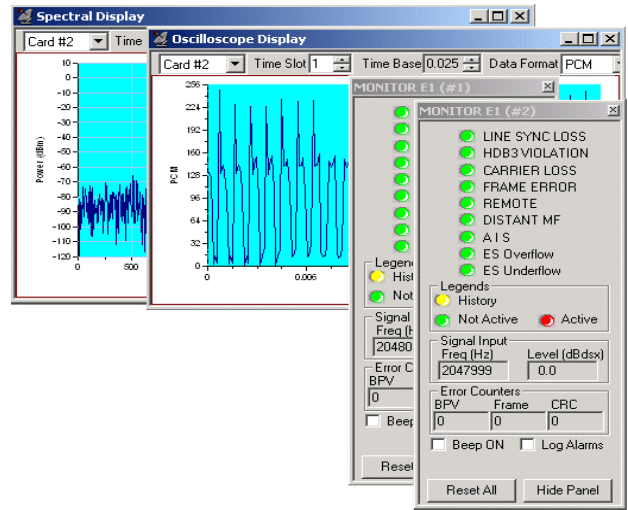
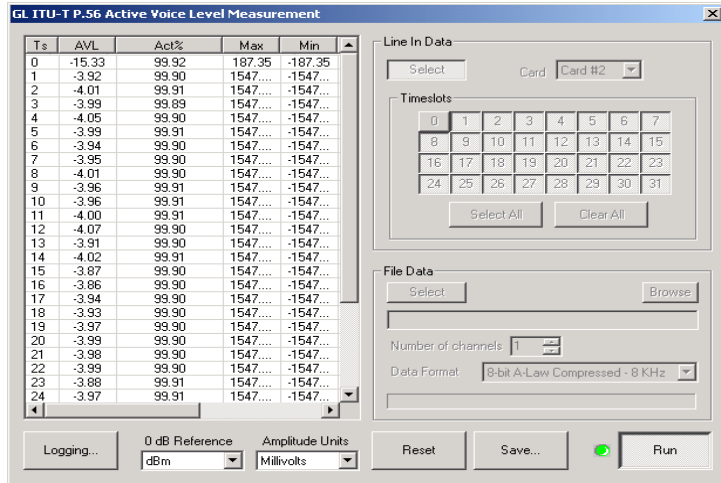
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## Monitoring Applications

The ULTRA T1 (E1) provides in-service monitoring of T1 (E1) circuit connections, alarms, frame errors, sync loss, bipolar violation signals, including received frequency, received signal level, data bytes, and DC offset. Also included are applications such as oscilloscope and spectral display to graphically analyze signals. The ULTRA T1 (E1) 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.

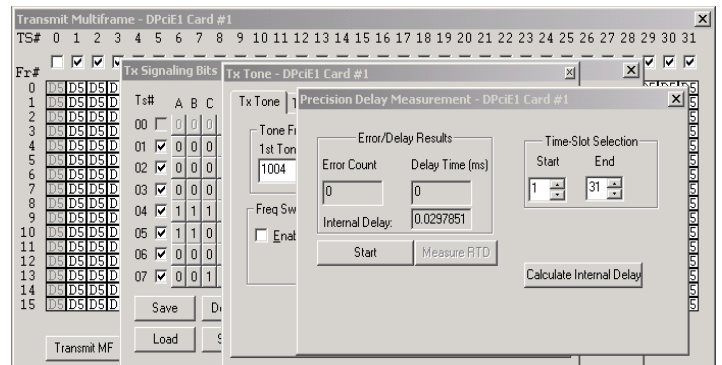
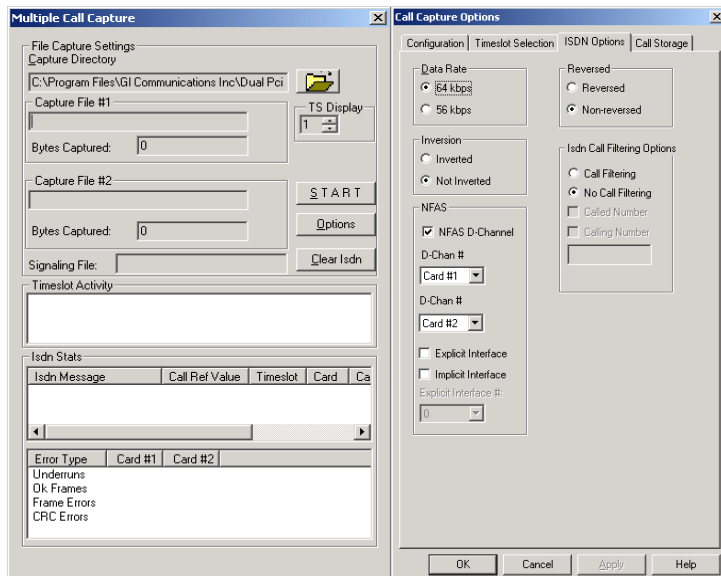


## Active Voice level

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. Once the Active Voice Level has been computed, an "Activity Factor" can also be computed. This is the percentage of time that the signal is judged active.

