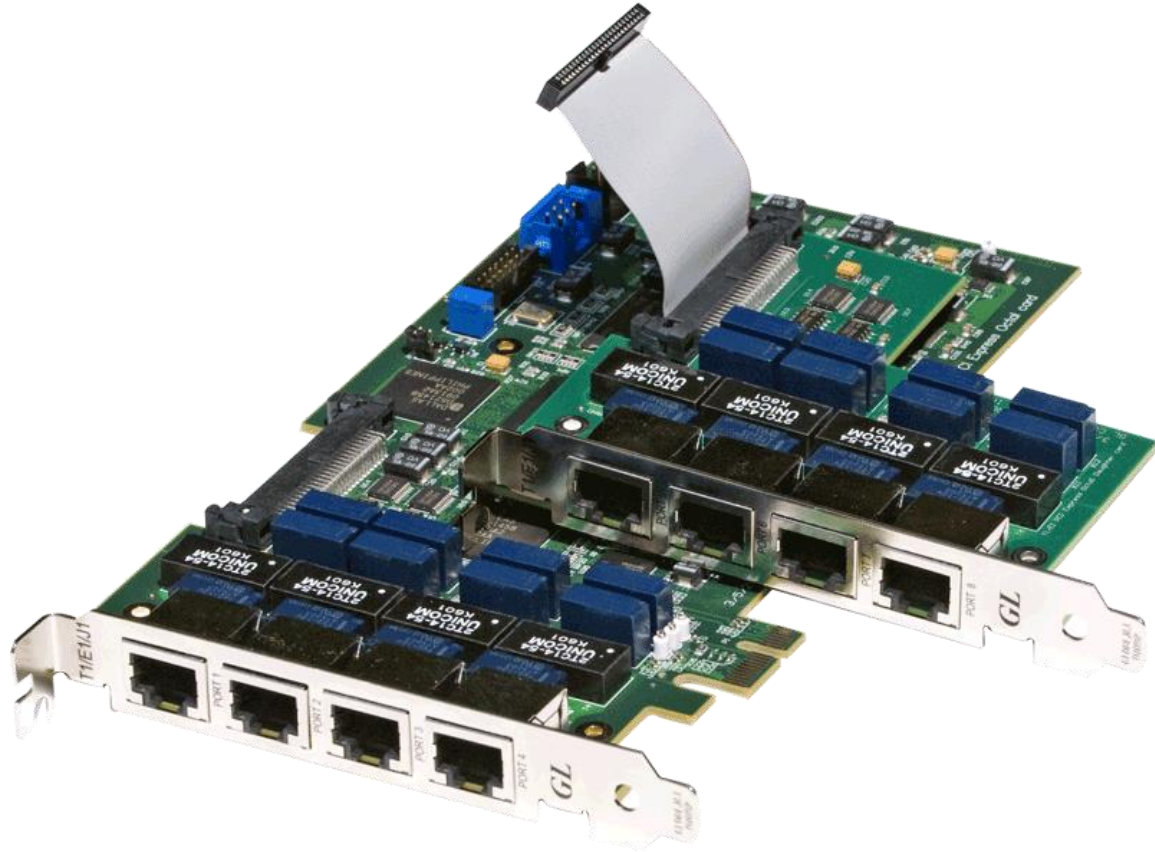

QUAD and OCTAL T1 E1 Boards



818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878
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Website: <https://www.gl.com>

PCIe based Octal and Quad T1 E1 Board



Octal T1 E1 Board on Rack PC



- High density Performance
- Provides Four (4) or Eight (8) RJ-48 T1 E1 ports and multiples thereof. For example, configurations of 8, 12, 16, 64 T1 E1s in a single rack are possible

What is this hardware superior?

- High Density and High Speed – The boards (with Direct Memory Access) are significantly faster and significantly more efficient
- Supports high performance voice and data applications
- PCI Express x1 Lane/Board
- Reduces hardware costs and power consumption.

Main Features

- T1 or E1 interfacing – Software Selectable
- User friendly GUI for Windows® 8 and above operating systems
- Windows and Linux Drivers for Open Source Applications
- TDM, ISDN, SS7 – High Density Voice
- VoIP, Frame Relay, Multi-Link Frame Relay, PPP and Multi Link PPP, HDLC
- Most all basic applications and special applications are available for Quad and Octal T1 E1 cards including Comprehensive Analysis / Emulation of voice, digits, tones, fax, modem, raw data, and Echo Testing
- Call Recording, Generation, and Monitoring for hundreds to thousands of calls in one platform
- Capable of simulating as well as decoding and demodulating fax calls over T1/E1 lines using Fax Simulator and FaxScan™

Main Features (contd...)

