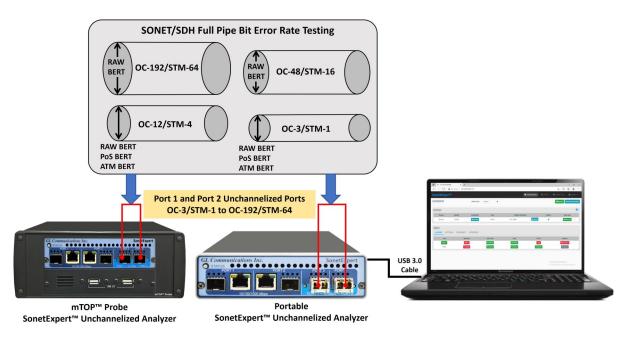
SonetExpert[™] Unchannelized Analyzer

(OC-3 / STM-1, OC-12 / STM-4, OC-48/STM-16 and OC-192/STM-64)



Overview

A majority of the backbone transport for voice, video and data applications continues to be SONET and SDH optical transmission networks. SONET and SDH transmission network also continue to be used for conventional channelized traffic – carrying many TDM T1, E1, T3, and E3 pipes.

GL's SonetExpert[™] portable hardware and application supports SONET/SDH Emulation and Analysis:

- SonetExpert[™] Channelized Emulation/Analysis for OC-3/12, STM-1/4 (for more details, refer to **SonetExpert-Channelized-Analyzer-**Brochure)
- SonetExpert[™] Unchannelized Emulation/Analysis for OC-3/STM-1 to OC-192/STM-64

GL's SonetExpert[™] Unchannelized Analyzer is capable of SONET/SDH testing over OC-3/STM-1, OC-12/STM-4, OC-48/STM-16 and OC-192/STM-64 transports. It is based on the PacketExpert[™]/SonetExpert[™] hardware platform. PacketExpert[™]/SonetExpert[™] hardware platform is a versatile hardware platform that supports both Ethernet (up to 10G) and SONET/SDH (up to OC-192/STM-64) testing. Two ports support SONET/SDH testing. Multiple hardware units can be connected to a single PC to increase test port density. The hardware/software is controlled through a web interface, and is accessed using any browser running on any device like PC, Laptop, Tablet etc. Unchannelized Analyzer supports RAW format BERT up to OC-192/STM-64 and various applications for OC-3/STM-1 and OC-12/STM-4 ATM (Asynchronous Transfer Mode) and PoS (Packet over SONET).

The ATM Analyzer is used to analyze and decode different ATM protocols like RAW ATM cells, AAL2 Protocols (CPS-SDU, SSSAR-SDU, and SSCS), AAL5 (CPCS), UNI and others across U plane and C plane of UNI and NNI interface. The analyzer can also decode ATM frames constituting Classical IP over ATM and traditional SS7 Stack (ISUP, SCCP, MAP, CAMEL(CAP) etc.) over ATM.

The PoS Analyzer captures a host of PoS protocols exchanged between the two nodes over SONET and provides useful analysis, which includes distribution of protocols, protocol fields, frame lengths, and frame status.

Various platforms are offered, including a <u>High-Density mTOP[™]</u> 1U/2U rack mount enclosures within which multiple SonetExpert[™] hardware units are stacked to provide high density form factor solution for testing multiple SONET/SDH lines.

GL also offers stand-alone <u>mTOP[™] Probe</u> hardware variant of SonetExpert[™], where a SonetExpert[™] hardware unit is coupled with a built in SBC (Single Board Computer), to make it a compact, portable toll, ideal for field testing.

More details are provided below, and visit at <u>SonetExpert[™] Unchannelized Analyzer</u> webpage.



818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A (Web) <u>www.gl.com</u> - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) <u>info@gl.com</u>