## Intrusive Testing Applications

A variety of standard data patterns including static and user-defined patterns are available for intrusive testing purposes. The BER Tester generates/detects unframed, framed, and fractional data that are defined in Pseudo Random Bit Sequence (PRBS). Precision Delay Measurement under basic software measures the round trip delay of a system. Measurement is precise and accurate to the microsecond level. Tone / Multiframe / Noise generation and detection, signaling bit manipulation and recording, including error insertion features provide complete signaling ability for T1/E1 analyzer. 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.



## Call Capture and Analysis (Optional Software-XX030)

The T1/E1 Call Capture and Analysis application provides the ability to non-intrusively record calls directly from T1/E1 lines. Calls can be manually captured or automatically triggered for capture from both directions (east and west) of transmission. ISDN and CAS (R1, wink start, MFC-R2) signaling triggers are supported. It includes two applications:

- Multiple Call Capture
- View PCM

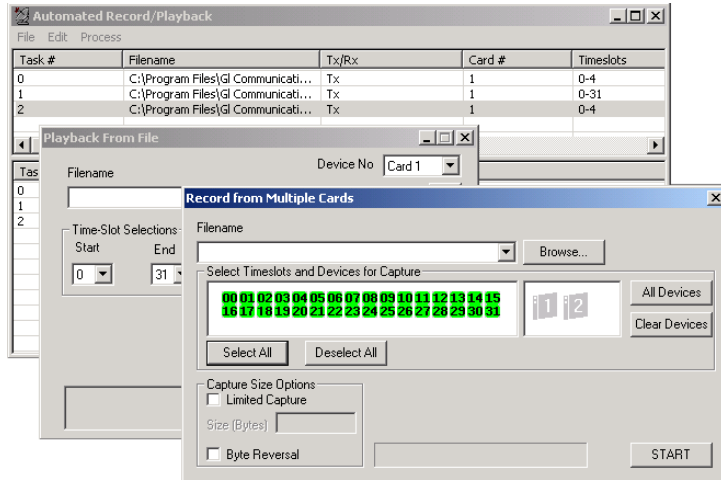
NFAS: NFAS standard is made available for ISDN PRI call processing system. This allows a single D channel to control multiple PRI trunks, resulting in freeing up one channel on each trunk to carry other traffic. NFAS grouping allows number of trunks to be classified into groups, with each group having a unique and identifiable D-Channel. Each NFAS group can consist a trunk containing the primary D-channel and up to 19 additional trunks (supporting a maximum of 479 B-channels).

Captures can be triggered with signaling, tone, ISDN and SS7 messages. SS7 link must be on the same T1/E1 trunk, which sets triggering to capture calls when any SS7 signaling messages are received. The SS7 link must be on the same T1 or E1 trunk. "Call filtering" feature is used to only capture calls with a user-defined called and calling numbers rather than all calls.

## Voice files, Raw data, Digits, and Multiframes Emulation Capture/Transmit DTMF/MF (MFR2-F, MFR2-B) Digits (Optional Software- XX022)

These applications provide the ability to capture/transmit DTMF and MF (along with MFR2-forward and MFR2-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 & load' feature allows the script display to be saved as a text file, loaded from a file or cleared.

These include two basic modes of operation: 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 a onhook to offhook transition at a time slot would mark the beginning of the capture activity.



## Echo Test Solutions (Optional Softwares-XX062, XX063)

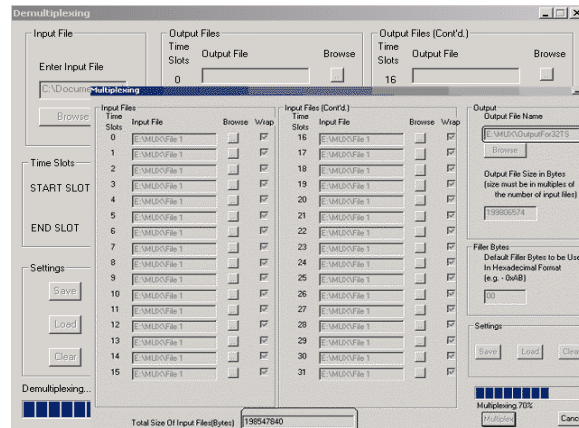
Echo Test Solutions have an application called Measure Loop Delay/ERL that provides the ability to measure / display loop delay and echo return loss (ERL) on one or more time slots.

## Multiplex/ Demultiplex (Optional Softwares- XX040)

Multiplex/Demultiplex Application provides the ability to multiplex individual files on different timeslots into one aggregate output file and the reverse process of demultiplexing one aggregate file into individual timeslot files.

