# **T1 E1 TESTERS**

**Back Panel** 

**Front Panel** 

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



PCIe Based Octal and Quad T1 E1 Boards



tScan16<sup>™</sup> High-Density T1 E1 Board



Dual T1 E1 PCIe Express Card



# 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 <u>tScan16<sup>™</sup></u> 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 <u>Octal & Quad T1 E1</u> <u>Analyzer Boards</u> 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. It's designed for the newer PCIe lanes for faster processing and scalability.

The <u>USB-based tProbe<sup>™</sup> T1 E1 VF and Serial Data Analyzer</u> 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<sup>™</sup> also includes ability to add optional boards such as the <u>tProbe<sup>™</sup> Datacom Analyzer</u>, and <u>tProbe<sup>™</sup> FXO-FXS Board</u>.

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 <u>T1 E1 Testing</u> 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, 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 & EIA-530A interfaces
- Compatible with Windows® 10 OS and user friendly real-time software

For more information, please visit <u>T1 E1 Applications</u> webpage.

# GL Communications Inc.

### **T1 E1 Optional Applications**

#### Record / Playback Files - Manual, Automated

#### Multi-Channel BERT

#### Call Capture, & Analysis

- Call Capture and Analysis (CCA)
- Voice Band Analysis (VBA)
- Call Data Records (CDR)
- Audio Processing Utility (APU)

#### WCS Modules

- Tx/Rx files
- DSP operations, Dynamic DSP capability
- FAX Emulation over T1/E1 and Analog Lines

#### Echo Cancellation Testing / Compliance -

- G.168, G.160, G.169 Automated, Manual, Semi-automated Test Suites
- Measure Loop Delay/ERL
- Delay Attenuate Timeslots
- Digital Echo Canceller Simulator

#### **Protocol Analysis**

- Physical Layer Alarms & Errors
- Protocol Identifier, Traffic Classifier
- DDS, ISDN, HDLC, SS7, CAS, GSM, GPRS, UMTS,
- GR303, Frame Relay, ATM, PPP, TRAU, CDMA, DCME, T1,
- E1 Maintenance Data Link (SaHDLC and SSM), SS1
- Facility Data Link , V5.x , Fax, Modem
- Remote and Offline Protocol Analyzer

#### Protocol Emulation (MAPS™)

- ISDN, SS7, ISUP, FXO FXS, CAS, APS
- GSM Abis, GSM A, CAP, MAP, INAP, BICC,
- TRAU, SS1, Multi-link Frame Relay Emulation
- MLPPP, UMTS, Inverse Multiplexing over ATM
- ISDN, LAPD, and IUSP Conformance

#### Centralized Network Surveillance and Monitoring

• NetSurveyorWeb<sup>™</sup>

#### **Centralized Voice and Data Quality Testing**

- VQT
- VQuad Probe
- Webviewer<sup>™</sup>

#### **Record and Playback Applications (XX020)**

**Transmit (Playback) and Record** application allows transmission or reception of pre-recorded 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) is an application, which provides the user with a new method of capturing data. Instead of capturing data from a card in one big block, it is possible to capture seamless chunks of data in files of the same size.

Includes Mux /DeMux application (STE040).

GL's <u>Synchronous Trunk Record-Playback</u> (or STRP) application has both Record and Playback features that permits the user to synchronously record any type of traffic (voice, digits, and tones) on many complete T1 or E1 line (trunk) with accurate timestamp. The **STRP** application records live T1 E1 traffic, and saves it to a file in FILE-TIME structure.

_	mated Re it Process	cord/Playt	back				_0,	<		
Task #		Filename		Tx/Rx	0	ard #	Timeslots			
0			n Files\Gl Communicati	Tx	1		0-4			
1			n Files\Gl Communicati	Tx	1		0-31			
2		C:\Program	n Files\Gl Communicati	Tx	1		0-4			
Pla	yback Fro	m File			⊐×'	3		T1/E1 R	ecord Playback	- • ×
Tas 0 1 2	Filename		Record from Multiple Filename Select Timeslots and 00 01 02 03 04 0 16 17 18 19 20 2	Device No Card 1 Cards Devices for Capture 5 06 07 06 03 10 11 1 1 22 23 24 25 26 27 2 Deselect All		je <b>Paphoki</b> , <u>Racod</u> <b>Lata Mason</b> , <u>Macan Na</u> <b>V</b> Setci Jan 1 Part, Jack, Jack	Played: 44772730000.t1 0 44772230000.t1 0 44772230000.t1 0 44772230000.t1 0 44772730000.t1 0 44772730000.t1 0 44772730000.t1 0	Under 0 0 0 0 0 0 0	Top:         Nor.           Statustion         PV/KV/Duction         0           Stat         Time 00(05/0015 00:34:37)         End Time 00(05/0015 00:34:37)           Bit         Stat         Time 100/05/0015 00:34:37           Bit         Stat         Time 100/05/0015 00:34:37           Bit         Stat         Stat           Bit         Stat         Stat           Bit         Stat         Stat           Bit         Stat         Stat           Stat         Stat         Stat           None         Stat         Stat	0 10 015 10:37:07 ay Time
									Jun	np To Event

**Transmit and Playback Applications** 

#### Multiplex / Demultiplex (STE040)

Multiplex / Demultiplex is an offline application that 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 timeslot files. Sample files are provided voice, data, and fax. Included with Record /Playback software (XX020).

Enter Input File		Slots	iles )utput File			Browse	- Outpr Time Slots 16	It Files ( Outpu		Browse
Browse	Input Fi Time Slots		Browse	Wrap	Input Fil Time Slots	es (Cont'd.) Input File		Browse	Wrap	Output Output File Name
	0	E:VMUXVFile 1		R	16	E:\MUX\File 1			R	E:\MUX\OutputFor32TS
	1	E:\MUX\File 1		R	17	E:VMLDXVFile 1	0		7	Browse
Time Slots	2	E:\MUXVFile 1		R	18	E:\MUX\File 1			ম	Output File Size in Bytes
START SLOT	3	E:\MUX\File 1		4	19	E:VMUXVFile 1	and a		되	(size must be in multiples of
	4	E:\MUXVFile 1		3	20	E:VMUXVFile 1			되	the number of input files
	5	E:\MUX\File 1		3	21	E:VMUXVFile 1			ম	199806574
END SLOT	6	E:\MUX\File 1		7	22	E:VMU0KVFile 1			5	
	7	E:\MUX\File 1		4	23	E:VMUXVFile 1			ন	Filler Bytes
Settings	8	E:\MUX\File 1		R	24	E: MUXVFile 1	NT OF STREET		ম	Default Filler Bytes to be U In Hexadecimal Format
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Save	10	E:\MUXVFile 1		ঘ	26	E: MUXVFile 1			되	00
	11	E:\MUX\File 1		N	27	E: VMUXVFile 1	675976		ম	
Load	12	E: MUXVFile 1		4	28	E:VMUXVFile 1			7	Settings
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Clear	14	E:\MUXVFile 1		3	30	E: MUXVFile 1	3331(23)		ঘ	Save Load Cle
	15	E:\MUX\File 1		ঘ	31	E:VMUXVFile 1	1.5		ন	
emultiplexing		Total Size Of Input File	nu fi	38547840						Multiplexing 70%

**Multiplex/ Demultiplex** 

#### WCS Modules

With additional licenses, WCS also supports transmission/ reception of files/digits, Multi-channel BERT, CAS Emulation, DSP operations, Dynamic DSP capability, SA Bits/ FDL/ HDLC/ TRAU/ MC-MLPPP/ SS7/ ISDN Tx Rx / Multilink-Frame Relay Emulation, and Pulse Mask and Jitter (only in tProbe<sup>™</sup> and Universal T1 E1 Analyzer), to name just a few. A separate brochure provides an overview of the server applications (visit <u>Client Server</u> for details).