Bit Error Rate testing (BERT):	 SonetExpert[™] can perform Unchannelized BER Testing over OC-3/STM-1, OC-12/STM-4, OC-48/STM-16 and OC-192/STM-64 SONET/SDH rates. It treats the entire OC-3 to OC-192 as a single big pipe and transmits/analyzes BERT traffic as a whole for the entire pipe i.e. using concatenated STS-3c/STS-12c/STS-48c/STS-192c signals. This helps to test and qualify the entire SONET/SDH Pipe, before delving into smaller pipes carried within Also supports BERT over PoS and ATM payloads on OC-3/STM-1 and OC-12/STM-4
Alarms/Error Monitoring:	 GL's SonetExpert[™] application monitors and reports various SONET/SDH Alarms (Section/Path/Line as well as BERT Alarms) in real time Alarms are also plotted in a graph and up to 7 days of alarm data can be viewed in the graph. Alarm generation and Error insertion also supported Supports Loss of Signal and Loss of Frames hardware alarms indication
Protocol Analysis	 PoS/ATM/RAW captured traffic can be analyzed in real time (for OC-3/STM-1 and OC-12/STM-4) Protocol Analysis provides detailed analysis of higher layer protocols (for PoS and ATM) and decode of SONET/SDH frames in real time on both ports simultaneously
Record and Playback	 SonetExpert[™] supports capturing wirespeed traffic (for OC-3/STM-1 and OC-12/STM-4) traffic on two ports simultaneously to a file on hard disk, with hardware filtering and timestamping The captured traffic can be played back from file on both ports simultaneously In PoS mode, PPP packets are captured, in ATM mode ATM cells are captured, and in RAW mode, RAW SONET/SDH frames are captured Similarly for playback, PPP packets/ATM cells/RAW SONET/SDH frames can be played back on a single port or on both ports
SCAN incoming SONET/ SDH traffic and identify the traffic structure	 Scans the incoming traffic on SONET/SDH interfaces, identifies and displays the traffic structure SCAN application supported on OC-3/STM-1, OC-12/STM-4, OC-48/STM-16 and OC-192/STM-64 rates Traffic structure up to STS-3c is identified and displayed in the main display, with different colors clearly indicating equipped or unequipped channels Provides complete overview of the incoming SONET/SDH traffic in an easy and intuitive graphical display and helps technicians to quickly identify the structure of unknown SONET/SDH traffic User selectable SONET or SDH terminology supported on both the ports independently.
Web based software	 Software is provided as a web interface, accessed from any standard web browser, allowing access from different devices like PCs/Laptops/Tablets etc. and also from different operating systems like Windows®/Linux®/Android® etc. The web interface enables multiple users to connect to a single web server and independently run tests on different hardware units. Using the mTOP™ probe unit to run the web server facilitates portable field testing, allowing users to access the software features using a Tablet running a browser

Main Features



Web Interface

SonetExpert[™] Unchannelized software is provided in the form of an easy to use and intuitive web interface. All the functionalities can be accessed from any standard web browser. This makes it convenient to control the hardware from multiple locations and from multiple access devices like a PC, laptop and even a tablet. Also, the client machine can be any operating systems such as Windows[®]/Linux[®]/Android[®] etc. as long as web browser can run on it.

inetSDHI	Expert™					🙆 Dasl	nboard 🗮 Ports	🛢 Event Log 🛛 🖪 Admi
Dashboard			SONET/S	DH SONET	×		I	Servers i Device Information
Devices								•
Device		Serial#	Availability	User	Module Selection	n	Status	Open App
Device1		188544	Reserved	Admin	OC3 - BERT	L Unload	٠	🖪 Open App
Ports							ී Reset	All All Ports Laser ON OFF
Alarms	Settings	Frequency	Interface					
P	ort	Laser	Int	erface	SECTION	LINE	PATH	Pattern
Po	ort1	Laser ON	N	lo Alarms	No Alarms	No Alarms	No Alarms	No Alarms
Po	ort2	Laser ON	N	lo Alarms	No Alarms	No Alarms	No Alarms	No Alarms

Figure: SonetExpert[™] Unchannelized Analyzer Web Interface



Bit Error Rate (BER) Testing

BERT:

- BERT over RAW SONET/SDH supported over OC-3/STM-1, OC-12/STM-4, OC-48/STM-16 and OC-192/STM-64
- BERT over PoS supported over OC-3/STM-1 and OC-12/STM-4
- BERT over ATM supported over OC-3/STM-1 and OC-12/STM-4

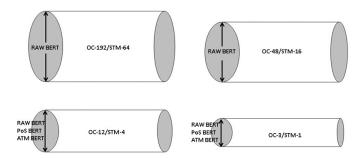


Figure: Whole Pipe Testing

- BERT testing can be done on 2 ports simultaneously
- Industry standard PRBS patterns supported 2⁹-1, 2¹¹-1, 2¹⁵-1, 2²⁰-1, 2²³-1, 2²⁹-1, 2³¹-1
- Reports Pattern Sync loss count and seconds, Bit Error Rate/count and seconds, Error/Error free seconds
- Bit Error and Sync Loss Alarms are displayed along with other alarms for comprehensive alarm monitoring in a single screen