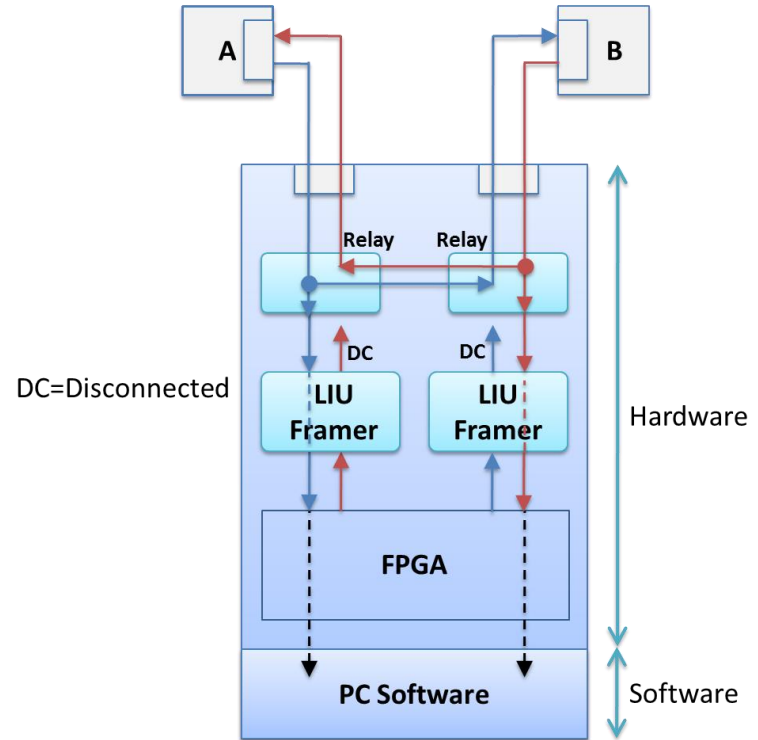
- Router with Multi T1 E1 WAN Interfaces i.e. MLPPP (Multi Link PPP)
- Media (VoIP) Gateway, IP PBX, and IVR Applications i.e. Asterisk (TM)
- “Cross-Port Through” and “Cross-Port Transmit” Modes – these configurations make cabling with Drop/Insert and Fail-Safe Inline Monitoring very easy
- Compatible with dual, quad, and higher core motherboards and software that simulate dual and quad cores (hyper-threading)
- Supports both 32-bit and 64-bit Windows® operating system.

Quad and Octal Cards over Dual T1 E1 Universal Cards

	Universal Dual T1 E1 Boards	Quad, Octal T1 E1 Boards
Number of Ports	2	4, 8
PCI Slot Type	Uses a PCI Bus / Connector	Uses a PCI Express x1 Bus / Connector
Output Frequency Offset	Each port can be individually set with an output frequency offset	A single frequency offset which is applied to all 8 ports
Pulse Mask Application	Supported	Not Supported
Jitter Measurement	Supported	Not Supported
External Clock Mode	Supported	No clock port connector
VF Drop and Insert	Supported	No VF connectors; Digital Drop/Insert supported
Speaker (on board)	Supported	No speakers

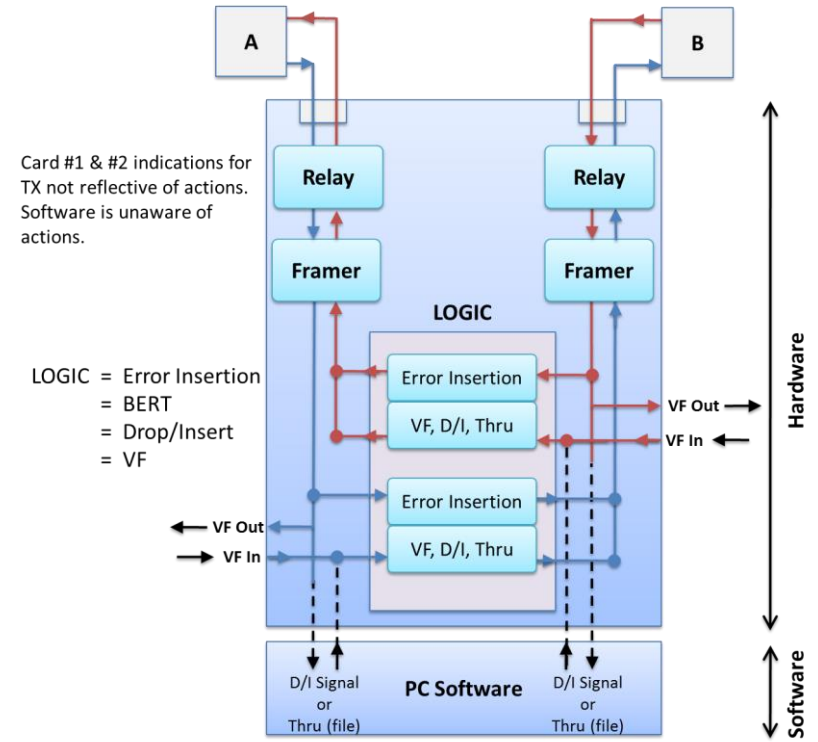
Cross-port Through Loopback

- Allows monitoring T1/E1 lines in-line while still being protected from loss of power to the board
- It is implemented entirely through relays and eliminates complex cabling
- The signal received on Card 2 (Port 2) is transmitted out onto Card 1 (Port 1)



