
tScan16™ - High-Density T1 E1 Analysis Tool

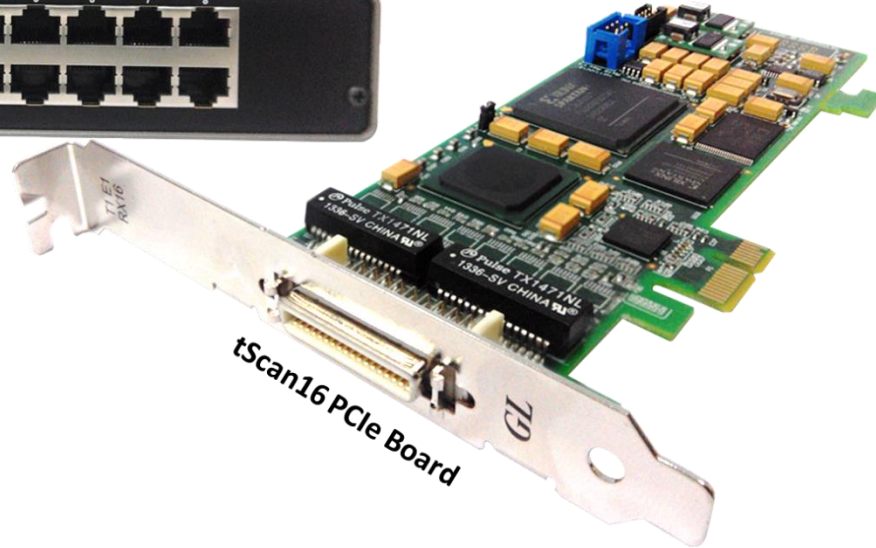
(16 T1 E1 Rx Only Ports)



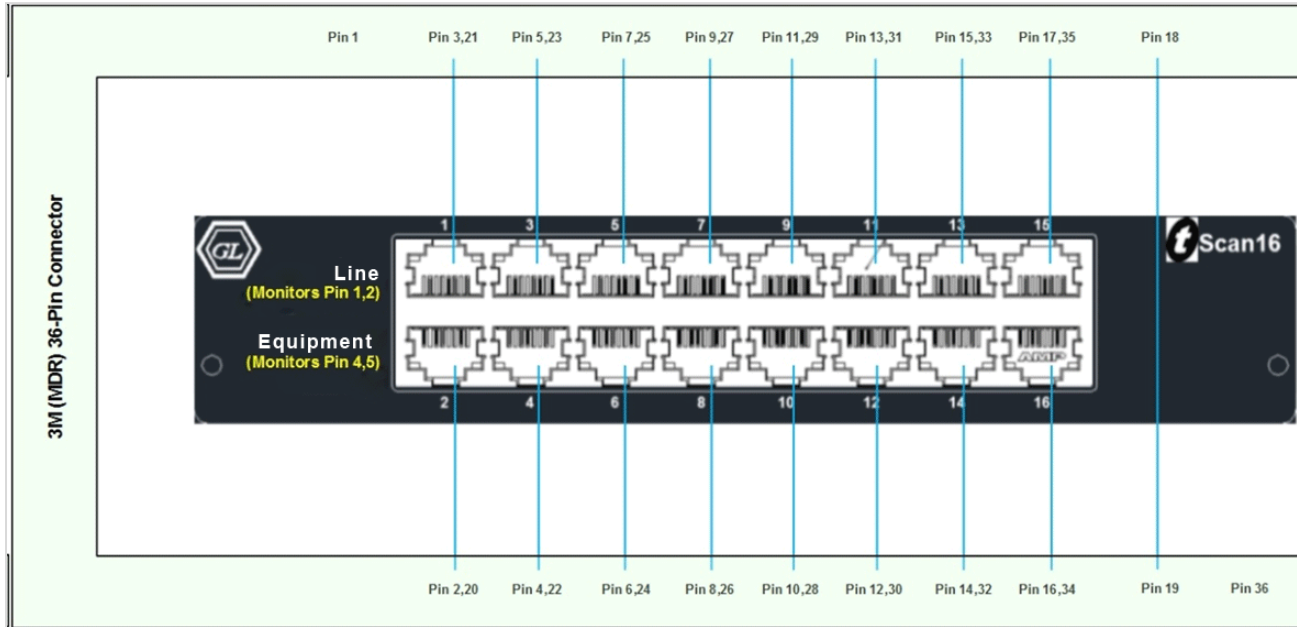
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PCIe based tScan16™ T1 E1 Board