	ERT Impairm	nents Grapi	h Sonet Ir	nterface	System Monitor				
Interface						Section			
Alarms		Status			Seconds	Alarms	Status	Seconds	
LOS		•			0	Loss Of Frame	•	0	
Rx Frequency	1	•			0	B1 BIP	•	0	
Rx Power		•			0	Out Of Frame	•	0	
Tx Frequency		•			0				
Tx Power		•			0	Line			
						Alarms	Status	Seconds	
BERT Alarms						AIS-L	•	0	
Alarm		Status	s	Reconds	Count	RDI-L	•	0	
Bit Error		•		0	0	B2 BIP	•	0	
Sync Loss		•		0	0	REI-L	•	0	
Frequency						Path			
Name	Freq (Hz)	Freq Deviation (ppm)	Alarm/Warning	Details	Freq Max Deviation (ppm)	Alarms	Status	Seconds	
Rx Frequency	622,080,004	0			0	AIS-P		0	
Tx	con 000 000	0			0	Loss		0	
Frequency	622,080,000	0			v	BDI-P		0	
								0	
CED Roal Time	Disgnostics					UNEO-P	•		
SFP Real Time	Diagnostics	Value	Alarm/Warning		Details	UNEQ-P B3 BIP	•	0	
Name		Value	Alarm/Warning		Details				
Name Rx Power (dB	3m)		Alarm/Warning		Details	B3 BIP	•	0	
Name	3m)	-4.96	Alarm/Warning		Details	B3 BIP REI-P	•	0	
Name Rx Power (dB	3m)	-4.96	Alarm/Warning		Details	B3 BIP REI-P PLM	•	0 0 0	
Name Rx Power (dB	3m)	-4.96	Alarm/Warning		Details	B3 BIP REI-P PLM All Ones	•	0 0 0	

Figure: All Alarms

Alarms				Status		
Alarm	Status	Seconds	Count	Description	Тх	Rx
Bit Error	٠	0	0	Status	Running	Running
Sync Loss	•	0	0	Running Time	11	13
				Start Time	Wed Apr 17 2024 09:58:13	Wed Apr 17 2024 09:58:1
Bits Analysis				End Time		
	Instant	aneous	Total			
Bit Error Rate		0.00e+0	0.00e+0			
Bit Error Count		0	0			
Bits Received	599,	040,000	4,071,375,360			
Time						
Total Seconds	Error Secon	de Error	Free Seconds			

Figure: BERT Results

Bit Error Rate (BERT) Testing (Contd.)

Graph:

- All SONET/SDH alarms, Interface related alarms like Tx/Rx Frequency, Power, Sync Loss, and Bit Error events are plotted in a real time "Event Graph"
- Events are grouped into major groups and plotted in the graph. For example, Bit Error and Sync loss events are grouped under Bert group, all Path alarms under Path group, all Line alarms under Line group, all Section alarms under Section group, all Interface related alarms under Interface group. User can click any event plotted on the graph, and the details of all the alarms present for the event will be displayed next to the graph including all the alarms present within each group



Figure: BERT Graph

- Up to 7 days of history data for all events are available in the graph and can be drilled down to the second level
- Minute/Hour/Day/7 days views available. User can switch between views anytime. At larger time scales, the results are summarized over appropriate time periods for easy event viewing

Impairment Generation:

- Alarm generation generate LOF, AIS-L, RDI-L, AIS-P, LOP-P, RDI-P, UNEQ-P alarms
- Error Insertion insert B1/B2/B3, REI-L, REI-P errors both Single as well as rate (10⁻⁴ to 10⁻⁹)
- Bit error insertion insert Single as well as Rate bit errors rate (10⁻³ to 10⁻⁹)



Bit Error Rate (BERT) Testing (Contd.)

PoS and ATM BERT:

• User defined PoS Header fields – user can define various IP/UDP fields like Source/Destination IP Addresses/ UDP ports etc.

figuration			•	onfigurati	on Result	3		I	🖺 Apply	Default	× Cance
	Header Configuration	Tx Configura	Tx/Rx (Coupled	Header	Configuration	Rx Configur	ation			
	Source IP Address	192.168			s	Source IP Address	192.16	3.1.200	🗌 Any		
	Destination IP Address	192.168			Desti	nation IP Address	192.16	8.1.100	Any		
	TOS/DS	0				Protocol	17 (Any			
	TTL					leader Checksum	00-00		Compute		
		128									
	Protocol		IDP								
	Header Checksum	00-00	Auto Compute			Source Port	2000	C Any			
	Identification	00-00	Auto Increment			Destination Port	1000	C Any			
		UDP 🗹				UDP Checksum	00-00	Auto	Compute		
	Source Port	1000									
	Destination Port	2000									
	UDP Checksum	00-00	Auto Compute								
	Payload Configuration	Tx Configura	Tx/Rx (oupled	Payload	Configuration F	Rx Configura	ition			
	Pattern Type	PRBS_2				Pattern Type	PRBS_2	E9_1	•		
	, and the pro-		t Pattern				🗌 Inve	t Pattern			
			Frame Size and Rate	Tx C	ionfiguration						
			Frame	Size	1518						
				Rate	100	% v					

Figure: PoS Header Fields

• User defined ATM Header fields – user can define various ATM header fields like UNI/NNI choice, GFC, VPI/VCI etc.