Cross-port Transmit Mode Loopback

- The data that would normally be transmitted on Card 1 (Port 1) is diverted and transmitted on Card 2 (Port 2)
- The data that would normally be transmitted on Card 2 (Port 2) is diverted and transmitted on Card 1 (Port 1)
- It is useful for Drop and Insert and Error Injection applications in which the board analyzes and may insert traffic running between two pieces of T1/E1 equipment



T1 / E1 Basic Software

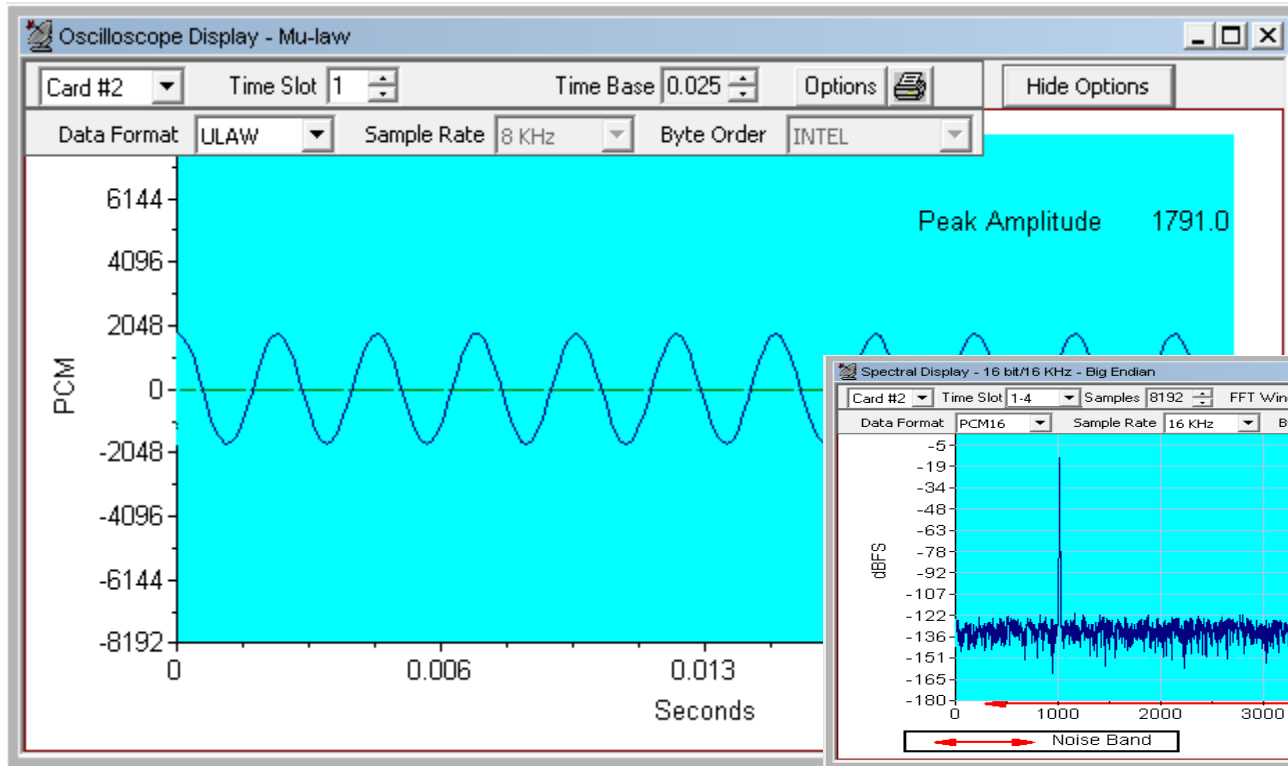
- T1 E1 Basic Software
 - Monitoring Options
 - Intrusive Testing
 - Windows Client / Server
 - Remote access to T1/E1 server
 - Clients - C++, Java, TCL

Monitoring Features

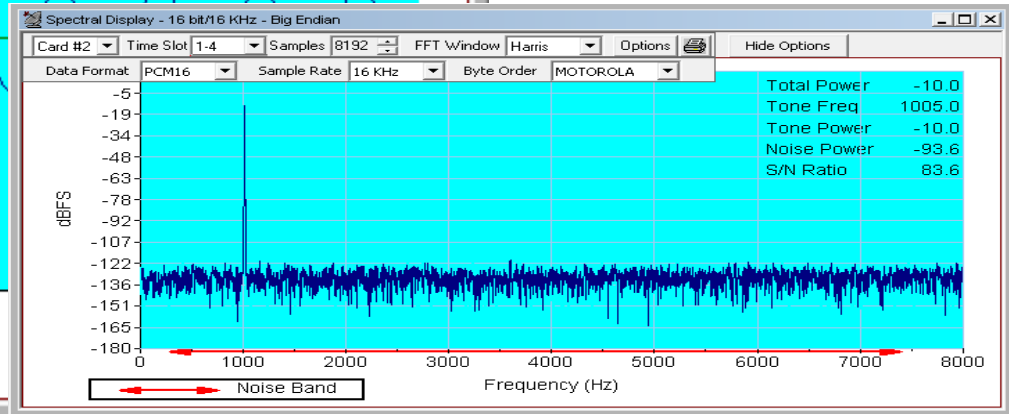
- Monitor T1/E1 Line
- Byte Values & Binary Byte Values
- Signaling bits, Power Level, DC Offset, & Frequency
- Multi-frames, and Real-time Multi-frames
- T1/E1 Data as Real-time Bitmap
- Timeslot Window
- ASCII Timeslot Display
- Oscilloscope & Power Spectral
- Audio Monitoring & Active Voice Level