#### Fax Emulation and Analysis – 2 to 120 Fax Ports (XXFT0)

The **Fax Emulation** (2 to 120 Fax Ports—XXFT0) 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. The receiving end reconverts the coded image and creates a copy of the document. It supports almost all FAX standards such as V.17, V.27, V.29, V.33, and V.34.

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

FAX_Simulator_E1.gls - GLClient
File Edit Wew Connect Script Log User Help
D # #   X % & @
Connected to GL Server on 'madhusudan' run task 'TaxSimulatofE iStarfExSim': Task 'TaxBi Istated inform task 'TaxFi Istated inform task 'TXFART': OK Inform task 1 "TXFAX #2:1 TIFF_FILE 'WinClientServer\FAX Simulator\send]3.tif CODEC_TYPE 2 MODEM_TYPE 16 MIN_RATE_TYPE 7 MAX_RATE_TYPE INFORMATION TASK 1 "TXFAX #2:1 TIFF_FILE 'WinClientServer\FAX Simulator\send]3.tif CODEC_TYPE 2 MODEM_TYPE 16 MIN_RATE_TYPE 7 MAX_RATE_TYPE OK Inform task 1 "TXFAX #2:1 TIFF_FILE 'WinClientServer\FAX Simulator\secvtor.tif CODEC_TYPE 2 MODEM_TYPE 16 MIN_RATE_TYPE 7 MAX_RATE_TYPE 16 PAGESUZE_TYPE 16 RESOLUTION_TYPE 16 ECMENABLED 0": OK Task 1: Fax Session Completed, PortNo: 1, TS: 1 Task 1: Fax Session Completed, PortNo: 2, TS: 1
I //* FAX Simulator Commands *//
//* FAX Simulator Commands *// //* Single FAX session in a task using A law cudec type *//
//" Single FAX session in a task using A law codec type "//
//* Single FAX session in a task using A law codec type *// run task "FaxSimulatorE1:StartFaxSim";
//* Single FXX session in a task using A law codec type *// run task 'FaxSimulatorE1:StartFaxSim': inform task 1 "START"; inform task 1 "TXFAX #1:1 TIFF_FILE *WinClientServer(FAX Simulator(send)3.50° CODEC_TYPE 2 MODEM_TYPE 16 MIN_RATE_TYPE 7 MAX_RATE_TYPE
<pre>//* Single FAX session in a task using A law codec type *// run task *FaxSimulatorE1:StartFaxSim*; inform task 1 "START"; inform task 1 "START"; inform task 1 "XFAX #1:1 TIFF_FILE "WinClientServer(FAX Simulator(send)3.tif" CODEC_TYPE 2 MODEM_TYPE 16 MIN_RATE_TYPE 7 MAX_RATE_TYPE 16 PAGESIZE_TYPE 16 ESCUUTION_TYPE 16 ECMENABLED 0*; inform task 1 "PGFAX #2:1 TIFF_FILE "WinClientServer(FAX Simulator(Recv/rev.tif" CODEC_TYPE 2 MODEM_TYPE 16 MIN_RATE_TYPE 7</pre>

**FAX Emulator** 

## Multi-Channel BERT (XX018)

Multi-Channel Bit Error Rate Testing (MCBERT) is a versatile application that measures correctness of data transmitted and received on T1 E1 lines/timeslots with stored data in a reference file. The application can work in real-time 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. A companion program like file playback can be sending the reference file or files.

	tal Info immary		l Sync Status	Sync Ch Count	Error Cou		Logic Error Count	Test Start			Tes Durati			
All char	iels ->	Al	SYNC	48	0		0	18:06:0	5		00:00	:34		
5			esize columns											
Dev	TS	SCh	Average Bit Error Rate	Current Bit Error Rate	Error Status	SyncLoss Count	Error Count	Error Free Seconds	Error Seconds	SyncLoss Seconds	Severely En Seconds	Available Seconds	Unavailable Seconds	^
	0		0	0	SYNC	0	0	34	0	0	0	34	0	
	1		0	0	SYNC	0	0	34	0	0	0	34	0	
	2		0	0	SYNC	0	0	34	0	0	0	34	0	
	3		0	0	SYNC	0	0	34	0	0	0	34	0	
	4		0	0	SYNC	0	0	34	0	0	0	34	0	
	5		0	0	SYNC	0	0	34	0	0	0	34	0	
	6		0	0	SYNC	0	0	34	0	0	0	34	0	
	7		0	0	SYNC	0	0	34	0	0	0	34	0	
	8		0	0	SYNC	0	0	34	0	0	0	34	0	
	9		0	0	SYNC	0	0	34	0	0	0	34	0	
	10		0	0	SYNC	0	0	34	0	0	0	34	0	
	11		0	0	SYNC	0	0	34	0	0	0	34	0	
	12		0	0	SYNC	0	0	34	0	0	0	34	0	
	13		0	0	SYNC	0	0	34	0	0	0	34	0	
	14		0	0	SYNC	0	0	34	0	0	0	34	0	
	15		0	0	SYNC	0	0	34	0	0	0	34	0	
	16		0	0	SYNC	0	0	34	0	0	0	34	0	
	17		0	0	SYNC	0	0	34	0	0	0	34	0	
	18		0	0	SYNC	0	0	34	0	0	0	34	0	
	10		0	0	CVAIC.	0	0	24	0	0	0	24	0	_
Rx,Tx, q	or Both			Pattern					Tx Underr	un Count:	0		_	
Rx & T	x 🔻	Ins	ert Error	QRSS	-					onfiguration		t Shift Subc	h	

**Multi-Channel BERT** 

#### Document Number: T1 E1-01

## Call Capture and Analysis (XX031)

The <u>Call Capture and Analysis</u> (CCA) application non-intrusively monitors, and records hundreds of calls directly from T1 E1 lines. Automatic call capturing can be triggered based on signaling (CAS -R1, wink start, MFC-R2), message (ISDN, SS7) & traffic (voice, fax, modem, tones, digits...), and any signal based on power.

All call data are captured including signaling bits, voiceband data, signaling protocol data (e.g. DTMF or MF digits), various types of traffic such as fax, modem, voice, and any type of signal. 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.

As an enhancement to this application, Multiple Call Capture & Analysis (Multi-CCA) is designed to perform the all of the CCA functions, simultaneously from multiple T1 E1 lines.

Once the capture trigger type is selected, users can control and run multiple capture instances on different T1 E1 ports from a single GUI. It allows users to log captured events in CSV or binary files along with the pcm files.