## Signaling Transitions (Optional Softwares-XX050)

The Signaling Transitions Application records all signaling bit changes along with the time-stamped indications for each bit. The application can also provide time stamped indications of all extra bit changes for E1 systems in Data Display.



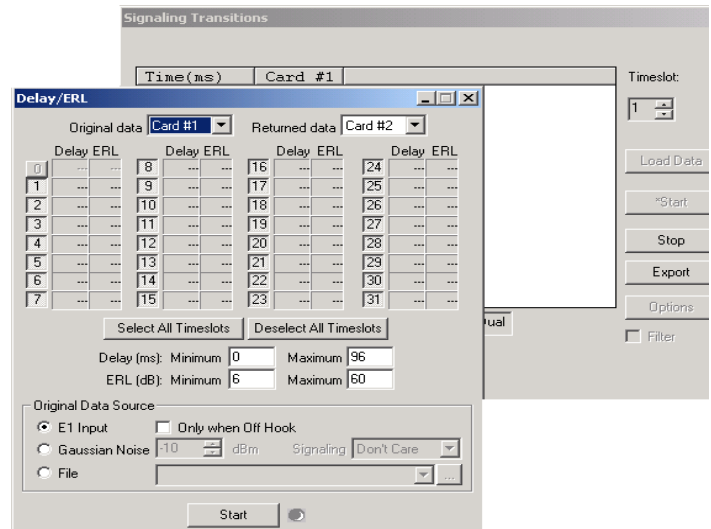
## Transmit (Playback) and Record Voice Files (Optional Software- XX020)

Transmit (Playback) and Record includes transmission or reception of prerecorded voice files, traffic loading applications and protocol analysis. Files of any length can be transmitted continuously (without loss) in user selected contiguous timeslots. Repeated transmission of a single file is also possible.

Transmitting file capability is supported in both D4 (193S) and ESF (193E) framing formats for T1 and CAS and CCS modes in E1.

**Record Data to File** application permits capture of data being transmitted on (any one, or multiple) T1/E1 cards to a file.

The **Automated Record/Playback (ARP)** is an extremely versatile application that runs several transmit or receive operation tasks simultaneously. The ARP application further supports subchannel and multiple subchannel streams for transmission and reception. **Automated Continuous Capture (ACC)** provides the user the flexibility of capturing data as chunks of data in files of the same size instead of one big file. It includes two types of continuous capture options - capture based on file size and capture based on time.



## Protocol Emulation

### ISDN Emulator (Optional Software- XX105)

ISDN Emulator offers a complete solution for testing, troubleshooting devices and networks implementing PRI ISDN. It is useful to test ISDN products designed for either U or S/T interface, including network terminations, Type 1 terminating equipment, and terminal adapters. ISDN equipment includes telephones, switchboards, PBXs, PC cards, Video Conferencing Equipment, Interconnect Systems, switches and routers

### HDLC Analysis & Emulator (Optional Software- XX090)

The HDLC Automated Test System consists of two applications: Transmitter application and Receiver application. Each application has real-time and off-line features. The Transmitter application generates HDLC test frames, transmits them over T1/E1 lines. The Receiver application can receive real-time frames over T1/E1 or can verify an off-line HDL file for correct frame order and data integrity.

### TRAU Analysis & Emulator (Optional Software- XX153)

The TRAU frames that can be located at the BTS, BSC, or (immediately in front of) at the MSC end can be emulated using TRAU ToolBox™ utility. This enables the use of lower rates (16 or 8 kbps) over the A-bis interface instead of the 64 kbps. The information between the Channel Codec Unit (CCU) and the remote TRAU is transferred in “TRAU frames” for every 20 ms, which has both the speech/data and the TRAU associated control signals are transferred. The analysis of the same can be performed using TRAU Analyzer as with other protocol analyses. Once the TRAU session is created, different kinds of audio/voice/digits can be generated and analyzed on GSM call for voice quality analysis.

The image shows two screenshots of protocol analysis software. The top screenshot is titled "TRAU Protocol Analysis TRAU" and displays a table of captured frames with columns for Dev, TS, Su, Frame#, TIME (Difference), Len, Error, TR, TRAU F, Fra, Speech Frame Classification, Tim, and CRC. Below the table, it shows "Hex Dump of the Frame Data" and "HDLc Frame Data + FCS". The bottom screenshot is titled "SS7 Protocol Analysis SS7 E1S1" and displays a table of captured frames with columns for Dev, TS, Su, Frame#, TIME (Relative), Len, Error, BSN, BIB, FSN, FIB, Statu, SLC, DPC, and OPC. It also shows "Hex Dump of the Frame Data" and "HDLc Frame Data + FCS".