Configu	uration	Results
ATM Header Fields		Tx/Rx Coupled
T	x/Rx Configura	ation
User/Network Interface	INI O	NNI
Generic Flow Control	1	(0-15)
Virtual Path Identifier	2	(0-255)
Virtual Channel Identifier	3	(0-65535)
Payload Type	1	(0-7)
Cell Loss Priority	1	(0-1)
Payload Configuration		Tx/Rx Coupled
T	x/Rx Configura	ation
Pattern Type	PRBS_28	E9_1 🔻
	Invert	Pattern
Traffic Rate		
	Tx Configurat	ion
Bandwidth Type	%	•
Bandwidth Rate	100	(0.01-100)

Figure: ATM Header Fields

Alarms/Error Monitoring

• Monitors and reports all SONET/SDH alarms - Section, Line, Path alarms (SONET) or RSOH, MSOH, HP alarms (SDH)

Section/RSOH Alarms

SONET (Section)	SDH (RSOH)					
Loss of Frame						
B1	BIP					
Out of Frame alarm						

Line/MSOH Alarms

SONET (Line)	SDH (MSOH)
AIS-L	MS-AIS
RDI-L	MS-RDI
B2 BIP	B2 BIP
REI-L	MS-REI

Path/HP Alarms

SONET (Path)	SDH (HP)
AIS-P	AU-AIS
LOP-P	AU-LOP
Loss	Loss
RDI-P	HP-RDI
UNEQ-P	HP-UNEQ
B3 BIP	B3 BIP
REI-P	HP-REI
PLM	PLM
All Ones	All Ones
OC Levels	STM Levels

- Status LED display for each alarm shows No Error (Green), History (Yellow) and Error (Red) for easy identification
- Count and seconds displayed for each alarm
- User selectable SONET or SDH terminology

SECTION				RSOH			
Alarms	Status	Seconds	Count	Alarms	Status	Seconds	Count
Loss Of Frame	•	0	0	Loss Of Frame	•	0	0
B1 BIP	•	0	0	B1 BIP	•	0	0
Out Of Frame	•	0	0	Out Of Frame	•	0	0
LINE				MSOH			
Alarms	Status	Seconds	Count	Alarms	Status	Seconds	Count
AIS-L	•	0	0	MS-AIS	٠	0	0
RDI-L	•	0	0	MS-RDI	•	0	0
B2 BIP	•	0	0	B2 BIP	•	0	0
REI-L	•	0	0	MS-REI	٠	0	0
PATH				HP			
Alarms	Status	Seconds	Count	Alarms	Status	Seconds	Count
AIS-P	•	0	0	AU-AIS	•	0	0
LOP-P	•	0	0	AU-LOP	•	0	0
Loss	•	0	0	Loss	•	0	0
RDI-P	•	0	0	HP-RDI	•	0	0
UNEQ-P	•	0	0	HP-UNEQ	•	0	0
B3 BIP	•	0	0	B3 BIP	•	0	0
REI-P	•	0	0	HP-REI	•	0	0
PLM	•	0	0	PLM	•	0	0
All Ones	•	0	0	All Ones	•	0	0
OC Levels	•	0	0	STM Levels	•	0	0

Figure: SONET/SDH Alarms

Alarms/Error Monitoring (Contd.)

- Monitor and report alarm for Tx/Rx clock frequency and the frequency deviation (in ppm)
- Monitor and report alarms for SFP power (Tx/Rx power) and SFP temperature, including the SFP power/temperature alarm and warning thresholds, read from the SFP itself

Alarms BER	T Impairme	ents Graph	Sonet Interfa	sy:	stem Monitor					
FP Module Plue	gged In									
Interface						SFP Real Time Diagnost	ics			
Alarms			Status		Seconds	Name	Val	ue Alarm/	Warning	Details
LOS			•		0	Rx Power (dBm)	-4.8	3		
Rx Frequency			•		0	Tx Power (dBm)	-1.4	6		
Rx Power			•		0	Temperature (°C)	40.	5		
Tx Frequency			•		0					
Tx Power			•		0	SFP Alarm and Warning	Thresholds			
SFP Fault			•		0	Name	Low Alarm	Low Warning	High Warning	High Alarm
						Rx Power (dBm)	-20	-18.01	2.01	2.51
Frequency						Tx Power (dBm)	-7.99	-7	1	2.01
Name	Frequency (Hz)	Freq Deviation (ppm)	Alarm/Warning	Details	Freq Max Deviation (ppm)	Temperature (°C)	-3328	-2048	73	78
Rx Frequency	622,080,002	0			0					
Tx Frequency	622,080,002	0			0					

Figure: Monitor and Report Alarms

• Summary of the alarms for all ports, to let user know all the port status.