Multiple Call Capture - tProbeT1 C	ard #1 and #2	
File Capture Settings		
C:\Program Files\GL Communication	ns Inc\tProbe T1 Analyzer	
Capture File 1: Card #1 - Washing	ton'	TS Display -
554000_555000_Nov29_Washing	ton0100_1_2011_1129	
Bytes Captured: 50664		
Capture File 2: Card #2 - 'New Yor	WRT Voiceband Analyzer - VBA F Profiles Logging Help	robe 1 — 🗆 X
554000_555000_Nov29_New Yor	Input File	Directory Start Elapsed ASL AF RMS
Bytes Captured: 50664	W 76856	12325 C.VProgram Fil 03/13/201818.20.50 60.478 -12.145582 32.588167 17.014980 12325 C.VProgram Fil 03/13/201818.20.50 60.478 -12.105252 32.201631 -17.027483 122424 C.VProgram Fil 03/13/201818.20.49 60.478 -12.142121 23.554140 -17.016569 RUN
	Line Echo W 76856	12324C.\Program Fil03/13/2018 18 20.49 60.478 -12 102381 32 15309 -17.028706 12923C\Program Fil03/13/2018 18 20.49 60.478 -12 138366 32 516968 -17.017266
Signaling File:554000_55500	Traffic Classifier W 76856	12232C.Nrogram Fil03/13/2018 18:20.49 60.478 -12.03948 32.125930 -17.02921 12322C.NProgram Fil03/13/2018 18:20.49 60.478 -12.134465 32.478441 -17.018513 <u>S</u> etup
Timeslot Activity	FaxScan W 76856	12822 C.V.Program Fil 03/13/2018 18:20:49 60:478 -12:09431 32:091523 -17:031027 12822 C.V.Program Fil 03/13/2018 18:20:49 60:478 -12:034931 32:091523 -17:031027 12921
00 01 02 03 04 05 06 07 08 09 16 17 18 19 20 21 22 23	Tone Decoder W 76856 E 76856	12921 C\Program Fil 03/13/2018 18:20:49 60:478 -12.091391 32.057267 -17.032126 12920 C\Program Fil 03/13/2018 18:20:49 60:478 -12.127557 32.410785 -17.020662
	Flight-Click to E 76856	
ISDN Stats	E 76856	1 Probe ID Call ID Orig Calling Called Start Released Duration Rel Code A
Isdn Message Call Ref	E 76856	I ISDN 180313181715-76 East(#2:17) 8556782117 7685612917 03/13/2018 18:21:51 03/13/2018 18:22:52 00:01:01 REL_COMPLETE
ISDN_MSGTYPE_ALE 22 ISDN_MSGTYPE_ALE 23	W 76856 E 76856	ISDN 180313181715-74 East(#2:14) 8556782114 7685612914 03/13/2018 18:21:50 03/13/2018 18:22:52 00:01:02 REL_COMPLETE
ISDN_MSGTTFE_ALE 23	W 76856 E 76856	ISDN 180313181715-72 East#212) 8556782112 7685612912 03/13/201818:21:50 03/13/201818:22:52 00:01:02 REL_COMPLETE
•	W 76856 E 76856	ISDN 180313181715-70 East(#210) 8556782110 7685612910 03/13/201818:21:50 03/13/201818:22:52 00:01:02 REL_COMPLETE
Error Type Card #1 Card #:	More Modules <	ISDN 180313181715-68 Eav(#2.8) 8556782108 7685612908 03/13/2018 18:21:50 03/13/2018 18:22:51 00:01:01 REL_COMPLETE
Underruns 0 1	CAccess Point #1	ISDN 180313181715-66 East(#2.6) 8556782106 7685612906 03/13/2018 18:21:50 03/13/2018 18:22:51 00:01:01 REL_COMPLETE ISDN 180313181715-65 East(#2:5) 8556782105 7685612905 03/13/2018 18:21:50 03/13/2018 18:22:51 00:01:01 REL_COMPLETE
Ok Frames 41 4	A-Law 💌	ISDN 180313181715-64 East(#2-4) 8555782104 7685612904 03/13/201818:21:50 03/13/201818:22:51 00:01:01 REL_COMPLETE ISDN 180313181715-42 East(#2-12) 8556782112 7695612912 03/13/201818:20:49 03/13/201818:21:50 00:01:01 REL_COMPLETE
Frame Errors 0 0 CRC Errors 0 0	E1 File	
	W1 File	Configure D Run Clear Diploy
		Cied Diplay
	Running Automatic Log: disabled	Running ISDN Scanning directories

**Call Capture and Analysis Applications** 

CC No	Capture Name	West(Port)	East(Port)	Timeslots	Storage	Location		Trigger Option	Action
1	CCA1	1	2	0-10	C:\	Program Files\GL Communications Inc\tPro	be T1 Analyzer	Edit	Abort
2	CCA2	1	2	11-21	C:\	Program Files\GL Communications Inc\tPro	be T1 Analyzer	Edit	Abort
TS	TS Status		We	st Filename	Bytes Cap	East Filename	Bytes Cap		Signaling Fil
)	Capturing	C:\Program Fil	es\GL Commu	nications	1023408	C:\Program Files\GL Communications	1023408	C:\Program Files\GL C	ommunications.
1	Capturing	C:\Program Fil			1023408	C:\Program Files\GL Communications	1023408	C:\Program Files\GL C	
2	Capturing	C:\Program Fil			1023408	C:\Program Files\GL Communications	1023408	C:\Program Files\GL C	
3	Capturing	C:\Program Fil			1023408	C:\Program Files\GL Communications	1023408	C:\Program Files\GL C	
4	Capturing	C:\Program Fil			1023408	C:\Program Files\GL Communications	1023408	C:\Program Files\GL C	
5	Capturing	C:\Program Fil	es\GL Commu	nications	1023408	C:\Program Files\GL Communications	1023408	C:\Program Files\GL C	ommunications
6	Capturing	C:\Program Fil	es\GL Commu	nications	1023408	C:\Program Files\GL Communications	1023408	C:\Program Files\GL C	ommunications
7	Capturing	C:\Program Fil	es\GL Commu	nications	1023408	C:\Program Files\GL Communications	1023408	C:\Program Files\GL C	ommunications
8	Capturing	C:\Program Fil	es\GL Commu	nications	1023408	C:\Program Files\GL Communications	1023408	C:\Program Files\GL C	ommunications
9	Capturing	C:\Program Fil	es\GL Commu	nications	1023408	C:\Program Files\GL Communications	1023408	C:\Program Files\GL C	ommunications
10	Capturing	C:\Program Fil	es\GL Commu	nications	1023408	C:\Program Files\GL Communications	1023408	C:\Program Files\GL C	
11	Ide				0		0		-
12	Ide			-	0		0		-
13	Ide			-	0	-	0		-
14	Ide			-	0		0		-
15	Ide				0		0		
<li>I</li>									1.151

**MultiCCA Application** 

#### Voice Band Analyzer (VBA) (VBA032)

<u>Voice Band Analyzer</u> (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 Classification. 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. Includes PKB070 Audio Processing Utility (APU).

## Call Data Records (CDR032)

GL's <u>CDR Analysis System</u> works with CCA and VBA to capture all calls and all events (including voice quality) during the call, on any network type such as TDM, IP, or Wireless.