The image shows three screenshots of software interfaces. The top screenshot is titled "HDLC On-line Transmit or Off-line to HDL File Test" and shows options for "Generated Frame Length" (2 Octets, 6 Octets, 7-8000 Octets) and "Maximum Length" (256). It also has fields for "Card1", "Time Slots", and "Output HDL File to Save Frames to". The middle screenshot is titled "Trau Tool - GL Communication" and shows a table with columns for Sln, Xn Rate, Device No, Channel No, Sub Channel, Direction, Type, Codec Type, Status, and Profile. The bottom screenshot is titled "ISDN Emulator" and shows "ISDN Setup" with fields for Protocol, Variant, and Protocol End, and buttons for "Link Down", "Link Up", and "L1 Active".

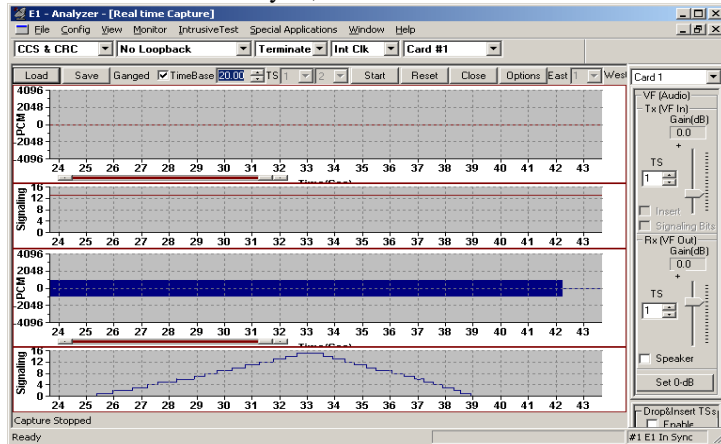
### Protocol Analysis (Optional Software)

Various TDM and wireless protocols can be analyzed in real-time / remote / offline. The following is a list of available protocol analyzers:

- HDLC Analysis and Emulation (Includes Playback, Impairment Utility, Tx and Rx Test utilities)
- ISDN Analysis and Emulation
- TRAU Analysis and Emulation (Includes Playback)
- Sa Bits HDLC Analysis and Emulation (For E1 Interface only)
- Frame Relay Analysis
- SS7 Analysis
- GR-303 Analysis
- V5.x Analysis (For E1 Interface only)
- ATM Analysis
- GSM Analysis
- FDL Analysis (For T1 Interface only)
- GPRS (Gb and IP Gx) Analysis
- CDMA (A1), (A9A11), and (A3A7) Analysis
- PPP Analysis
- UMTS Analysis

## Windows Client Server (Optional Software- XX600+ series)

Windows Client/Server software provides the user the ability of remote operation, automation, and multi-site connectivity. T1/E1 Cards in a server are easily controlled through software clients at remote or local sites via TCP/IP sockets. Connectivity can be via Dial-Up, LAN, WAN, or more typically, the Internet. A Client communicates with the Server via TCP/IP encapsulated commands/tasks/responses. **GL Client** is a Windows-based application that is distributed with GL Server as a sample client application. GL provides samples-working clients written in C++, VB, TCL, and Java. In addition, WCS supports Transmission/Reception of files, digits, DSP operations, FDL/HDLC/TRAU analysis, and more.



## DCME Analyzer (Optional Software- XX007, XX008),

DCME (Digital Circuit Multiplication Equipment) is capable of analyzing bearer, connectivity, bit rotation, audio playback and facsimile control channel analysis. The software aligns to the DCME frame, and the DCME control channel(s) are decoded. The data can be displayed to permit bit level analysis and verification of channel mapping and implementation timing of the DCME protocol.

## FDL Analysis (for T1 Analysis) (Optional Software- XX021)

Facility Data Link (FDL) software consists of several powerful modules that have the ability to transmit, receive, and decode FDL data in many ways like FDL Playback GUI application, FDL View & Save GUI application, FDL Protocol Analyzer GUI application, FDL VB Client for Windows Client Server in both real-time and offline modes. The real-time mode of operation is used to capture stream of HDLC frames on the selected cards and also embedded bit-patterned ESF data link messages. Captured information can be saved to disk for later off-line analysis

The screenshot shows the 'Bit Error Rate Test' window. It displays a table with columns for 'Dev', 'TS', 'SC', 'Bit Error Rate', and 'Bit Error Rate Test: C:\Program Files\GL Comm'. The table contains 16 rows of data. Below the table are buttons for 'Time Slots', 'Start', 'Stop', 'Pattern File', 'Data From File', 'Reset', 'Log', and 'Exit'.