Ports					ී Reset All	All Ports Laser ON OFF
Alarms Settings	Frequency Interface					
Port	Laser	Interface	SECTION	LINE	PATH	Pattern
Port1	Laser ON	Rx Freq +2	No Alarms	No Alarms	No Alarms	No Alarms
Port2	Laser ON	Rx Freq +2	No Alarms	No Alarms	No Alarms	No Alarms



• Different colors for alarms summary for easy identification of problems - Red (Alarm Active), Yellow (Alarm History) and Green (No Alarms)

SonetSDHE	xpert™			🤁 Dashboa	rd 🗮 Ports	🛢 Event Log 🛛 🔒 Admin
Dashboard		SONET/SDH	SONET	•	e	i Device Information
Devices						
Device	Serial#	Availability	User	Module Selection	State	us Open App
Device1	188544	A Reserved	Admin	OC12 - BERT 1000	•	🖪 Open App
Ports Alarms	Settings Frequer	ncy Interface			ී Reset All	All Ports Laser ON OFF
Port	Laser	Interface	SECTION	I LINE	PATH	Pattern
Port1	Laser ON	LOS +3	No Alarn	No Alarms	No Alarms	No Alarms
Port2	Laser OFF	Tx Power +3	No Alarn	No Alarms	Pointer Adjustments +1	No Alarms

Figure: Alarms Summary with Errors

Record and Playback application

SonetExpert[™] provides two types of Error Insertion –**Bit Error Insertion** and **BIP Error Insertion**. Bit Error insertion allows inserting Bit Errors into the outgoing Tx traffic. BIP (Bit Interleaved Parity) Error insertion allows sending packets with wrong B1, B2 and B3 value.

In both the Bit Error and BIP Error Insertion types, single as well as Rate Error Insertion is supported. Single error insertion allows user to manually introduce a single Bit/BIP error. Rate Error insertion allows the user to select a constant error rate, ranging from 10^{-3} to 10^{-9} , to be introduced into the outgoing stream.

Also, user can set the H1/H2 pointer value, as well as introduce negative and positive justification into the outgoing stream. Both Single as well as rate justification can be introduced.

- Record Application
 - Capture on both ports simultaneously to a file on hard disk in GL's proprietary HDL format
 - Capture PoS traffic (PPP packets), ATM traffic (ATM cells), or RAW SONET/SDH traffic (RAW SONET/SDH frames)
 - Multiple Versatile filters (ex PPP, IP, UDP etc for PoS, VPI, VCI and other ATM Header fields for ATM) can be applied to incoming PoS/ATM traffic to capture only traffic of interest. Up to 16 hardware filters can be applied to each port. Hardware filters work at wire speed.
 - Hardware timestamping of captured traffic
 - Onboard 8GB of DDR3 RAM memory to temporarily store the captured traffic before transferring it to the PC. Out of this 8GB,
 4GB is used for the Record application and 4GB for the Playback application
 - Capture based on different criteria Size, Number of frames etc.
 - Split capture into multiple files, for easy handling of small size files
 - Multiple Record instances supported in parallel

SonetSDHExpert™		෯ Dashboard	🖺 Ports 🛛 🔺	Application 🗧	🖹 Event Log 📑 Admin
Record To File					
# Tasks 🕒 🛍		Configuration	Summary		
1 Recorder1		Select Record Type AT	IM DATAPIPE V	STOP	
	Select Ports		Select File	OC12_ATM_P1.hdl	
		Active Filter	Capture Size	00:05:00	Time 🔻
	_	0 A Details			
	Device1 / Port2 1	0 A Details			
	Split Recording				
	Status		Statistics		
	Name Value		Name		Value
	Status Running		Disk Write Byt	tes/Sec	42,194,205
	Running Time 00:00:35		Disk Write But	ffer Utilization	0
	Progress 00:00:35/00:0	5:00 hh:mm:ss (11.67%)	Packets Rece	eived	22,070,158
	Failure Reason		File Bytes Wri	itten	1,522,840,902

Figure: Record To File Application

Record and Playback application (Contd.)

- Playback Application
 - Playback from file (previously captured file) on both ports simultaneously
 - Playback PoS traffic (PPP packets), ATM traffic (ATM cells), or RAW SONET/SDH traffic (RAW SONET/SDH frames)
 - Playback on the same ports as captured, or playback on user selected ports
 - One shot playback stop playback, once end of file is reached or Continuous playback start over from the beginning once end of file is reached
 - Playback specified number of frames only and stop
 - Supports multiple playback instances in parallel, but only when multiple devices are connected. For example, one instance can
 playback on one device, while another instance can playback on another device