The signaling, alarms, and traffic capture over IP or TDM lines is performed with capturing tools such as <u>**T1 E1 Call Capture and Analy-</u>** <u>sis</u> or <u>**PacketScan™**</u>. The system allows one to troubleshoot call failures, identify "problem calls", "call-of-interest", and provide insight into the overall performance.</u>

**Retrieving Calls of Interest:** With an accompanying tool - GL's **Advanced Excel® Add-in for Filtering**, the generated CSV call records can be processed and analyzed more comprehensively to get the calls of interest. The generated measurements along with the recorded voice files of a particular call are combined in the Excel® Addin. It also allows the users to do custom filtering based on any of call parameters, measurements f(ASL, AF, % Digits, %Voice, Mid-call-digits,...), and signaling messages (ISDN Signaling, CAS Signaling, Release Codes, Call Duration, Call Events,...). The selected call from the filtered records in Excel® Addin can be played back, downloaded, call statisitics can be printed or stored as PDF files for further scrutiny.

	А		в	С	D	E		F			G		н	1	J	К	L	M	N	0
6	Probe ID		-	-	Side 2	-				Released	•		Duration				_			-
	/oIPProbe					SIP	11/30/20	11 10.0			11 10.		00:00:58						61	
-	/oIPProbe					SIP	11/30/20						00:00:58						30	-
-	/oIPProbe					SIP	11/30/20						00:00:52						14	
-	/oIPProbe					SIP	11/30/20						00:01:00						32	
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Filtering Required Calls from Large Set of Records

#### **Protocol Analysis**

Various TDM, IP, and Wireless protocols can be analyzed in real-time, remote, or offline modes. All GL's protocol analyzers have a common framework. The following is a list of available protocol analyzers:

- HDLC XX090 (Includes Playback, Impairment , Tx and Rx)
- TRAU XX153 (Includes Playback, Tx and Rx)
- Sa Bits HDLC and SSM Analysis XX095 (E1 Maintenance Data Link)
- Physical Layer Alarms & Errors
- ISDN XX100
- Frame Relay XX130
- SS7 XX120
- GR-303 XX140
- ATM IMA XX160
- ML-PPP XX135
- UMTS XX165
- FDL (For T1 only) XX021
- V5.x (For E1 only) XX110
- GSM XX150
- GPRS (Gb) XX155
- CDMA (A1, A3A7) XX142
- DCME DC007, DC008
- CAS XX092
- SS1 XX626
- DDS XX102

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**Protocol Analysis** 

#### **Protocol Identifier (XX089)**

Identify protocols on T1 E1 lineas and their timeslot or subchannel locations. Further detailed analysis can be achieved by individual Protocol Analyzers.

	col Classifier jews <u>H</u> elp		_ <b>_</b> X
	Protocol S		ical View
TS	Port 1	Port 2	<u> </u>
	SubChannel	SubChannel	
0			
1	ISDN	ISDN	
2	FRAMERELAY	FRAMERELAY	
3	TRAU TRAU	SS7	
4	TRAU TRAU	SS7	
5	TRAU TRAU	PPP	
6		TRAU TRAU	
7		TRAU TRAU	
8		TRAU TRAU	
9			_
10 11	HDLC	HDLC	
12	MTP2	HDLC	
13	0112	note	
14			
15			
16	HDLC	LAPD	
			×
	Reset Stop	Re	fresh

**Protocol Classifier & Identifier** 

## DCME Analyzer (DC007, DC008)

DCME, or Digital Circuit Multiplication Equipment, is used to compress voice and voiceband data for transmission over satellite. This application is capable of analyzing DCME bearer traffic, connectivity between uncompressed and compressed bearers, bit rotation, and facsimile control channel analysis. Additional detailed information is available in a separate brochure.

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34	14 15	Ŭ	24 25	22 23 24 25	Ŭ	45 4	4 V 5 V 6 V		LEGEND For Column 'T'
123456789 10	1 2	Ŭ	26 27	26 27	Ŭ	47 4	7 Ŭ 8 U	т	T = Transparent Channel
?	123456789	Ŭ	28 29	28 29	Ŭ	49 4			
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11 12 13	?	Ŭ	32 33	32 33	Ŭ	53 5	3 U	Ť	
13 14	9 10	Ŭ	34 35	34 35	Ŭ	55 5	5 Ŭ	F	
15	11 16	ů	36 37	36 37	Ŭ	56 5 57 5 58 5	7 U 8 U	8	B = Bit Bank U = Unconnected
10 17 18	17	Ŭ	38	38 38 39	Ŭ	59 5	о 9 U 0 U		4 = Voice Channel in 4-Bit Mode 3 = Voice Channel in 3-Bit Mode
19	18 19	Ŭ	39 40	40	Ŭ	61 6		ž	2 = Voice Channel in 2-Bit Mode
20 Ch	20 ange	U I	41 DCME	41 Fran	U ne	PDn D	CME	MF	Frame Legend Data ESC

**DCME Analyzer** 

#### Echo Test Solutions (XX062, XX063, XX066)

Echo Test Solutions are a set of applications that measure and test line and acoustic echo in TDM and VoIP networks. This includes **Measure Loop Delay/ERL** that provides the ability to measure / display loop delay and echo return loss (ERL) on one or more time slots. **Delay Attenuate Timeslots** allows users to apply delay, attenuation, and/or filtering to a received signal on any number of timeslots. The **Digital Echo Canceller** is a true EC that models the echo path characteristics including a graphical impulse response, echo path delay, echo path loss, and other useful statistics. **GLC View** is a waveform-viewer application used to view previously captured raw data files and their corresponding power.

Automated and Scripted G.168 and G.167 Compliance Test solutions are also available.

Delay/Attenuate 1	'imeslots		
Timeslots	Rx Data Source		
Start 🛛 🚊	Card Card #1 💌 Decode u-	Law 🔽	
End 23 🛫	Delay 100 ms Gain -1	0 dB Filter Browse None	
Rx Delay Range		GL Digital Echo Canceller Simulator	
🖸 18 - 200 ms	0 100 200 -40		
C 0 - 2 sec	Mix Speech	Provisioning View Statistics Logging About	Rin Source E1 In Card #1
Configuration -	None File	Langth 129 V Offact 0 (ma)	File C:\Program Files\GI Communications DeMux
Save	C Speech from File	Dauble Tell Dataster	Rout Destination
Load	C Speech from VF Input Gain C Timeslot 0 😤	Enable ON Sensitivity 10922	E1 Out Card #2
Load		Defaults OFF Sensitivity 21844	File C:\Program Files\GI Communications   Mux
	Mix Noise	Non-Linear Processor	Sin Source E1 In Card #2
	None     File	Defaulte Attenuation 12 - (dR)	File C:\Program Files\GI Communications DeMux
Processing Options	C Noise from File	Smoothness 8	Sout Destination
	C White Noise Gain G	Tone Detector	E1 Out Card #1
		F Enable Detection Threshold 20 (dB)	File C:\Program Files\GI Communications Mux
	Tx Destination	Comfort Noise Generator	Timeslots
	Card Card #1 💌 Encode u-La	Finable Power Level 0 (dB)	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 Select All
		· · · · · · · · · · · · · · · · · · ·	16 17 18 19 20 21 22 23 Clear All
- Supe Start		Reset All H Save All H Clear Log Display	24 25 26 27 28 29 30 31
Sync Start with Rx Burst	<u>S</u> top Tx=2304, Rx=2326	Enable Echo Enable Enable Enable	
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**Echo Test Solutions** 

#### **Protocol Emulation**

**ISDN Emulator (XX105)** - A very simple to run GUI, that offers a complete solution for testing PRI ISDN devices and networks . All ISDN variants are supported.