Dev	TS	SC	Bit Error Rate	Bit Error Rate Test: C:\Program Files\GL Comm
1	0	x01	1.000000E+000	noSYNC 0
1	0	x02	1.000000E+000	noSYNC 0
1	1	x01	1.000000E+000	noSYNC 0
1	1	x02	2.685147E-003	SYNC 280
1	2	x01	1.000000E+000	noSYNC 0
1	2	x02	2.684324E-003	SYNC 280
1	3	x01	1.000000E+000	noSYNC 0
1	3	x02	2.685216E-003	SYNC 280
1	4	x01	1.000000E+000	noSYNC 0
1	4	x02	2.686040E-003	SYNC 280

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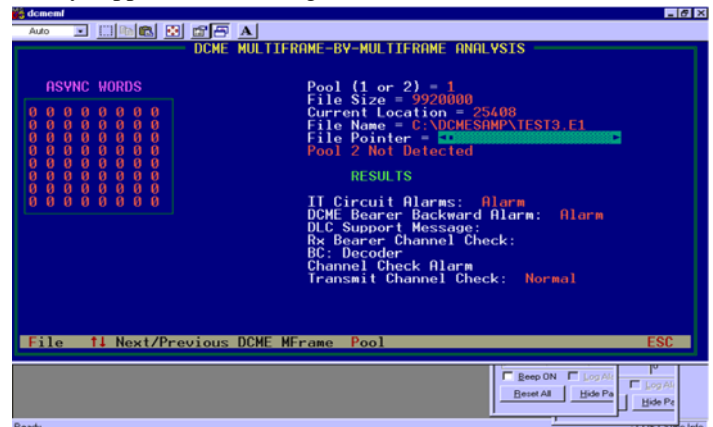
192: set multiframeformat esf #1;
192: get multiframeformat #1;
192: get inwardframerloopback #1;
192: get outwarddriverloopback #1;
192: get inwarddriverloopback #1;
192: get rx interface #1;
192: set tx clock source internal #1;
192: tx server file "bxrcutilityqrss.ber" #1:1 2min;
192: get all alarms #1;
192: ber 64k pattern "qrss" #1 6sec report 2sec;
192: set multiframeformat esf #1;
192: get multiframeformat #1;
192: get inwardframerloopback #1;
192: get outwarddriverloopback #1;
192: get inwarddriverloopback #1;
192: get rx interface #1;
192: set tx clock source internal #1;
192: get all alarms #1;
192: tx server file "bxrcutilityqrss.ber" #1:1 2min;
192: ber 64k pattern "qrss" #1 6sec report 2sec;
  
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## Real-time Strip Chart (Optional Software- XX024),

The 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 Multi-Channel Audio Driver (Optional Software- XX017)

Real-time Multi-Channel Audio Driver option allows almost any software, which normally sends/receives sound to a sound card, to redirect the audio streams to/ from timeslots on a T1 or E1 line. It works with almost any sound software such as Adobe Audition, Windows Media Player, etc. The Real-time Multi-Channel Audio Driver is not supported on the dual and single laptop platforms. It is only supported on the single and dual PCI cards.



## Multi-channel BERT (Optional Software- XX018)

Multi-channel Bit Error Rate Testing (MCBERT) measures correctness of data received on T1/E1 lines/timeslots with stored data in a reference file. The application can work in real-time with data currently being received on T1/E1 lines/timeslots, or off-line with data stored in a file. The on-line T1/E1 testing can be done on full or fractional T1/E1 timeslots. For online analysis, proper device number and timeslots are selected to specify the online data to be verified. Mode of received data (64kbps, n x 64kbps or n x 8kbps) is selected depending upon timeslot specification. Application is started and the MCBERT statistics are observed. For offline analysis, Data is captured into hard disc using applications like Record data to a file. MCBERT window is invoked and the reference file is selected. Captured file is selected using the option "Data from File".

## Physical Interface

USB Connector	USB TYPE B
External Power Connector	6mm DC Powerjack with 2mm center
T1/E1 Connectors	2 RJ48c Connectors
Audio I/O Connectors	4 Tx and Rx mini jacks (3.5mm)
External clock I/O Connectors	2 MCX Coaxial Jacks
Handset Connectors:	2 RJ-22

## USB Requirements

USB Interface	USB 2.0 Compliant Interface
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## External Power Requirements

Power Requirements	+5V @ 1A with power applied to the centering
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## T1/E1 Line Interface