16 Dual RJ45c Jacks Breakout Box

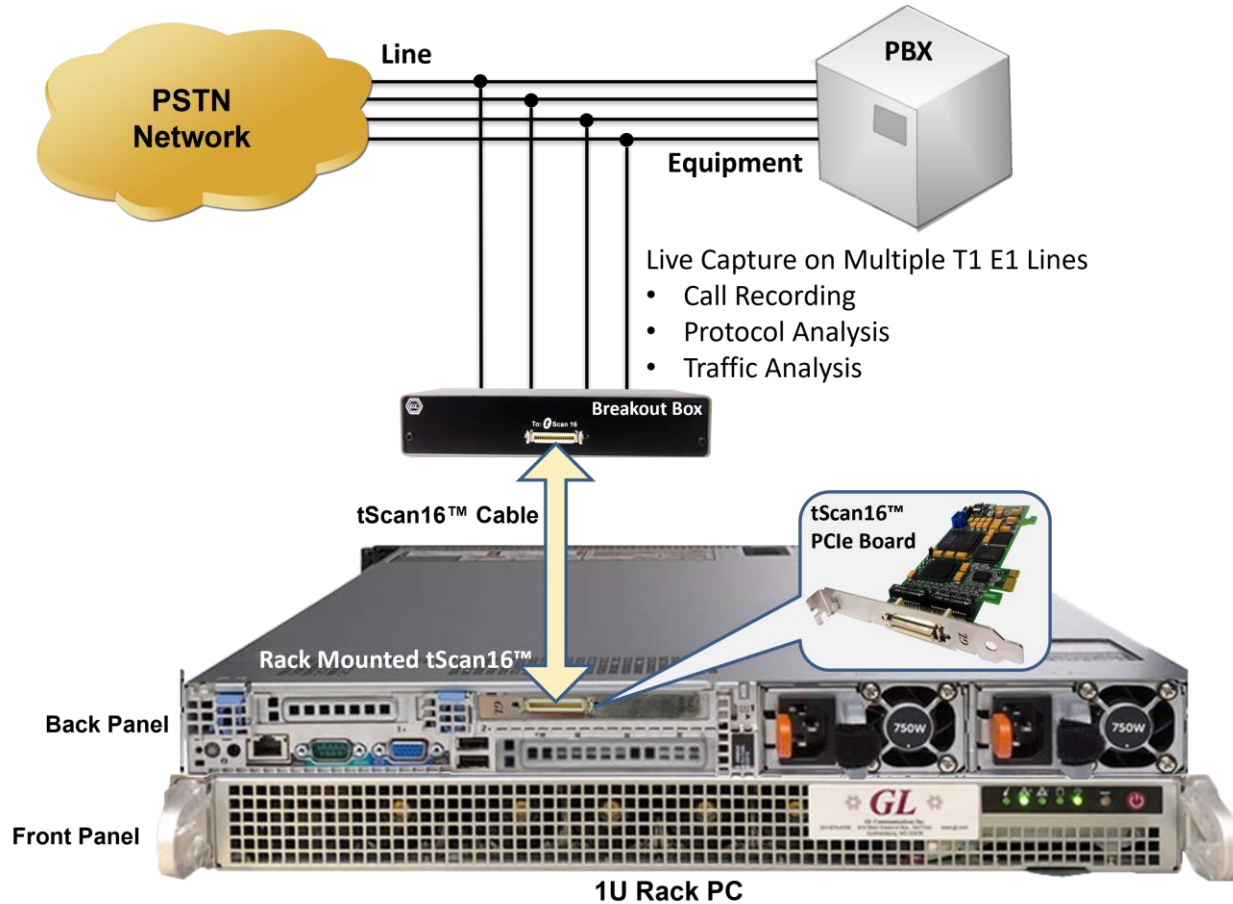


tScan16™ Breakout Box- Pinout (MDR 36-pin Connector)



- The tScan16™ Breakout Box is used to receive the T1/E1 traffic on 16 ports for tScan16™ application
- Consists of 8 pairs of Line and Equipment RJ45c ports