SonetSDHExpert™		🆚 Dashboard	🛱 Ports 🛛 🖪		🛢 Event Log	🛔 Admin
Playback From File						
# Tasks 🕒 🛍		Configuration	Summary			
1 Playback1	Server1 V	Select Playback Typ		STOP		
	Playback Ports As Per File File to Port Mapper Frames will be transmitted as per the PortId record the file. Unmatched Port Handling : Action to take when P match any physical/configured port Action Drop Frame	rded in each frame of		OC12_ATM_P1.hdl	0	
	Status	File Info		Statistics		
	Name Value	Name	Value	Name	Value	
	Status Running	Frames In File	184,168,220	Tx Frame	s 27,245,5	51
	Running 00:00:47 Time	Ports In File	0			
	Progress 27,245,551/184,168,220 (14.80)%					
	Failure Reason					

Figure: Playback Application



Protocol Analysis Applications

ATM Protocol Analysis

GL's OC-3/STM-1, OC-12/STM-4 ATM Analyzer is used to analyze and decode different ATM protocols like RAW ATM, AAL2 Protocols (CPS-SDU (Common Part Sublayer Service Data Unit)), SSSAR-SDU (Service Specific Segmentation and Reassembly Sublayer), and SSCS (Service Specific Convergence Sublayer), AAL5 (CPCS-Common Part Convergence Sublayer), UNI and others across U plane and C plane of UNI and NNI interface. The analyzer can also decode ATM frames constituting Classical IP over ATM, or CIP based networks, and traditional SS7 Stack (ISUP, SCCP, MAP, CAMEL(CAP) etc.) over ATM.

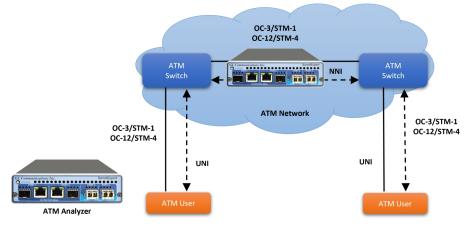


Figure: ATM in a OC-3 / STM-1 OC-12 / STM-4 Network

The ATM Analyzer can capture, decode, filter, and reassemble AAL-2 and AAL-5 frames in real-time, from within the ATM cells according to user defined VPI/VCI. The ATM Protocol Analyzer application is invoked from the application menu of GL's OC-3/STM-1, OC-12/STM-4 ATM Analyzer for real-time analysis. The analyzer displays Summary, Detail, Hex Dump, Statistics, and Call Detail Views in different panes. The Summary pane displays Dev#, Frame#, Time, Length, Error, VPI/VCI, PT and so on. User can select a frame in Summary View to analyze and decode each frame in the Detail View. The Hex Dump View displays the frame information in HEX and ASCII format.

ATM I	Protocol Analysis	AAL2,5(UNI3.1) 6	54-bit							- 0	×
			e Call Detail Records C								
Dev	TScount	Frame#	TIME (Relative)	Len		VCI	GoTo	PT	PID	Ether Type	1
					ATM	ATM	ATM	ATM	Multi Protocol Encapsulation	Multi Protocol Encapsulation	1
V 0	0	41207570	00.00.29.166894306	52	ATM-Cell	200	356	1			
V 0	0	41207571	00:00:29.166895026	52	ATM-Cell	200	356	1			
V 0	0	41207572	00:00:29.166895746	52	ATM-Cell	200	356	1			
V 0	0	41207573	00:00:29.166896364	52	ATM-Cell	200	356	1			
V 0	0	41207574	00:00:29.166897594	52	ATM-Cell	200	356	1			
/0	0	41207575	00:00:29.166898320	52	ATM-Cell	200	356	1			
/0	0	41207576	00:00:29.166898932	52	ATM-Cell	200	356	1			
/0	0	41207577	00:00:29.166899652	52	ATM-Cell	200	356	1			
/0	0	41207578	00:00:29.166900270	52	ATM-Cell	200	356	1			
/0	0	41207579	00:00:29.166900990	52	ATM-Cell	200	356	1			
<											>
0003 CL 0004 HE					1 (1) 00110 (6)						
<											
lex Dum	p of the Fr	ame Data									_
EF 59 C	5 28 D4 D0 9 A2 95 DE	27 23 1B 5D	32 F1 13 66 B5 0C C3 88 7C 98 40 68 BB E0 76 13 36 38	ì	9 I ÷D[=2ñ fµ VÅ(0Þ:≄]ÄI 4®h KyoIÞIIIkosàv 68 85						
Running, L	Itilization 0.00%			C:\	Program Files\GL Communications In	c\SonetEx Captu	red 43 136 796	frames			

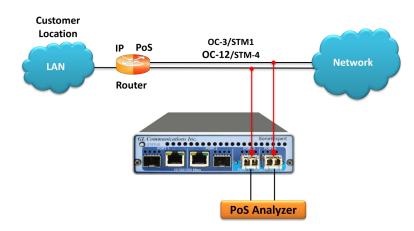
Figure : Protocol Summary, Detail, and Hex Dump Views in ATM Protocol Analysis

Protocol Analysis Applications (Contd.)