Framing Formats	Unframed, D4 (T1) , ESF(T1), CAS(E1), FAS(E1), CRC4, J1 Hardware Compliant: SLC96, T1ESF ZBTISI
Line Code format	AMI, B8ZS (T1) or HDB3 (E1)
Bert Pattern Generation	Pseudorandom patterns: (63) 2 <sup>6</sup> -1, (511) 2 <sup>9</sup> -1, (2047) 2 <sup>11</sup> -1, (32767) 2 <sup>15</sup> -1, (1048575) 2 <sup>20</sup> -1, (8388607), 2 <sup>23</sup> -1, QRSS. Hardware Compliant: T1 In-Band Loop Code Generation and Detection Fixed patterns: All Ones, All Zeros, 1:1, 1:7, 3 in 24. Hardware Compliant: User pattern of up to 32 bits in length International, National & Extra Bits: User Defined (E1)
Display and Logging	Bit Errors, Bit Error Rate, Error Seconds, Error Free Seconds, %EFS, Severely Error Seconds, % SES, Degraded Minutes, %Dmin, Loss Pattern Sync Count, Loss of Sync Seconds, Available Seconds, %Available Seconds, Unavailable Seconds, Bipolar Violations, BPV Rate, BPV Seconds, BPV Free Seconds, Frame Errors, FE Rate, FE Seconds, FE Free Seconds, with Detailed logging into disk file. Resync In Progress, Loss of Signal, Blue Alarm, Change of Frame Alignment, Bipolar Violation, Frame Error, Carrier Loss, Yellow Alarm, Out of Frame Events Counter, Error Super frame Counter, Bipolar Violations, Remote Alarm, Distant Multiframe Alarm, Signaling All Ones. CAS Multiframe Error.

	CRC4 Error.
Drop and Insert	Any Contiguous set of digital timeslots and/or audio input Hardware Compliant: Any Contiguous Channels
Facility Data Link	T1 ESF Mode: Transmit/Receive Messages, Bit-Oriented Messages, and files.

## Transmit

T1/E1 Interface	Hardware Compliant: >ANSI: T1.403.1995, T1.231-1993, T1.408 AT&T: TR54016, TR62411 ITU: G.703, G.704, G.706, G.736, G.775, G.932, I.431, O.151, Q.161 ITU-T: Recommendation I.432-03/93 B-ISDN User-Network Interface-Physical Layer Specification ETSI: ETS 300 011, ETS 300 166, ETS 300 233, CTR12, CRT4 Japanese: JTG.703, JTI.431, JJ-20.11 (CMI Coding Only)
T1 Output Level	T1: 3.0V + .15V Base to Peak Selectable 0-655Ft Pulse Equalization Setting
E1 Output Level	E1: 3.0V + .10V Base to Peak
Line Buildout Selections	0dB, -7.5dB, -15dB, -22.5dB
Alarm Insertion	Blue, Yellow, Remote, Distant Multiframe Hardware Compliant: Bit 7 Zero Suppression D4 Yellow: 1 in S bit of frame 12 AIS-CI Code ESF-RAI CI Code Receive Carrier Loss: 0's for 2047 or 255 bits
Error Insertion	BPV, Bit Error, Frame Error, CRC Errors, Burst Frames, Fixed Error Rate, Random Error Rate, auto logic from 10-2 to 10-9 for selectable 56K or 64Kps channels.
Internal Clock Specification	Standard: +/- 3ppm Optional: +/- 1ppm
Output Clock Source	Internal, Recovered, External Clock

## Receive

Input Impedance	100 ohms for Terminate and monitor (T1) 120 ohms for Terminate and monitor (E1) > 1K ohms for Bridge
Terminations	Terminate, Monitor, Bridge
T1 Input Frequency	1.544MHz +/- 20KHz

E1 Input Frequency	2.048Mhz +/- 20KHz
Frequency Measurement	+/- 1ppm
Error Detection	<p>Frame Error, CRC Error, BPV Error, Logic Error, Frame Alignment Error</p> <p>Hardware Compliant:</p> <ul style="list-style-type: none"> <li>* 10 or 24 bits for sync time</li> <li>* 2/4, 2/5, or 2/6 frame bit in error frame select</li> <li>* Frame error bit corruption for 1 or 3 frame bits</li> <li>* E-Bit Error</li> <li>* Line Code Violation</li> <li>* Path Code Violation</li> </ul>
Alarm Detection	D4 Yellow Alarm, ESF Yellow Alarm Hardware Compliant: J1 Yellow Alarm
Input Range	<p>T1:</p> <ul style="list-style-type: none"> <li>* Terminate</li> <li>* 0 to 36dB (Long haul)</li> <li>* Monitor</li> <li>* Bridge</li> </ul> <p>Hardware Compliant:</p> <ul style="list-style-type: none"> <li>* Terminate</li> <li>* 0 to 15dB (Limited Long haul)</li> </ul> <p>Monitor</p> <ul style="list-style-type: none"> <li>* 20dB, 26dB, 32dB</li> </ul> <p>E1:</p> <ul style="list-style-type: none"> <li>* Terminate</li> <li>* 0 to 43dB (Long haul)</li> <li>* Monitor</li> <li>* Bridge</li> </ul> <p>Hardware Compliant:</p> <ul style="list-style-type: none"> <li>* Terminate</li> <li>* 0 to 13dB (Short Haul)</li> <li>* Monitor</li> <li>* 20dB, 26dB, 32dB</li> </ul>
Intrinsic Jitter	<p>Meets Jitter Tolerance:</p> <p>Meets AT&amp;T TR 62411 (Dec. 90)</p> <p>Meets ITU-T G.823</p> <p>Jitter Transfer:</p> <p>Meets AT&amp;T TR 62411 (Dec. 90)</p> <p>Level Measurement:</p>