Working Principle



Why is this tool 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

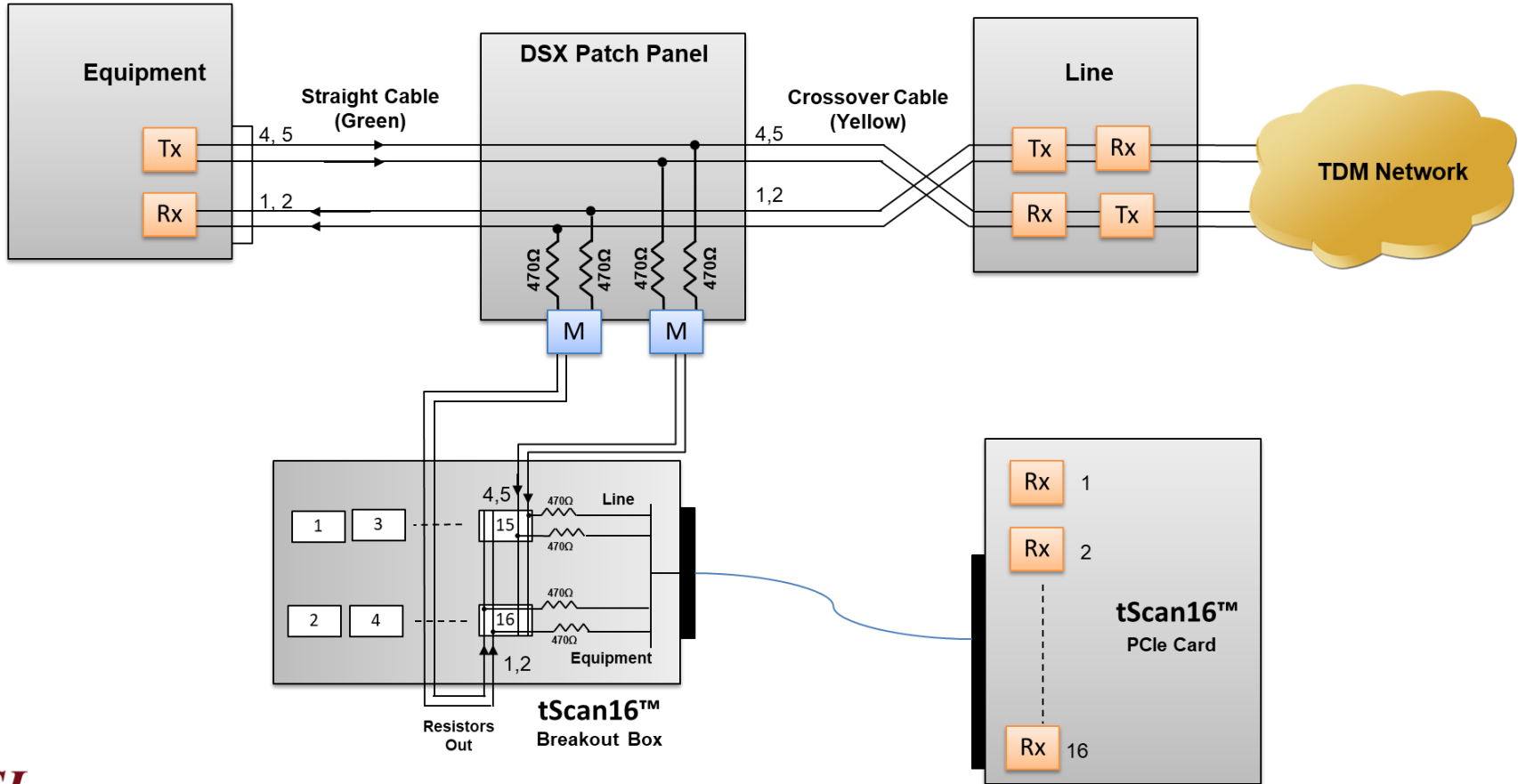
Main Features

- Software selectable 16 Rx Only T1 or E1 interfaces
- Convenient High-density Cabling
- Monitor T1/E1 line conditions such as frame errors, bipolar violations, alarms, frequency, power level, and clock (or frame/bit) slips
- Analysis of ISDN, SS7, Frame Relay, Multilink Frame Relay, PPP and Multilink PPP, HDLC, and many more protocols
- Comprehensive analysis of Voice, Data, Fax, Protocols, and Digital signals, including Echo and Voice Quality testing
- Call Recording, Analysis, and Monitoring for hundreds to thousands of calls in one platform
- The data (Signaling, and Traffic Call Data Records) collected at probe-level are stored into a relational database (Oracle) using Open Database Connectivity
- With the use of NetSurveyorWeb™ application, the real-time and historic call data records can be accessed using simple web browser interface for remote or local monitoring