**Client-server based ISDN and LAPD Emulator** (XX629) emulates ISDN calls over T1 E1 links, performing various other tasks on remote clients.

#### HDLC Automated Test System (XX090, XX640, XX641, XX634)

The **HDLC Automated Test System** generates HDLC test frames, transmits them over T1 E1 lines and receives real-time frames over T1 E1 lines. GL also provides client–server based HDLC capture, playback, emulation, & analysis modules.

HDLC Playback application is used to transmit HDLC frames in the pre-recorded files over T1 E1 channels. HDLC Link Impairment Utility (HLIU) offers various options to "impair" (inject errors) specific HDLC frames of a real time HDLC frame stream.

#### TRAU Emulator (XX153, XX646, XX645)

**TRAU Toolbox™** can be used to create, monitor, and terminate multiple TRAU/GSM traffic (TRAU sessions). **TRAU Traffic Playback** is used to generate TRAU traffic on T1 E1, providing the ability to playback the recorded TRAU HDL files using TRAU Analyzer on selected/ all subchannels of T1/E1 lines.

WCS TRAU Tx/Rx Test can simulate & analyze TRAU/CCU (BTS or BSC end) on T1 E1. Another WCS based TRAU Record/Playback (Traufunc) module allows capture/playback of TRAU traffic.

**Multi-link Frame Relay Emulation - (XX655)** or MFR, is similar to Multi-Link PPP, and both are a form of inverse multiplexing. FR and MFR can be emulated and analyzed using GL's client-server based MFR and FR Emulation software module.

**Multiplexing for ATM Emulation (XX654)** - Inverse Multiplexing for ATM (IMA) can be emulated on up to 16 T1 E1 lines using GL's client-server based IMA Emulation software.

T1 Facility Data Link Emulation (XX021, XX660) software consists of several powerful modules such as FDL Playback, FDL View & Save, FDL Protocol Analyzer, and FDL VB Client that have the ability to transmit, receive, and decode FDL data in both real-time and offline modes.

**MC-MLPPP Emulation (XX635 and XX636)** simulates MC-MLPPP and PPP protocols over T1 E1 links. The unit is capable of generating and receiving MC-MLPPP/PPP traffic (with or without impairments).

**SS1 Emulation (XX626)** -SS1 Analyzer & Dialer application provides detailed analysis and emulation capability of SS1 (Selective Signlaing-1) tone based dialing system. It provides the ability to setup and dial tone sequences that make up SS1 dial digits.

**MAPS-GSM A & Abis** (XX692, XX693) Emulator is an advanced protocol simulator/tester for GSM simulation over A & Abis Interface that can simulate BSSMAP, DTAP, BTSM messages and signaling specification as defined by 3GPP standards.

MAPS<sup>™</sup> ISDN (XX648) and ISDN Conformance Suite(XX642) are advanced ISDN protocol simulators that can simulate ISDN and LAPD call states over T1 E1 as per Q.931 and Q.921 standards.

MAPS<sup>™</sup> CAP (XX696) can emulate CAP (CAMEL Application Part) supplementary services such as unified messaging, prepaid, toll-free (Freephone), and fraud control. These services are available in TDM based GSM, GPRS, UMTS over TDM and IP networks.

MAPS<sup>™</sup> ISUP (XX649) and ISUP Conformance Suite (XX647) are advanced ISUP protocol simulators that can test Service Switching Points (SSPs) with ISUP signaling as per Q.761-764 and Q.784.

MAPS<sup>™</sup> MAP (XX649) is an advanced protocol simulator to simulate MAP messages and signaling over GSM-D interface in TDM (T1 E1) as defined by 3GPP standards.

MAPS<sup>™</sup> MLPPP Conformance Testing (XX652) is an advanced protocol simulator to simulate for MLPPP/PPP simulation over TDM (T1 E1). The tester can simulate MLPPP signaling as defined in the RFC1661 specifications.



### Protocol Emulation (Contd.)

MAPS<sup>™</sup> FXO FXS (XX624) GL's MAPS<sup>™</sup> FXO FXS emulates functions of Foreign Exchange Subscriber (FXS) by analog phone lines and Foreign Exchange Office (FXO) by phones using the FXO and FXS ports on a tProbe<sup>™</sup>. MAPS<sup>™</sup> provides a facility to place call/answer incoming call on both FXO and FXS ports.

MAPS<sup>™</sup> INAP (XX656) GL's MAPS<sup>™</sup> INAP Emulator can emulate IN services available in TDM based SS7 network. INAP information flow is defined between functional entities such as Service Control Function (SCF) and Service Switching Function (SSF) distributed across network executing services.

#### Channel Associated Signaling (CAS) Simulation (XX625)

It is an optional application that simulates any user defined CAS protocol by providing signaling bit transitions and forward/backward frequency tones/digits.

MAPS<sup>™</sup> BT IUP (XX682) is an advanced simulator used to simulate UK specific SS7 IUP in BT networks. It is designed to simulate Incoming and Outgoing Networks via Interconnect route as defined by the PNO-ISC/INFO/004(IUP) and TGS/SPEC/006 specifications.

## **Centralized Network Surveillance System**

GL's **Network Monitoring and Diagnostic Systems** can be used for billing verification, remote protocol analysis, and traffic engineering. GL's T1 E1 / T3 E3 / OC-3 /OC-12 Analyzer probes provide the basis for a network wide management of TDM and Optical lines, including line health, non-intrusive diagnostics, and much more.

- These probes include intelligent protocol analyzers that monitor many protocols (ISDN, SS7, GSM, TRAU, ...) non-intrusively, extract relevant contents, and forwards call detail records (CDRs) and statistics to a central NMS for storage, display, and control
- Records are stored into a relational database (Oracle, DB2, Sybase, Microsoft Access....) using ODBC. This provides a user friendly interface to query and display database custom records.
- The web-based client **NetSurveyorWeb™** connected to T1/E1 probes through a web server facilitates result display using a web interface as shown in the screenshot. With this, one can view real-time CDR data , navigate through records, filter the required call records (based on the start time and date of each call) through a simple web browser. Custom Filter option allows users to filter the call records based on Called number, Calling number, OPC, and DPC criteria.

For more information, please visit <u>NetSurveyorWeb™</u> webpage.



## Voice, Fax, and Data Quality Monitoring System

GL's **Network-wide Voice, Fax, and Data Quality system** testing solution provides a complete solution for the telecommunication operators to verify the quality of their service, therefore to provide a better service for the customer.

The solution consists of:

Distributed VQuad<sup>™</sup> Nodes - These nodes control individual or multiple wireless, landline or VoIP telephony terminals.

**Associated Measurement Applications with VQuad™ Node** - Various GL applications work with VQuad<sup>™</sup>- DUAL UTA to provide additional test and measuring capabilities. Some of these applications include

- Voice Quality Testing (VQT) software for analysis according to widely accepted ITU (International Telecommunications Union) voice comparison algorithms
- Echo Measurement Utility (EMU) for echo and delay measurements
- Voice-band Analyzer (VBA) for monitoring voice band traffic and so on
- GLInsight<sup>™</sup> or FaxScan<sup>™</sup> for detail fax and modem analysis

**Remote Client WebViewer™** - for web based controlling and monitoring VQuad<sup>™</sup> nodes over the entire network. With this, you can remotely control any node within network, view status of entire network, and access all results associated with the VQuad<sup>™</sup> test including Call Control (Call Failure and Call Dropped), Voice Quality, Round Trip Delay, One Way Delay, Echo Measurement, Data Testing, Fax Events from PC or Mobile Device.