Monitoring Features

Oscilloscope Display



Spectral Display



Intrusive Testing

- Drop and Insert
- Bit Error Rate Test
- Enhanced Bit Error Rate
- Transmit Tone
- Transmit Gaussian Noise
- Transmit Multi-frame
- Transmit Signaling Bits
- Precision Delay Measurement
- Rx-to-Tx Loop back
- Error Insertion
- DTMF / MF Capture
- Real-time Multichannel Audio Bridge
- Real-time Strip Chart

Enhanced BERT and TX Signaling BITS

Enhanced BERT

The screenshot shows the 'Enhanced BERT Untitled' application window. The 'Tx Rx Settings - Card #1' dialog is open, with the 'Tx Settings' tab selected. The 'Transmit Receive Coupled Settings (Tx=Rx)' checkbox is checked. The 'Error Rate (Logic Error)' is set to 10^{-3} . The 'User Defined Rate' is set to 0.01. The 'BER Patterns' section shows 'QRSS' selected with a 'User Defined Pattern' of 0. The 'Timeslot Selection' table is as follows:

	0	4	8	12	16	20
1	5	9	13	17	21	
2	6	10	14	18	22	
3	7	11	15	19	23	

The 'Sub Channel Selection' is set to 7, with a pattern of 1 1 1 1 1 1 1. The 'Graph - Online Display' section shows a 'Real-Time Display' graph for 'Errors' over time. The graph shows a series of red bars (LOGIC_ERROR) and green bars (BPV) between 10:24:30 and 10:25:10. The legend is checked for LOGIC_ERROR, BPV, and FRAME_ERROR.

Transmit Signaling BITS

The screenshot shows the 'Tx Signaling Bits' application window. It displays a table of signaling bits for 24 time slots (Ts# 00 to 23). Each time slot has a checkbox and four columns (A, B, C, D) with values 0 or 1. The signaling bit patterns are listed in a dropdown menu on the right, with '0101 F' selected. The 'Device Selection' dropdown is set to 'Card #1'. Buttons for 'Save', 'Deselect All', 'Transmit', 'Load', 'Select All', and 'Close' are visible at the bottom.

Ts#	A	B	C	D	Ts#	A	B	C	D	Ts#	A	B	C	D
00	0	1	0	1	08	0	1	0	1	16	0	1	0	1
01	0	1	0	1	09	0	1	0	1	17	0	1	0	1
02	0	1	0	1	10	0	1	0	1	18	0	1	0	1
03	0	1	0	1	11	0	1	0	1	19	0	1	0	1
04	0	1	0	1	12	0	1	0	1	20	0	1	0	1
05	0	1	0	1	13	0	1	0	1	21	0	1	0	1
06	0	1	0	1	14	0	1	0	1	22	0	1	0	1
07	0	1	0	1	15	0	1	0	1	23	0	1	0	1

The screenshot shows the 'Signaling Bits' application window for 'Card #2'. It displays a grid of signaling bits for 24 time slots (TS 0 to 23). Each time slot has a fixed signaling bit pattern of '0101'.

TS	0101	TS	0101	TS	0101
TS 0	0101	TS 8	0101	TS 16	0101
TS 1	0101	TS 9	0101	TS 17	0101
TS 2	0101	TS 10	0101	TS 18	0101
TS 3	0101	TS 11	0101	TS 19	0101
TS 4	0101	TS 12	0101	TS 20	0101
TS 5	0101	TS 13	0101	TS 21	0101
TS 6	0101	TS 14	0101	TS 22	0101
TS 7	0101	TS 15	0101	TS 23	0101