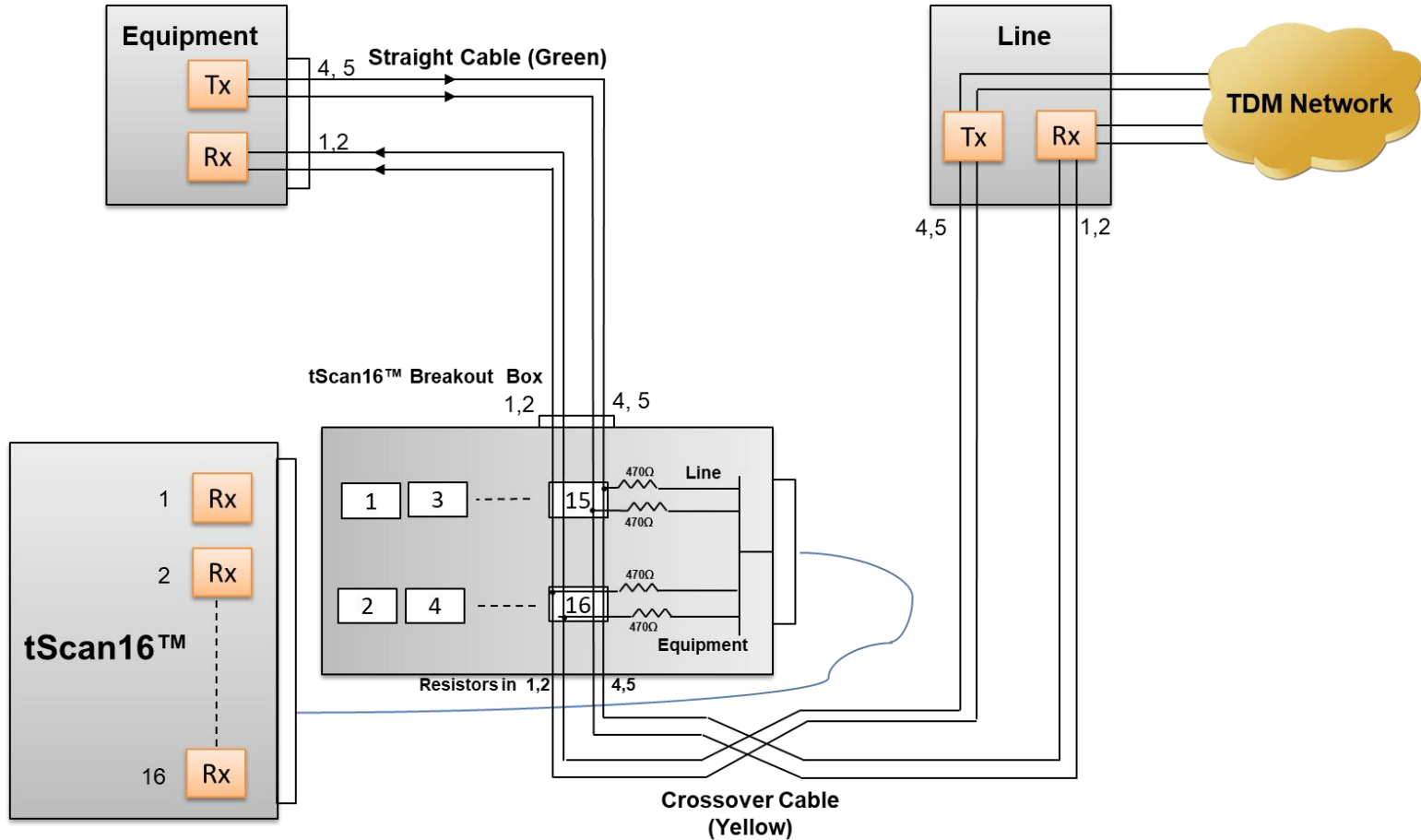
Quad and Octal Cards vs tScan16™ Cards

Feature	Quad, Octal T1 E1 Boards	tScan16™ T1/E1 Boards
Number of Ports	4, 8	16 (Rx only) 31x16 = 496 timeslots for E1 24x16 = 384 timeslots for T1
Board Height:	Standard PCIe board	Standard PCIe board or 2U
PC Bus:	PCIe v1.1 x1	PCIe v1.1 x1
Adapter Board:	Quad: none; Octal: 4 port daughterboard	16 port RJ45 breakout board with MDR 36-Pin Connector (3M Mini D Ribbon cable) to interface with main board
T1/E1 Connectors:	RJ-45	RJ-45 with Inline Monitoring T1/E1