### PCM Interface

Transmit	<p>Synthesized Tone: 15 Hz to 3975 Hz selectable in 1Hz steps, +3.0dBm to -40dBm in 0.1 steps selectable, Frequency sweep.</p> <p>Dual Tone: Single or any combination of tones.</p> <p>Supervision: User defined states of A, B, (C, D) bits.</p> <p>Signaling: DTMF/MF Dialing Digits.</p> <p>File Playback: User created or recorded file.</p> <p>Special Codes: Milliwat Codes, CSU Loop Up/Down Codes.</p>
Receive	<p>Displays for All Channels: Signaling Bits, Power Level, Frequency, Data.</p> <p>Graphical displays: Oscilloscope, Spectral, Spectrogram, Signal-to-Noise</p> <p>Signaling: DTMF/MF Dialed Digit Detection and Analysis</p> <p>Recorder: Record Full/Fractional T1/E1 Timeslots to hard disk file.</p>

### Audio Interface

Transmit	<p>Level: 0.0dBm +/- 0.1dBm</p> <p>Selectable steps in 0.1dB steps Range: +7.0dB to -18.0dB</p> <p>Output Impedance: 600 Ohms nominal</p>
Receive	<p>Audio Monitoring: Built-in Speaker or external speaker attachment.</p> <p>Audio Insertion: Selected DS0 replaced with inserted audio from VF Input with selected gain.</p> <p>Volume Control: User specified software controller</p> <p>Input Impedance: 600 ohms nominal</p>

### External Clock Interface

Input/Output Level	TTL Level tolerant
Input/Output Impedance	50 Ohms nominal
Handset Interface	<p>Handset Current: &gt;2mA</p> <p>Output Level: -46 dBV</p> <p>Output Impedance: 1000 Ohms</p> <p>Input Impedance: 150 Ohms</p>
Propagation Delay Measurement	Up to 2 Seconds
Precision Delay Measurement	Up to 8 Seconds

### Computer Requirement

Pentium III or higher with MS-Windows 2000 or XP, USB 2.0 Compliant Interface
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### Physical Dimensions

Dimension	5" (L) x 4 1/8" (W) x 1 1/2" (H)
Weight	2 lbs.

\*Specifications are subject to change without notice.

**Specifications for HD, PCI T1/E1 Analyzers Cards\*  
Mechanical (Dimensions)**

PCI	T1	E1
Single	7.0" x 4.2" (PCI 2.1 Complaint)	7.0" x 4.2" (PCI 2.1 Complaint)
Dual	9.2" x 4.2" (PCI 2.1 Complaint)	9.2" x 4.2" (PCI 2.1 Complaint)
HD	T1	E1
Dual	7.2" x 4.2" (PCI 2.1 Complaint)	7.2" x 4.2" (PCI 2.1 Complaint)

**Mechanical (Connectors and Jacks)**

PCI/HD	T1/E1
Single/ Dual	RJ48C Connector and Mini Headphone Jacks (1/8" - diameter) for the VF I/O MCX Connector for External Clock Connection 1/8" (3.2 mm) Audio Jacks for VF I/O

**Miscellaneous**

PCI/HD Single/ Dual	T1	E1
Power	0.6 mAmp @ -5V min; 12.0 mAmp @ -5V max 0.76 mAmp @ +5V min; 13.5 mAmp @ +5V max	0.6 mAmp @ -5V min; 12.0 mAmp @ -5V max 0.76 mAmp @ +5V min; 13.5 mAmp @ +5V max
Framing Formats	D4, ESF	CCS Multiframe, CAS Multiframe, and CRC4 Multiframe
Line Coding	B8ZS, AMI	HDB3, AMI
Zero Suppression	B7 Stuffing, Transparent, & B8ZS	
Signaling	Robbed-Bit or Clear Channel (Single and Dual PCI)	

PCI/HD Single/ Dual	T1	E1
Alarm Detection and Generation	Yellow Alarm (B2 Suppressed-2nd MSB) Yellow Alarm (S-Bit) Yellow Alarm (00FF in FDL) Blue Alarm (Framed or Unframed All Ones)	Remote Alarm Distant Multi frame Alarm Signaling All Ones Unframed All Ones
Rx Resync Options	10 Consecutive Ft or FPS bits 24 Consecutive Ft or FPS bits Re sync Using only Ft or FPS bits Re sync Using Both Ft and Fs or FPS and CRC	
Rx Out-Of-Frame Criteria	2 of 4 Framing Bits 2 of 5 Framing Bits	
		CAS Multi frame Sync Criteria Fixed Re sync Criteria Fixed and/or 0000XXXX in Two Consecutive Timeslot 16s Frame Re sync Criteria Fixed Re sync Criteria Fixed and/or Bit 2 in Timeslot 0 of Nonaligned Frames in Error on 3 Consecutive Occasions