PoS Protocol Analysis

The PoS Analyzer captures a host of PoS protocols exchanged between the two nodes over SONET and provides useful analysis, which includes distribution of protocols, protocol fields, frame lengths, and frame status. User can obtain detailed analysis of the protocol and can perform various statistics measurements.

PoS Analyzer supports <u>Packet Data Analysis (PDA)</u> module, it is an outstanding tool for live monitoring of signaling and traffic over IP. PDA is distributed with GL's Packet Analyzers, allowing users to monitor live IP networks including capture, analysis, and reporting of every call in detail. Supported protocols include SIP, MEGACO, MGCP, H.323, SCCP, RANAP (UMTS IuCS), and GSM A. It can capture IP packets over different transmission lines, including IP, T1, E1, T3, E3, and OC-3 STM-1 / OC-12 STM-4. PDA then processes the captured packets, identifies, and segregates calls based on signaling and traffic parameters.





The PoS analyzer application is invoked from the application menu of GL's OC-3/STM-1 OC-12/STM-4 Analyzer for real-time analysis. The analyzer displays Summary, Detail, Statistics, and Hex Dump Views in different panes. The Summary pane displays Dev#, Frame #, Time relative, Len, Error, Layer 3 protocol, LCP code, IPCP code, BCP code, PoS Message type, Source/Destination IP address, TCP Source/Destination Port, UDP Source/Destination Port, Message Type, and so on. The User can select a frame in Summary View to analyze and decode each frame in the Detail View. The Hex Dump View displays the frame information in HEX and ASCII format.

	TIME (Relative)	Len Er	ror Protocol	Address	Source IP Address	Destination IP Address	Protocol	Source Port	Destination Port
			PPP Link	PPP Link	IPv4	IPv4	IPv4	UDP	UDP
147	00.01:31.292898180	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	45329	14563
148	00:01:31.404528162	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	20151	14563
149	00:01:31.437234558	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	54351	61895
150	00:01:31.459270926	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	3063	54613
151	00:01:32.966957052	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	47879	42141
152	00:01:35.499371064	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	57541	33518
153	00:01:36.594983520	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	29353	58254
154	00:01:37.094117076	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	52937	46226
155	00:01:37.574514180	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	44551	23870
156	00:01:37.626128700	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	15340	58254
157	00:01:38.049436944	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	39989	27887
158	00.01:38.065586334	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	50277	60904
159	00:01:38.557504896	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	16073	43728
160	00.01:38.870378376	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	56362	14621
161	00:01:40.705664766	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	38676	37857
162	00:01:41.229922110	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	41526	39640
163	00:01:41.694830700	1514	Internet Protocol (IPv4)	255	192.168.1.100	192.168.1.200	UDP	25215	61895
Address Ctl Protocol Version Internet Differen Differe	<pre>tta + FCS === PPP Link 1 === IPv4 Layes Header Lengt) tiated Service ntiated Service t Congestion 1 o TCP Segmente</pre>	(In 32 bi s Field es Codepoi lotificatio	- 1111111 - 00000011 - 0100000 - 0100 t words)0101 int - 000000 m00	(3) 00100001 Internet (4) (5) Default Not-ECT (Not ECN-					

Figure: Protocol Summary, Detail, and Hex Dump Views in PoS Protocol Analysis

Document Number: SEU901 /SEU902-01

Protocol Analysis Applications (Contd.)

RAW Protocol Analysis

GL's SonetExpert[™] RAW Analyzer is used to analyze and decode RAW SONET/SDH packets.

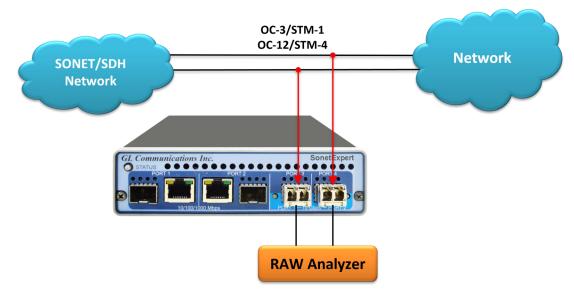


Figure: Analysis of RAW Packets over OC-3/STM-1 to OC-192/STM-64 Lines

The RAW analyzer application is invoked from the application menu of GL's OC-3 / STM-1 OC-12 / STM-4 Analyzer for real-time analysis.