T1/E1 Termination modes:	Terminate, Bridge, Monitor	Terminate and Monitor (on main board)
T1/E1 interface modes:	Normal Mode, Cross-port Through Mode	Receive Only into main board. Breakout adaptor board connects equipment side and line side using RJ45 connector.

tScan™ with DSX1 Patch Panel

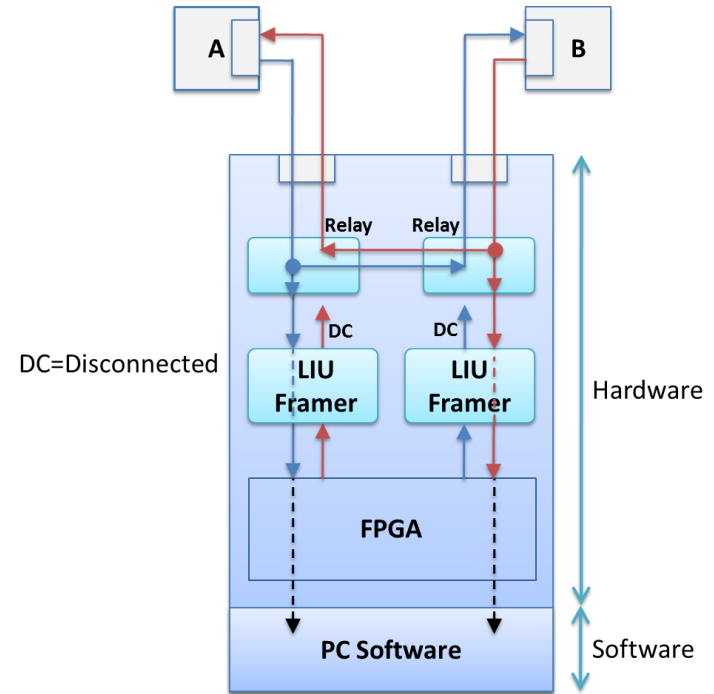


tScan™ without DSX1 Patch Panel



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 thru relays and eliminates complex cabling
 - The signal received on Port 2 is transmitted out onto Port 1
- Port 1