## Buyer's Guide:

UTE001 Laptop T1/E1 Hardware USB Base Unit

UTA001 Basic Laptop T1 Software

UEA001 Basic Laptop E1 Software

SA000c High Stability Internal Clock Option

### Hardware

PCT001/PCE001 (Ultra PCI cards) for use with T1 or E1

DPT001/DPE001 (Ultra Dual PCI cards) for use with T1 or E1

HDT001/HDE001 (Ultra HD cards) for use with T1 or E1

UTE001- Laptop T1/E1 Hardware USB Base Unit

SWT001-T1/E1/J1 Intrusive Switch

### Related Software

XX023 E1  $\mu$ -law or T1 A-law Software (Basic Software)

XX010 Application Development Software Kit

XX017 Real-Time T1/E1 Multi-Channel Audio Driver

XX018 Multi-Channel BERT Software

XX019 Transmit /Receive File Utility Software

XX020 Playback and Record data

XX021 FDL Tx/Rx Software for T1 Products

XX022 DTMF/MF Detector and Generator

XX024 Real-Time Strip Chart

XX030 Call Capture & Analysis

SA048 - Goldwave Software

XX031 Call Management Utility

XX050 Signaling Bits Recorder

XX062 Echo Path Delay /Loss Simulation

XX063 Echo Path Delay /Loss Measurement

XX064 Wireless / Landline Echo + Delay + Voice Quality Measurement Accessories

XX065 G.168 Test Suite for Echo Canceller Systems

XX066 Digital Echo Canceller

XX067 Automated Echo Canceller Testing

XX068 Semi-Automated and Scripted Echo Canceller Testing Suite, w/ C++ Client ,w/ LabView Client, w/ Matlab Client

XX069 Automated Voice Enhancement Device (VED) Test Suite per G.160

XX070 MFC/R2 Capture & Analysis for E1 Products

XX600 Basic Client Server Scripted Control SW

XX610 With Transmit and Receive File Capability

w/ DTMF/MF/MFC-R2 + answer/place call capability (XX620)

w/ DSP Capability (XX630)

w/ HDLC Encode/Decode (XX640)

w/ HDLC Remote Capture (XX641)

w/TRAU Engine (GSM – Abis) (XX645)

w/ SA bits Encode/Decode (XX650)

w/ FDL (XX660)

w/Multi-Channel Bert (XX670)

w/Traffic Classifier (XX680)

XX040 Mux/Demux Software

FXMD01 Single Complete Fax & Modem Analysis System – TDM & IP

FXMD05 Floating Complete Fax & Modem Analysis System – TDM & IP

### Protocol Analysis

XX090 T1 or E1 Real-Time HDLC Analysis/Playback/Simulate Software

OLV090 Offline/ Remote HDLC Analysis

XX095 E1 Real-Time SA Bit HDLC Analysis

OLV095 Offline SA Bit HDLC Analyzer

XX100 T1 or E1 Real-Time ISDN Protocol Analyzer

OLV100 Offline/ Remote ISDN Analyzer

XX105 T1 or E1 Real-Time ISDN Protocol Emulator

XX110 E1 Real-Time V5.x Protocol Analyzer

OLV110 Offline/ Remote V5.x Analyzer

XX120 T1 or E1 Real-Time SS7 Protocol Analyzer

OLV120 Offline/ Remote SS7 Analyzer

XX130 T1 or E1 Real-Time Frame Relay Protocol Analyzer

OLV130 Offline/ Remote Frame Relay Analyzer

XX135 T1 or E1 Real-Time PPP Analyzer

OLV135 Offline PPP Analyzer

XX140 Real-Time GR-303 Analysis

OLV140 Offline/ Remote GR303 Analyzer

XX142 T1 or E1 Real-Time CDMA 2000 Protocol Analyzer

OLV142 Offline/ Remote CDMA2000 Analyzer

XX150 T1 or E1 Real-Time GSM Analyzer

OLV150 Offline GSM Analyzer

XX153 T1 E1 TRAU Tool Box™

OLV153 Offline TRAU Analyzer

XX155 T1 or E1 Real-Time GPRS Protocol Analyzer

OLV155 Offline GPRS Analyzer

XX160 T1 or E1 Real-Time ATM Analyzer

OLV160 Offline ATM Analyzer

XX165 T1 or E1 Real-Time UMTS Analyzer

OLV165 Offline UMTS Analyzer

XX170 Network Surveillance Software

\*Specifications for USB Laptop T1/E1 Analyzers