Client Server

- Allow the user (with an appropriate client) to operate analyzers remotely, write scripts for automation, or provide multi client connectivity to a single T1 E1 Analyzer.

```
E1_Regressiontest.gls - GLClient
File Edit View Connect Script Log User Help
get board count;
board_count=2
get response;
response = 500.0
go 0,0,0,0 #1;
OK
get signaling bits #2:1..15;
#2:1.sig_bits=0,0,0,0
#2:2.sig_bits=0,0,0,0
#2:3.sig_bits=0,0,0,0
#2:4.sig_bits=0,0,0,0
#2:5.sig_bits=0,0,0,0
#2:6.sig_bits=0,0,0,0

// setting both the cards to cas mode to get all four signaling bits
//getting the signaling bits transmitted from card#1
//cross connect card 1 and 2
go 0,0,0,0 #1;
get signaling bits #2:1..15;
// transmitting different formats of signaling bits as mentioned before for time slots 1 to 15 only
go 0,0,0,1 #1;
get signaling bits #2:1..15;
wait 2000;
go 0,0,1,0 #1;
get signaling bits #2:1..15;
wait 2000;
go 0,0,1,0 #1;
get signaling bits #2:1..15;
Ready

Untitled - GL Server
File Edit View Setup Help
Connected: client #404 at 192.168.1.63
404: set rx interface terminate #*;
404: set signaling mode cas #*;
404: set crc4 on#*;
404: set tx clock source internal #*;
404: set outward driver loopback off #*;
404: get tx clock source #*;
404: get outward driver loopback #*;
404: get rx line frequency #*;
404: get rx line level #*;
404: get all alarms #*;
404: get board count;
404: get response;
404: go 0,0,0,0 #1;
404: get signaling bits #2:1..15;
404: go 0,0,1,0 #1;
404: get signaling bits #2:1..15;
404: go 0,0,1,0 #1;
404: get signaling bits #2:1..15;
Ready
```

T1 / E1 Special Applications

- Protocol Analysis
 - ISDN, HDLC, SS7, Frame Relay, TRAU, CDMA, DCME, T1 Facility Data Link
 - E1 Maintenance Data Link, UMTS, PPP, ATM, GSM, V5.x, GPRS, GR303, SS1
- Protocol Emulation
 - ISDN, HDLC, MLPPP, MLPPP Conformance, CAS, TRAU, SS7, SS7 Conformance
 - GSM A, GSM Abis, MAP, CAMEL, Frame Relay, ATM IMA, SS1
- Capture, Analysis, & Emulation
 - BER, Playback
 - Manual & Automated Record / Playback files
 - Call Capture and Analysis (CCA)
 - Multiple Call Capture and Analysis

T1 / E1 Special Applications

- Voice Band Analysis Software
 - Call Data Records (CDR)
 - Voice Band Analyzer (VBA)
 - Fax Emulation and Analysis
- Fax Simulator
 - Fax Analysis using GLInsight™ or FaxScan™
- Echo Cancellation Testing / Compliance
 - Manual
 - Semi-automated
 - Automated
- WCS Modules
 - Transmission/reception of files/digits
 - Multi-channel BERT
 - DSP operations, Dynamic DSP capability
 - SA Bits/ FDL/ HDLC/ TRAU/ MC-MLPPP/ SS7/ ISDN / ML Frame Relay
- Signaling Transitions Recording
- Protocol Identifier
- Multi-Channel BERT
- Multiplex / Demultiplex Software
- Real-time Strip Chart
- Network Surveillance

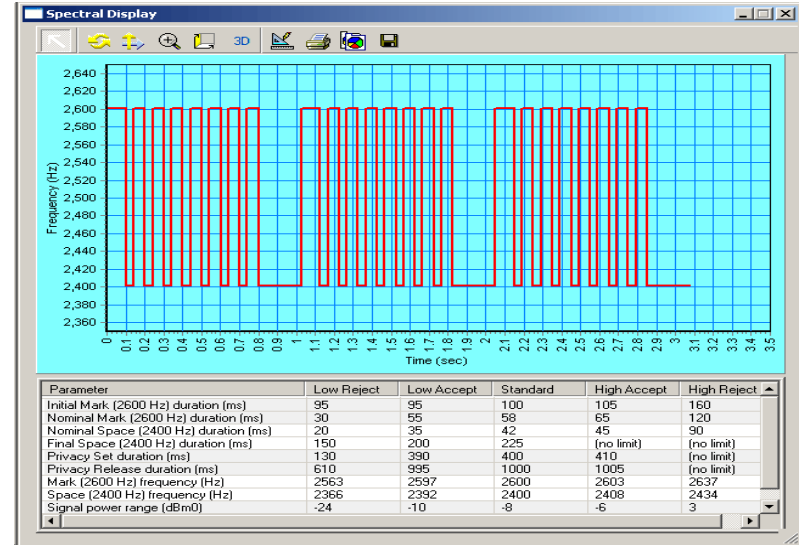
T1 / E1 Special Applications ...

Protocol Identifier

The PC Protocol Classifier interface displays a table of protocol identification results for two ports (Port 1 and Port 2) across 16 time slots (TS). The 'Protocol Set' is configured to 'TRAU'. A 'Protocol Color Selection' dialog box is open, showing a list of protocols with corresponding color swatches: ALL (yellow), TRAU (orange), ATM (red), HDLC (blue), MTP2 (red), LAPD (magenta), SS7 (orange), PPP (brown), ISDN (cyan), GSM (cyan), GSMABIS (cyan), and FRAMERELAY (grey). The 'Default' button is visible at the bottom of the dialog.