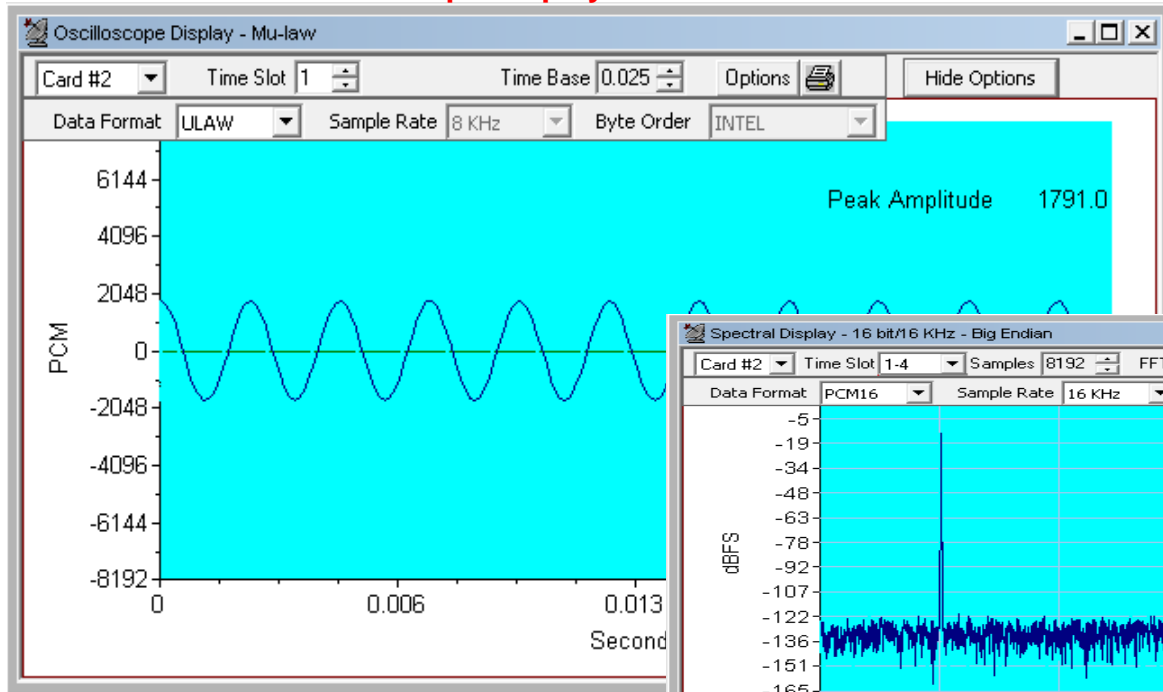


T1 E1 Basic Software

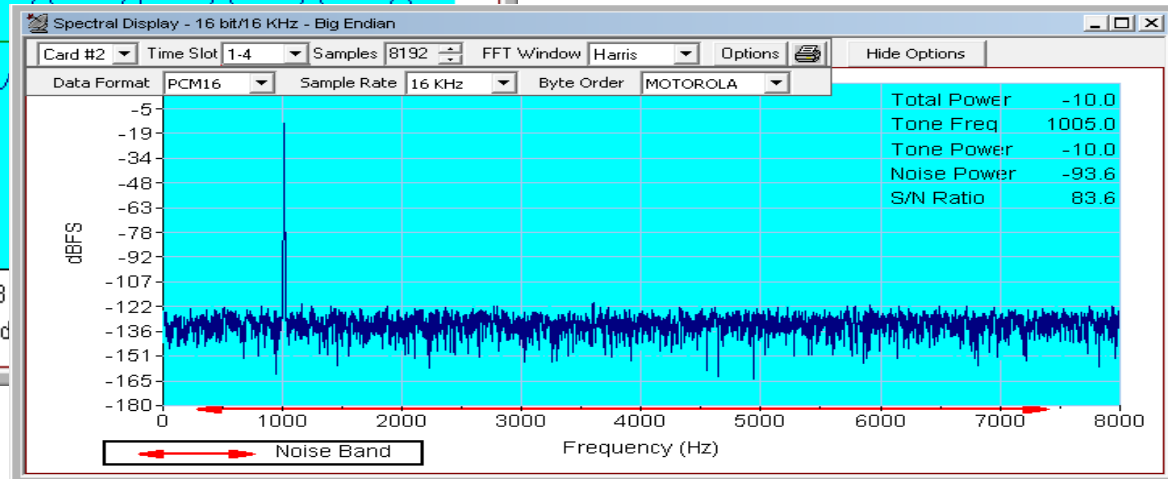
- T1 E1 Basic Software
 - Monitoring Options
 - Intrusive Testing
 - Windows Client / Server
 - Remote access to T1/E1 server
 - Clients – Python and Java
- Monitoring Features
 - Byte Values & Binary Byte Values
 - Signaling bits, Power Level, DC Offset, & Frequency
 - Multi-frames, and Real-time Multi-frames
 - T1/E1 Data as Real-time Bitmap
 - Timeslot Window
 - ASCII Timeslot Display
 - Oscilloscope & Power Spectral
 - Active Voice Level
- Intrusive Testing
 - Bit Error Rate Test
 - Enhanced BERT

Monitoring Features

Oscilloscope Display



Spectral Display



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, Signaling Bit Transitions
- Captured Dialed Digits
- Realtime Strip Chart
- Realtime Multichannel Audio Bridge
- Capture, Analysis, & Emulation
 - Call Capture and Analysis (CCA)
 - Multiple Call Capture and Analysis
- 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
- Protocol Identifier
- Multi-Channel BERT
- Multiplex / Demultiplex Software
- Network Surveillance