For more information, please visit Complete VQT Solutions webpage.



XX010Application Development Tool Kit (Programmer's Guide)XX013Multi-Channel BERT SoftwareXX020Record/Playback File SoftwareXX021FDL Software for ESF (TI only)XX022DTMF/MF Detector & Generator SoftwareXX023TI A-law or E1 µ-law SoftwareXX021Synchronous Trunk Record PlaybackXX021Enhanced T1 / EI Call Capture/Analysis SoftwareXX021TI or E1 Call Capture/Analysis SoftwareXX021Call Data RecordsXX023Call Data RecordsXX031Tu or E1 Call Capture/Analysis Software w/ Traffic Activated Trigger OptionXX023Call Data RecordsXX031Tu or Wire Etch Analysis for VBAXX032Traffic Analysis for VBAXX033Traffic Analysis for VBAXX034Fax Demodulator / DecoderXX035Dual VF X rax (Only for tProbe) (Included with Basic Software)XX036Pulse Shape & Jitter Measurement (Included with Basic Software)XX031Trasmit/Detect digits (included with Basic Software)XX035YI File based Record/PlaybackXX036V / SI Signaling Analyzer and DialerXX037W / SSI Signaling Analyzer and DialerXX038W / SSI Signaling Analyzer and DialerXX039W / Drasmit/Detect digits (included with Basic Software)XX036W / SSI Signaling Analyzer and DialerXX037W / SSI Signaling Analyzer and DialerXX038W / Drasmit/Detect digits (Included Xith Basic Software)XX039W / SSI Signaling Analyzer and DialerXX031 <th>Item No</th> <th>Related Software</th>	Item No	Related Software
XX012Transmit/Receive File Utility SoftwareXX020Record/Playback File SoftwareXX021FDL Software for ESF (T1 only)XX022DTMF/MF Detector & Generator SoftwareXX023T1 A-law or E1 µ-law SoftwareXX031Enhanced T1 / E1 Call Capture/Analysis SoftwareXX031Enhanced T1 / E1 Call Capture/Analysis SoftwareXX032Call Data RecordsXX032Call Data RecordsVBA032Voice Band AnalyzerVBA033Two-Wire Echo Analysis for VBAVBA034Fax Demodulator / DecoderXX605Dual VF Tx Rx (Only for Probe) (Included with Basic Software)XX606Pulse Shape & Jitter Measurement (Included with Basic Software)XX616T1 E1 UVCS Client Python ModuleXX625w/ CAS simulatorXX626w/ SSI Signaling Analyzer and DialerXX627w/ SSI Signaling Analyzer and DialerXX628w/ SSI Signaling Analyzer and DialerXX629w/ SSI Signaling Analyzer and DialerXX629w/ CAS simulatorXX629w/ SSI Signaling Analyzer and DialerXX629w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX632w/ Dynamic DSP CapabilityXX633High Throughput HDLC Tx/Rx TestXX636High Throughput MC-MLPPP Tx/Rx Test	<u>XX010</u>	Application Development Tool Kit (Programmer's Guide)
XX020Record/Playback File SoftwareXX021FDL Software for ESF (11 only)XX022DTMF/MF Detector & Generator SoftwareXX023T1 A-law or E1 µ-law SoftwareXX031Fnhanced T1 / E1 Call Capture/Analysis SoftwareXX031T1 or E1 Call Capture and Analysis Software w/ Traffic Activated Trigger OptionCDR032Call Data RecordsYBA033Two-Wire Echo Analysis for VBAYBA034Two-Wire Echo Analysis for VBAYBA035Fax Demodulator / DecoderXX050Dasic Client/Server Scripted Control Software (Included with Basic Software)XX605Dual VF Tx Rx (Only for tProbe) (Included with Basic Software)XX605Vile Basha Record/PlaybackXX616T1 E1 WCS Client Python ModuleXX620Transmit/Detect digits (included with Basic Software)XX621W/ SSI Signaling Analyzer and DialerXX622w/ SSI Signaling Analyzer and DialerXX623w/ SSI Signaling Analyzer and DialerXX624W/ SSI Signaling Analyzer and DialerXX625w/ CAS SimulatorXX636W/ SD EnapabilityXX631High Throughput HDLC Tx/Rx TestXX632High Throughput MC-MLPPP Tx/Rx TestXX633High Throughput MC-MLPPP Tx/Rx Test	<u>XX018</u>	Multi-Channel BERT Software
XX021PDL Software for ESF (T1 only)XX022DTMF/MF Detector & Generator SoftwareXX023T1 A-law or E1 µ-law SoftwareXX031T1 A-law or E1 µ-law SoftwareXX031Enhanced T1 / E1 Call Capture/Analysis SoftwareXX031T1 or E1 Call Capture and Analysis Software w/ Traffic Activated Trigger OptionCDR032Call Data RecordsXBA033Two-Wire Echo Analysis for VBAVBA034Two-Wire Echo Analysis for VBAVBA035Traffic Analysis for VBAVBA036Traffic Analysis for VBAVBA037Basic Client/Server Scripted Control Software (Included with Basic Software)XX606Pulse Shape & Jitter Measurement (Included with Basic Software)XX607Vi F1k Based Record/PlaybackXX618T1 E1 LWCS Client Python ModuleXX629Transmit/Detect digits (Included with Basic Software)XX620XVS SimulatorXX621W/ SS Signaling Analyzer and DialerXX631W/ DSP CapabilityXX631High Throughput HDLC Tx/Rx TestXX632High Throughput MC-MLPPP Tx/Rx Test	<u>XX019</u>	Transmit/Receive File Utility Software
Xx022DTMF/MF Detector & Generator SoftwareXx023T1 A-law or E1 µ-law SoftwareXx0231Synchronous Trunk Record PlaybackXx031Enhanced T1 / E1 Call Capture/Analysis SoftwareXx031T1 or E1 Call Capture and Analysis Software w/ Traffic Activated Trigger OptionCDR032Call Data RecordsVBA033Two-Wire Echo Analysis for VBAVBA034Tarofic Analysis for VBAVBA035Traffic Analysis for VBAVBA036Traffic Analysis for VBAVBA037Dual VF Tx Rx (Only for tPoobe) (Included with Basic Software)Xx606Pulse Shape & Jitter Measurement (Included with Basic Software)Xx616T1 EI busc Client Python ModuleXx627w/ SI Signaling Analyzer and DialerXx628w/ SSI Signaling Analyzer and DialerXx629w/ ISDN EmulationXx633w/ Dynamic DSP CapabilityXx634High Throughput HDLC Tx/Rx TestXx635High Throughput MC-MLPPP Tx/Rx Test	<u>XX020</u>	Record/Playback File Software
Xx023T1 A-law or E1 µ-law SoftwareXx051Synchronous Trunk Record PlaybackXx031Enhanced T1 / E1 Call Capture/Analysis SoftwareXx031T1 or E1 Call Capture and Analysis Software w/ Traffic Activated Trigger OptionCDR032Call Data RecordsYBA033Two-Wire Echo Analysis for VBAYBA034Traffic Analysis for VBAYBA035Traffic Analysis for VBAYBA036Fax Demodulator / DecoderXx600Basic Client/Server Scripted Control Software (Included with Basic Software)Xx605Dual VF Tx Rx (Only for Probe) (Included with Basic Software)Xx606Pulse Shape & litter Measurement (Included with Basic Software)Xx610w/ File based Record/PlaybackXx621Transmit/Detect digits (included with basic software)Xx622w/ SS1 Signaling Analyzer and DialerXx623w/ JSDN EmulationXx634High Throughput HDLC Tx/Rx TestXx635High Throughput MC-MLPPP Tx/Rx Test	<u>XX021</u>	FDL Software for ESF (T1 only)