TS	Port 1	Port 2
0		
1	ISDN	ISDN
2	FRAMERELAY	FRAMERELAY
3	TRAU	SS7
4	TRAU	SS7
5	TRAU	PPP
6		TRAU
7		TRAU
8		TRAU
9	HDLC	HDLC
10		
11	MTP2	HDLC
12		
13		
14		
15	HDLC	LAPD
16		

SS1 Analyzer & Emulator



Call Capture and Analysis

Call Capture & Analysis

File Capture Settings

Capture Directory
D:\CapturedFiles\ManualCall1210091146

Capture File #1
Dec10W01.000

Bytes Captured: 17024

Capture File #2
Dec10E01.000

Bytes Captured: 17024

Signaling File: Dec1001.0

Timeslot Activity

CC No	Capture Name	West(Port)	East(Port)	Timeslots	Storage Location	Trigger Option	Action
1	CCA1	1	2	0-23	C:\Program Files\GL Communications Inc\Dual Ultra HD T1 Analyzer	Edit	Abort
2	CCA2	1	2	0-23	C:\Program Files\GL Communications Inc\Dual Ultra HD T1 Analyzer	Edit	Abort
3	CCA3	1	2	0-23	C:\Program Files\GL Communications Inc\Dual Ultra HD T1 Analyzer	Edit	Abort
4	CCA4	1	2	0-23	C:\Program Files\GL Communications Inc\Dual Ultra HD T1 Analyzer	Edit	Abort

Multiple Call Capture & Analysis

Multi Call Capture for Manual - Untitled

File Edit Trigger Options Process

TS	TS Status	West Filename	Bytes Captured(West)	East Filename	Bytes Captured(East)
0	Capturing	C:\Program Files\GL Communications In...	742224	C:\Program Files\GL Communications Inc\Dual Ultra ...	742224
1	Capturing	C:\Program Files\GL Communications In...	742224	C:\Program Files\GL Communications Inc\Dual Ultra ...	742224
2	Capturing	C:\Program Files\GL Communications In...	742224	C:\Program Files\GL Communications Inc\Dual Ultra ...	742224
3	Capturing	C:\Program Files\GL Communications In...	742224	C:\Program Files\GL Communications Inc\Dual Ultra ...	742224
4	Capturing	C:\Program Files\GL Communications In...	742224	C:\Program Files\GL Communications Inc\Dual Ultra ...	742224
5	Capturing	C:\Program Files\GL Communications In...	742224	C:\Program Files\GL Communications Inc\Dual Ultra ...	742224

CCA Details Timeslots Map

Protocol Analysis

PPP Protocol Analysis

PPP Protocol Analysis PPP

File View Capture Statistics Database Configure Help

GoTo

Dev	TSlot	SubCh	Fram...	TIME (Relative)	Len	Error	PPP Laye...	LCP Code	IPCP Code	BCF
✓ 1	1-31		0	00:00:00.000000	14		Link Control	Echo-Request		
✓ 2	1-31		1	00:00:00.000625	14		Link Control	Echo-Reply		
✓ 2	1-31		2	00:00:00.088625	14		Link Control	Echo-Request		
✓ 1	1-31		3	00:00:00.092000	14		Link Control	Echo-Reply		
✓ 1	1-31		4	00:00:09.993996	14		Link Control	Echo-Request		
✓ 2	1-31		5	00:00:09.994625	14		Link Control	Echo-Reply		
✓ 2	1-31		6	00:00:10.082625	14		Link Control	Echo-Request		
✓ 1	1-31		7	00:00:10.083000	14		Link Control	Echo-Reply		

Card1 TimeSlots=1-31 Frame=0 at 00:00:00.000000 OK Len=14

HDLC Frame Data + FCS

===== PPP Link Layer =====

Address = 11111111 (255)
Ctl = 00000011 (3)
Protocol = 11000000 00100001 Link C

===== Link Control Layer =====

Code = 00001001 Echo-Request
Identifier = 172 (xAC)
Length = 8 (x0008)
Magic Number = 165410210 (x00DC102E)

Hex Dump of the Frame Data

FF 03 C0 21 09 AC 00 08 09 DC 19 2E 85 63 ÿ À ! ~ Ü .ic

Off-line Viewing D:\misc\MLPPP.hdl 23 726 Frames

PPP Packet Data Analysis

Traffic Analyzer - Summary View

File View Call Summary Settings Help

Sip Calls Show All Sessions

Call Summary Registration Summary Alert Summary

Call #	SSRC	Payload	Packet Received	Conversat MOS/R...	Listening MOS/R...	Packets Discard...	Missing Packets...	Duplicate Packets...	Out Of Sequen...	Average Gap(mst)	Average Delay	Average Jitter	Average Inter A...
Call#000001	Caller:0001@192.168.40.245	Callee:0001@192.168.20.20	CallId:GLPG1413613128143612	Call StartTime:2011-11-23 09:56:52.064	Call C								
1	22145...	PCMU...	1	0.00 / 0	0.00 / 0	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00	0.00	0.00	0
2	22117...	PCMU...	1	0.00 / 0	0.00 / 0	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00	0.00	0.00	0
Call#000002	Caller:0001@192.168.40.245	Callee:0001@192.168.20.20	CallId:GLPG1421035128143618	Call StartTime:2011-11-23 09:56:59.475	Call C								
1	22141...	PCMU...	1	0.00 / 0	0.00 / 0	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00	0.00	0.00	0
2	22194...	PCMU...	1	0.00 / 0	0.00 / 0	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00	0.00	0.00	0
Call#000003	Caller:0002@192.168.40.245	Callee:0002@192.168.20.20	CallId:GLPG1428645128143624	Call StartTime:2011-11-23 09:57:07.082	Call C								
3	22137...	PCMU...	1	0.00 / 0	0.00 / 0	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00	0.00	0.00	0
3	22168...	PCMU...	1	0.00 / 0	0.00 / 0	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00	0.00	0.00	0