Protocol Identifier and Analyzer

Protocol Identifier

PC Protocol Classifier

Config Views Help

Protocol Sel: TRAU Protocol Color Selection Log Statistics

TS	Port 1								Port 2							
	SubChannel								SubChannel							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
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	HDLC								HDLC							
11	MTP2								HDLC							
12																
13																
14																
15																
16	HDLC								LAPD							

Protocol Color Selection

- ALL
- TRAU
- ATM
- HDLC
- MTP2
- LAPD
- SS7
- PPP
- ISDN
- GSM
- GSMABIS
- FRAMERELAY

Reset Stop Refresh

SS1 Analyzer & Emulator

Spectral Display

Parameter	Low Reject	Low Accept	Standard	High Accept	High Reject
Initial Mark (2600 Hz) duration (ms)	95	95	100	105	150
Nominal Mark (2600 Hz) duration (ms)	30	55	58	65	120
Nominal Space (2400 Hz) duration (ms)	20	35	42	45	90
Final Space (2400 Hz) duration (ms)	150	200	225	(no limit)	(no limit)
Privacy Set duration (ms)	130	390	400	410	(no limit)
Privacy Release duration (ms)	610	995	1000	1005	(no limit)
Mark (2600 Hz) frequency (Hz)	2563	2597	2600	2603	2637
Space (2400 Hz) frequency (Hz)	2366	2392	2400	2408	2434
Signal power range (dBm0)	-24	-10	-8	-6	3

Call Capture and Analysis

Call Capture & Analysis

Multiple Call Capture - UsbE1 Card #1 and #2

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

01	02	03	04	05	06	07	0
16	17	18	19	20	21	22	23

Multiple Call Capture & Analysis

Multi Call Capture for Manual - Untitled

File Edit Trigger Options Process

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

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

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	00:00:00.008625	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					
✓ 2	1-31		5	00:00:09.994625	14					
✓ 2	1-31		6	00:00:10.082625	14					
✓ 1	1-31		7	00:00:10.000000	14					

Card1 TimeSlots=1-31 Frame=0 at 00:00:00.000000 OK Len=14
HDLC Frame Data + FCS
===== PPP Link Layer =====
Address = 11111111
Ctl = 00000011
Protocol = 11000000
===== Link Control Layer =====
Code = 00001000
Identifier = 172 (xÅ
Length = 8 (x000
Media Number = 10041000

Hex Dump of the Frame Data
+-----+-----+-----+-----+-----+-----+-----+-----+
FF 03 C0 21 09 AC 00 08 09 DC 19 2E 85 63 y Å!

Off-line Viewing D:\misc\MLPPP.hdl

PPP Packet Data Analysis

Traffic Analyzer - Summary View

File View Call Summary Settings Help

Sip Calls Show All Sessions

Call #	SSRC	Payload	Packet Received	Conversat MOS/R...	Listening MOS/R...	Packets Discard...	Missing Packets...	Duplicate Packets...	Out Of Sequen...	Average Gap(ms)	Average Delay	Average Jitter	Average Inter Ar
Call#0000001	0001@192.168.40.245	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
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
1	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#0000002	0001@192.168.40.245	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	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#0000003	0002@192.168.40.245	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	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
Purged Calls(Completed)	0