XX051Synchronous Trunk Record PlaybackXX031Enhanced T1 / E1 Call Capture/Analysis SoftwareXX031T1 or E1 Call Capture and Analysis Software w/ Traffic Activated Trigger OptionCDR032Call Data RecordsVBA032Voice Band AnalyzerVBA033Two-Wire Echo Analysis for VBAVBA036Traffic Analysis for VBAVBA037Fax Demodulator / DecoderXX600Basic Client/Server Scripted Control Software (Included with Basic Software)XX605Dual VF Tx Rx (Only for tProbe) (Included with Basic Software)XX606Pulse Shape & litter Measurement (Included with Basic Software)XX610w/ File based Record/PlaybackXX612Transmit/Detect digits (included with basic software)XX625w/ CAS SimulatorXX626w/ SS1 Signaling Analyzer and DialerXX621w/ DSP CapabilityXX632W/ Dynamic DSP CapabilityXX633Wigh Throughput HDLC Tx/Rx TestXX636High Throughput MC-MLPPP Tx/Rx Test	<u>XX022</u>	DTMF/MF Detector & Generator Software
XX031Enhanced T1 / E1 Call Capture/Analysis SoftwareXX031T1 or E1 Call Capture and Analysis Software w/ Traffic Activated Trigger OptionCDR032Call Data RecordsVBA032Voice Band AnalyzerVBA033Two-Wire Echo Analysis for VBAVBA036Traffic Analysis for VBAVBA037Fax Demodulator / DecoderXX600Basic Client/Server Scripted Control Software (Included with Basic Software)XX605Dual VF Tx Rx (Only for tProbe) (Included with Basic Software)XX606Pulse Shape & Jitter Measurement (Included with Basic Software)XX610w/ File based Record/PlaybackXX516T1 E1 WCS Client Python ModuleXX625w/ CAS SimulatorXX626w/ SS1 Signaling Analyzer and DialerXX630w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX632High Throughput HDLC Tx/Rx TestXX636High Throughput MC-MLPPP Tx/Rx Test	XX023	T1 A-law or E1 μ-law Software
XX031T1 or E1 Call Capture and Analysis Software w/ Traffic Activated Trigger OptionXX032Call Data RecordsVBA032Voice Band AnalyzerVBA033Two-Wire Echo Analysis for VBAVBA034Traffic Analysis for VBAVBA035Fax Demodulator / DecoderXX600Basic Client/Server Scripted Control Software (Included with Basic Software)XX605Dual VF Tx Rx (Only for tProbe) (Included with Basic Software)XX605Pulse Shape & Jitter Measurement (Included with Basic Software)XX616T1 E1 WCS Client Python ModuleXX625w/ File based Record/PlaybackXX626Trasmit/Detect digits (included with basic software)XX625w/ CAS SimulatorXX626w/ SS1 Signaling Analyzer and DialerXX631w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX632High Throughput HDLC Tx/Rx TestXX634High Throughput HDLC Tx/Rx TestXX636High Throughput MC-MLPPP Tx/Rx Test	<u>XX051</u>	Synchronous Trunk Record Playback
CDR032Call Data RecordsVBA032Voice Band AnalyzerVBA033Two-Wire Echo Analysis for VBAVBA036Traffic Analysis for VBAVBA037Fax Demodulator / DecoderXX600Basic Client/Server Scripted Control Software (Included with Basic Software)XX605Dual VF Tx Rx (Only for tProbe) (Included with Basic Software)XX606Pulse Shape & Jitter Measurement (Included with Basic Software)XX605Dual VF Tx Rx (Only for tProbe) (Included with Basic Software)XX606Pulse Shape & Jitter Measurement (Included with Basic Software)XX616T1 E1 WCS Client Python ModuleXX620Transmit/Detect digits (included with basic software)XX625w/ CAS SimulatorXX625w/ SS1 Signaling Analyzer and DialerXX630w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX632High Throughput HDLC Tx/Rx TestXX636High Throughput MC-MLPPP Tx/Rx TestXX636High Throughput MC-MLPPP Tx/Rx Test	<u>XX031</u>	Enhanced T1 / E1 Call Capture/Analysis Software
VBA032Voice Band AnalyzerVBA033Two-Wire Echo Analysis for VBAVBA036Traffic Analysis for VBAVBA037Traffic Analysis for VBAVBA038Fax Demodulator / DecoderXX600Basic Client/Server Scripted Control Software (Included with Basic Software)XX600Dual VF Tx Rx (Only for tProbe) (Included with Basic Software)XX606Pulse Shape & Jitter Measurement (Included with Basic Software)XX606Pulse Shape & Jitter Measurement (Included with Basic Software)XX610w/ File based Record/PlaybackXX610Transmit/Detect digits (included with basic software)XX622w/ CAS SimulatorXX625w/ CAS SimulatorXX626w/ SS1 Signaling Analyzer and DialerXX630w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX632High Throughput HDLC Tx/Rx TestXX635High Throughput MC-MLPPP Tx/Rx TestXX636High Throughput MC-MLPPP Tx/Rx Test	<u>XX031</u>	T1 or E1 Call Capture and Analysis Software w/ Traffic Activated Trigger Option
YBA033Two-Wire Echo Analysis for VBAYBA036Traffic Analysis for VBAVBA038Fax Demodulator / DecoderXX600Basic Client/Server Scripted Control Software (Included with Basic Software)XX605Dual VF Tx Rx (Only for tProbe) (Included with Basic Software)XX606Pulse Shape & Jitter Measurement (Included with Basic Software)XX610w/ File based Record/PlaybackXX516T1 E1 WCS Client Python ModuleXX622Transmit/Detect digits (included with basic software)XX625w/ CAS SimulatorXX630w/ SS1 Signaling Analyzer and DialerXX630w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX632High Throughput HDLC Tx/Rx TestXX635High Throughput MC-MLPPP Tx/Rx Test	CDR032	Call Data Records
VBA036Traffic Analysis for VBAVBA038Fax Demodulator / DecoderXX600Basic Client/Server Scripted Control Software (Included with Basic Software)XX605Dual VF Tx Rx (Only for tProbe) (Included with Basic Software)XX606Pulse Shape & Jitter Measurement (Included with Basic Software)XX610w/ File based Record/PlaybackXX616T1 E1 WCS Client Python ModuleXX620Transmit/Detect digits (included with basic software)XX625w/ CAS SimulatorXX626w/ SS1 Signaling Analyzer and DialerXX630w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX632High Throughput HDLC Tx/Rx TestXX635High Throughput MC-MLPPP Tx/Rx Test	<u>VBA032</u>	Voice Band Analyzer