Active Calls

Counter Type Counters

Total Packet Count 8472
Total Calls 67
Active Calls 0
Completed Calls 24
Expired Calls(Completed) 0

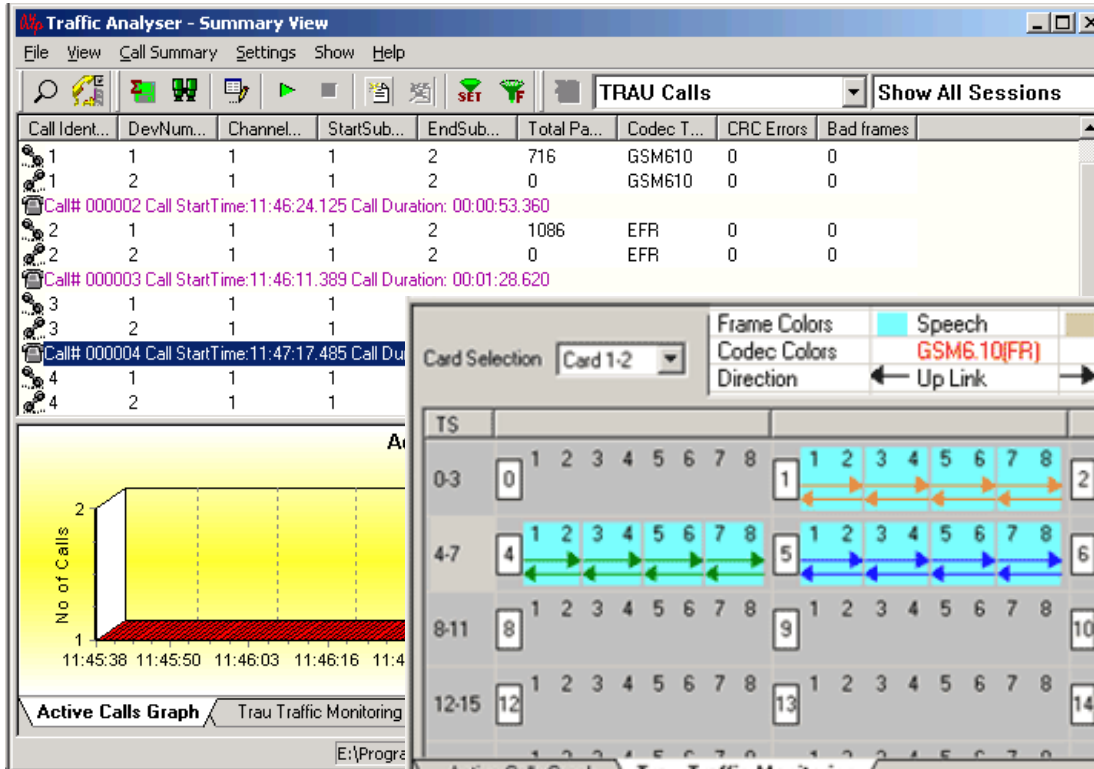
Counter Type Counters

Total SIP Packets 2904
SIP Calls 67
SIP Active Calls 0

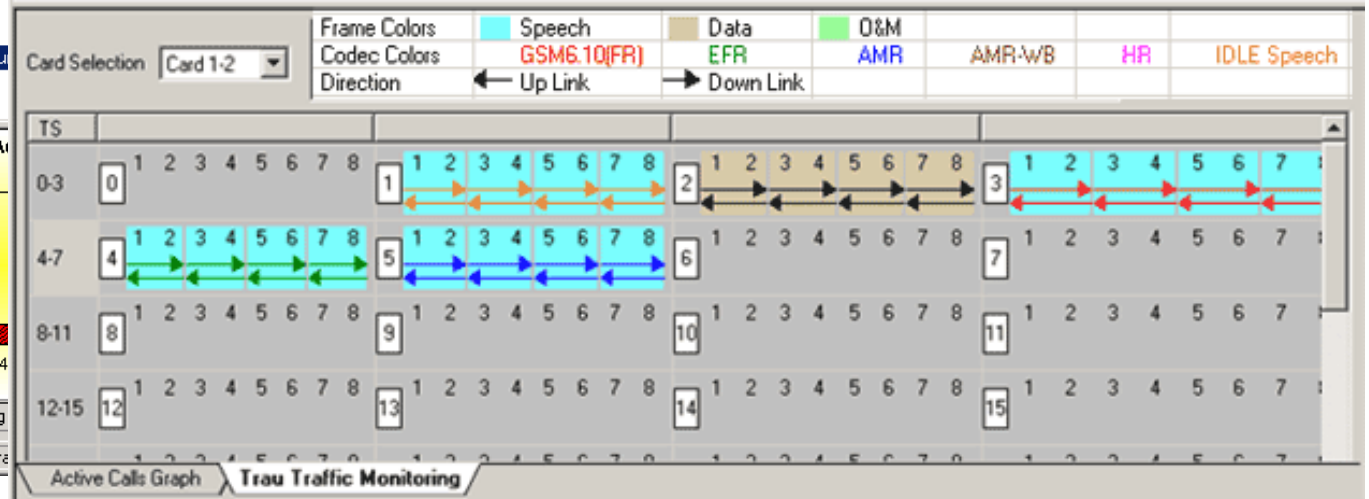
Active Calls Graph Average Jitter Distribution E-Model RTP Packets Graph SIP / H323 \ RTP \ MEGACO /