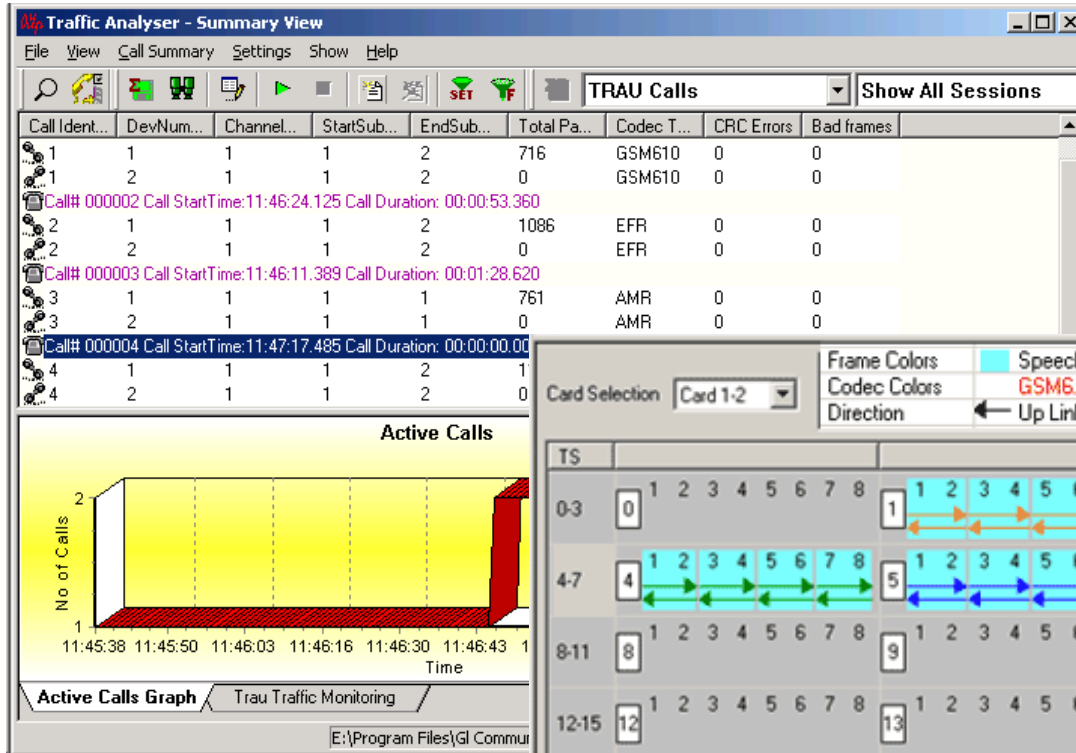
Counter Type Counters

Total SIP Packets	2904
SIP Calls	67
SIP Active Calls	0

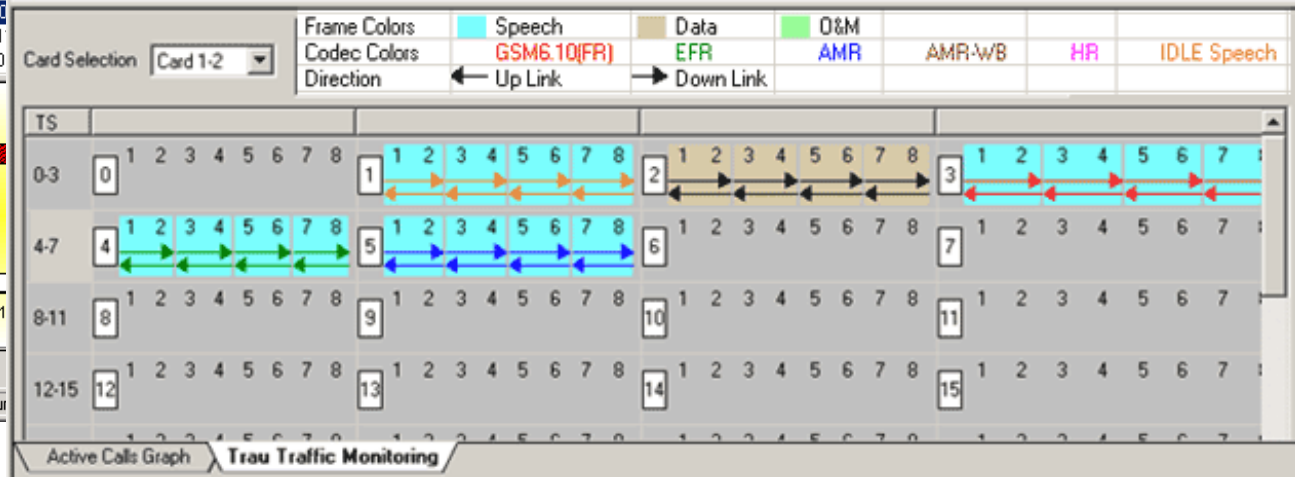
Active Calls Graph Average Jitter Distribution E-Model RTP Packets Graph SIP / H323 / RTP / MEGACO

Protocol Analysis (Contd.)

TRAU Packet Data Analysis - Active Calls Graphs



TRAU Traffic Monitoring



Thank you