VBA038Fax Demodulator / DecoderXX600Basic Client/Server Scripted Control Software (Included with Basic Software)XX605Dual VF Tx Rx (Only for tProbe) (Included with Basic Software)XX606Pulse Shape & Jitter Measurement (Included with Basic Software)XX610w/ File based Record/PlaybackXX616T1 E1 WCS Client Python ModuleXX620Transmit/Detect digits (included with basic software)XX625w/ CAS SimulatorXX626w/ SS1 Signaling Analyzer and DialerXX630w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX632High Throughput HDLC Tx/Rx TestXX635High Throughput MC-MLPPP Tx/Rx Test	<u>VBA033</u>	Two-Wire Echo Analysis for VBA
XX600Basic Client/Server Scripted Control Software (Included with Basic Software)XX605Dual VF Tx Rx (Only for tProbe) (Included with Basic Software)XX606Pulse Shape & Jitter Measurement (Included with Basic Software)XX610w/ File based Record/PlaybackXX616T1 E1 WCS Client Python ModuleXX620Transmit/Detect digits (included with basic software)XX625w/ CAS SimulatorXX626w/ SS1 Signaling Analyzer and DialerXX630w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX633High Throughput HDLC Tx/Rx TestXX635High Throughput MC-MLPPP Tx/Rx Test	<u>VBA036</u>	Traffic Analysis for VBA
XX605Dual VF Tx Rx (Only for tProbe) (Included with Basic Software)XX606Pulse Shape & Jitter Measurement (Included with Basic Software)XX610w/ File based Record/PlaybackXX616T1 E1 WCS Client Python ModuleXX620Transmit/Detect digits (included with basic software)XX625w/ CAS SimulatorXX626w/ SS1 Signaling Analyzer and DialerXX630w/ ISDN EmulationXX631w/ Dypamic DSP CapabilityXX633High Throughput HDLC Tx/Rx TestXX635High Throughput MC-MLPPP Tx/Rx Test	VBA038	Fax Demodulator / Decoder
XX606Pulse Shape & Jitter Measurement (Included with Basic Software)XX610w/ File based Record/PlaybackXX616T1 E1 WCS Client Python ModuleXX620Transmit/Detect digits (included with basic software)XX622w/ CAS SimulatorXX626w/ SS1 Signaling Analyzer and DialerXX629w/ ISDN EmulationXX630w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX633High Throughput HDLC Tx/Rx TestXX636High Throughput MC-MLPPP Tx/Rx Test	XX600	Basic Client/Server Scripted Control Software (Included with Basic Software)
XX610w/ File based Record/PlaybackXX610T1 E1 WCS Client Python ModuleXX620Transmit/Detect digits (included with basic software)XX625w/ CAS SimulatorXX626w/ SS1 Signaling Analyzer and DialerXX629w/ ISDN EmulationXX630w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX633High Throughput HDLC Tx/Rx TestXX635High Throughput MC-MLPPP Tx/Rx Test	XX605	Dual VF Tx Rx (Only for tProbe) (Included with Basic Software)
XX616T1 E1 WCS Client Python ModuleXX620Transmit/Detect digits (included with basic software)XX625w/ CAS SimulatorXX626w/ SS1 Signaling Analyzer and DialerXX629w/ISDN EmulationXX630w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX634High Throughput HDLC Tx/Rx TestXX635High Throughput MC-MLPPP Tx/Rx Test	XX606	Pulse Shape & Jitter Measurement (Included with Basic Software)
XX620Transmit/Detect digits (included with basic software)XX625w/ CAS SimulatorXX626w/ SS1 Signaling Analyzer and DialerXX629w/ISDN EmulationXX630w/ DSP CapabilityXX631w/ DSP CapabilityXX633High Throughput HDLC Tx/Rx TestXX635High Throughput MC-MLPPP Tx/Rx Test	<u>XX610</u>	w/ File based Record/Playback
XX625w/ CAS SimulatorXX626w/ SS1 Signaling Analyzer and DialerXX629w/ISDN EmulationXX630w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX634High Throughput HDLC Tx/Rx TestXX635High Throughput PPP Tx/Rx TestXX636High Throughput MC-MLPPP Tx/Rx Test	<u>XX616</u>	T1 E1 WCS Client Python Module
XX626w/ SS1 Signaling Analyzer and DialerXX629w/ISDN EmulationXX630w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX634High Throughput HDLC Tx/Rx TestXX635High Throughput PPP Tx/Rx TestXX636High Throughput MC-MLPPP Tx/Rx Test	<u>XX620</u>	Transmit/Detect digits (included with basic software)
XX629w/ISDN EmulationXX630w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX634High Throughput HDLC Tx/Rx TestXX635High Throughput PPP Tx/Rx TestXX636High Throughput MC-MLPPP Tx/Rx Test	<u>XX625</u>	w/ CAS Simulator
XX630w/ DSP CapabilityXX631w/ Dynamic DSP CapabilityXX634High Throughput HDLC Tx/Rx TestXX635High Throughput PPP Tx/Rx TestXX636High Throughput MC-MLPPP Tx/Rx Test	<u>XX626</u>	w/ SS1 Signaling Analyzer and Dialer
XX631w/ Dynamic DSP CapabilityXX634High Throughput HDLC Tx/Rx TestXX635High Throughput PPP Tx/Rx TestXX636High Throughput MC-MLPPP Tx/Rx Test	<u>XX629</u>	w/ISDN Emulation
XX634       High Throughput HDLC Tx/Rx Test         XX635       High Throughput PPP Tx/Rx Test         XX636       High Throughput MC-MLPPP Tx/Rx Test	<u>XX630</u>	w/ DSP Capability
XX635     High Throughput PPP Tx/Rx Test       XX636     High Throughput MC-MLPPP Tx/Rx Test	<u>XX631</u>	w/ Dynamic DSP Capability
XX636     High Throughput MC-MLPPP Tx/Rx Test	<u>XX634</u>	High Throughput HDLC Tx/Rx Test
	<u>XX635</u>	High Throughput PPP Tx/Rx Test
XX640 File based HDLC Record/Playback	<u>XX636</u>	High Throughput MC-MLPPP Tx/Rx Test
	<u>XX640</u>	File based HDLC Record/Playback

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

GL Communications Inc.

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

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Item No	Related Software
<u>XX155</u> OLV155	T1 or E1 Real-Time GPRS Protocol Analyzer Offline GPRS Analyzer
<u>XX160</u> OLV160 XX162	T1 or E1 Real-Time ATM Analyzer Offline ATM Analyzer ATM BERT
<u>XX165</u> OLV165	UMTS Analyzer Offline UMTS Analyzer
<u>PKV170</u>	NetsurveyorWeb™ (Perpetual License, Unlimited Users/Nodes)
<u>PKV169</u>	NetsurveyorWeb™ Lite
PKV171	NetSurveyor Agent Toolkit
<u>DC007</u>	DCME Test & Analysis Software w/Desktop PC
<u>DC008</u>	DCME Test & Analysis Software w/Portable PC
<u>SA048</u>	Goldwave Software
<u>STE40</u>	Mux/Demux Software
STE50	Sample Traffic Files



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 <sup>™</sup> requires additional licenses)
ETE001	OctalXpress T1 E1 Main Board plus Daughter Board (Octal Port <sup>™</sup> 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)
<u>XX003</u>	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

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

For more information, please visit <u>T1 E1 Testing</u> webpage.