Protocol Analysis

TRAU Packet Data Analysis - Active Calls Graphs



TRAU Traffic Monitoring



Protocol Emulation

GSM Call Generation

The screenshot shows the 'Call Generation - MTC_BulkCall' application window. It features a table with columns: Sr No, Script Name, Profile, Call Info, Script Execution, Status, Events, Events Profile, Result, Total Iterations, and Completed Iterations. Below the table are buttons for 'Add', 'Delete', 'Insert', 'Start', 'Abort', 'Refresh', and 'Start'. At the bottom, there are tabs for 'Scripts', 'Message Sequence', 'Event Config', 'Script Flow', and 'Profile'. The 'Message Sequence' tab is active, showing a diagram between 'MAPS' and 'DUT' with a 'PAGING CoMmand' arrow pointing from MAPS to DUT at 11:44:13.296000.

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Profile	Result	Total Iterations	Completed Iterations
1	BSC_MTC_Ce...	Pro0.xrn	0x99999999	Abort		None		Pass	Infinite	0
2	BSC_MTC_Ce...	Pro1.xrn	0x22222222	Start		None		Pass	1	0
3	BSC_MTC_Ce...	Pro2.xrn	0x33333333	Start		None		Pass	Infinite	0
4	BSC_MTC_Ce...	Pro3.xrn	0x44444444	Abort		None		Pass	Infinite	0
5	BSC_MTC_Ce...	Pro4.xrn	0x55555555	Start		None		Pass	Infinite	0
6	BSC_MTC_Ce...	Pro5.xrn	0x66666666	Abort		None		Pass	Infinite	0
7	BSC_MTC_Ce...	Pro6.xrn	0x77777777	Abort		None		Pass	Infinite	0
8	BSC_MTC_Ce...	Pro7.xrn	0x88888888	Abort		None		Pass	Infinite	0

GSM Call Reception

The screenshot shows the 'Call Reception' application window. It features a table with columns: Sr No, Script Name, Call Info, Script Execution, Status, Events, Events Profile, and Results. Below the table are buttons for 'Abort', 'Auto Trash', and 'Trash'. At the bottom, there are tabs for 'Scripts', 'Message Sequence', 'Event Config', 'Script Flow', and 'Profile'. The 'Message Sequence' tab is active, showing a diagram between 'MAPS' and 'DUT' with several arrows: 'PAGING CoMmand' (11:41:58.421000), 'CHANnel ReQuireD' (11:41:58.421000), 'Immediate Assignment' (11:41:59.515000), 'PAGING RESPONSE' (11:41:59.515000), and 'AUTHENTICATION REQUEST' (11:41:59.859000). To the right, a 'BTSM Layer' window displays a list of protocol parameters and their values.

Sr No	Script Name	Call Info	Script Execution	Status	Events	Events Profile	Results
1	MTC.gls	9341141850	Abort	Transmitting File	Terminate		Pass
2	MTC.gls	9341141851	Completed	Establishing TRAU session	None		Pass
3	RX_Channel Activat...	4	Completed	Transmitting File	None		Pass
4	MTC.gls	9341141852	Abort	Transmitting File	Terminate		Pass
5	RX_Channel Activat...	4	Completed	Transmitting File	None		Pass
6	MTC.gls	9341141853	Abort	Transmitting File	Terminate		Pass
7	RX_Channel Activat...	4	Completed	Transmitting File	None		Pass
8	MTC.gls	9341141854	Abort	Transmitting File	Terminate		Pass
9	RX_Channel Activat...	4	Completed	Transmitting File	None		Pass
10	RX_Channel Activat...	4	Completed	Transmitting File	None		Pass
11	MTC.gls	9341141855	Abort	Transmitting File	Terminate		Pass
12	RX_Channel Activat...	4	Completed	Transmitting File	None		Pass
13	MTC.gls	9341141856	Abort	Transmitting File	Terminate		Pass
14	MTC.gls	9341141857	Completed	RR Connection Failed	None		Unknown

Thank You