_		sis SONET 64-bit															-	
File Viev	Capture S	itatistics Database Con	figure Help	4 3 1 * *		0	Go	Tol										
Device	Frame#	TIME (Relative)		ror A1A1A1A2A2A2 STS-3c	B1 STS-3c	B2B2B2 STS-3c	D1 STS-3c	D10 STS-3c	D11 STS-3c	D12 STS-3c	D2 STS-3c	D3 STS-3c	D4 STS-3c	D5 STS-3c	D6 STS-3c	D7 STS-3c	D8 STS-3c	D9 STS-3c
/1	882470	00:00:55.154891784	9720	*F6F6F6F6F6F6F6	×4E	x0CD 600	×83	xFF	xFF	×81	x6F	x6F	x87	×88	x8F	×93	x93	×0C
0	882471	00:00:55.154956452	9720	xF6F6F6F6F6F6F6	жСА	×2DD600	жВЕ	x1C	xCC	×75	xC1	xC5	x60	x95	хAC	×65	xBB	×78
1	882472	00:00:55.155016782	9720	xF6F6F6F6F6F6F6	×4E	x0CD600	x88	xFF	xFF	x81	x6F	x6F	xB7	x88	х8F	x93	x93	x0C
0	882473	00:00:55.155081456	9720	xF6F6F6F6F6F6F6	жCA	x2DD600	яВЕ	x1C	xCC	x75	xC1	xC5	x60	x95	жАС	x65	xBB	x78
1	882474	00:00:55.155141786	9720	*F6F6F6F6F6F6F6	×4E	×0CD600	×88	xFF	xFF	x81	x6F	x6F	xB7	x88	x8F	x93	×93	x0C
0	882475	00:00:55.155206454	9720	×F6F6F6F6F6F6F6	жCA	×2DD600	×BE	x1C	xCC	×75	xC1	xC5	x60	x95	хAC	×65	xBB	x78
1	882476	00:00:55.155266784	9720	xF6F6F6F6F6F6F6	:×4E	x0CD600	x88	xFF	xFF	x81	x6F	x6F	xB7	x88	x8F	x93	x93	x0C
0	882477	00:00:55.155331458	9720	*F6F6F6F6F6F6F6	жCA	x2DD600	жВЕ	x1C	xCC	x75	xC1	xC5	x60	x95	xAC	x65	xBB	x78
1	882478	00:00:55.155391788	9720	×F6F6F6F6F6F6F6	×4E	×0CD600	×88	xFF	xFF	×81	x6F	x6F	xB7	x88	x8F	×93	×93	×0C
0	882479	00:00:55.155456456	9720	xF6F6F6F6F6F6F6	жСА	x2DD600	xBE	x1C	xCC	x75	xC1	xC5	×60	x95	жАС	x65	×BB	x78
1	892490	00:00:55 155516796	9720	VERERERERERE	wir	v33D600	URR .	UFF	VEE	vR1	vEF	ver	⊍R7	VRR	VAF	v43	~92	unn -
00 A1 06 J0 09 Ro 60 Ro	AlAlA2A2A2 vl Bytes vl Bytes	1-87 88-174		= xF6F6F6F6F6F6F6 xF6F6F6282828282 x8E4E4E4E4E4F87 x8E4E4E4E4E4FB7B7E x4E4E4E4E4E4FB7B7E	7B7B7B788	8888888888	6F6F6F6F6	F93939393	3938C0C0CI	OCOCOFFFF	FFFFFFF8:	81818181	8E4E4E4E	4E4FB7B7	B7B7B788	88888888	8F6F6F6F	6F6F939
00 Å1. 06 J0 09 Ro 60 Ro 87 Ro 0E B1 11 E1 14 F1 17 Ro 6E Ro C5 Ro 11 D1 14 F1 17 Ro 17 Ro 17 Ro 18 Ro 19 Ro 10 Ro 1	AlAlA2A2A2 #1 Bytes #1 Bytes #1 Bytes 1	1-87 88-174 75-261		<pre>= xF6F6F6F6F6F6 = xF6 F6F6 = xF6F6F62828282828282828282828282828282828</pre>	7B7B7B7888 7B7B78888 F6F6F6F9393	388888888888 38888888888 39393939393800 3939393938000	6F6F6F6F6 6F6F6F6F9 0C0C0C0C0C0	F9393939393 39393939393 FFFFFFFFFFFFFFF	3938C0C0C0 38C0C0C0C0 7FF8181811 781818181	0C0C0FFFF 0C0FFFFFF 81818E4E4 818E4E4E4	FFFFFF818 FFFFF818 E4E4E4FB E4E4FB7B	8181818181 818181818 7878787878 78787878	18E4E4E4E 14E4E4E4E4 1888888888888888888	4E4FB7B7 4FB7B7B7 8888F6F6F 8F6F6F6F	B7B7B788 B7B78888 6F6F6F93 6F6F9393	888888888 888888888 19393939393 1939393938C	8F6F6F6F 6F6F6F6F 8C0C0C0C 0C0C0C0C	6F6F939 6F93939 0C0FFFF 0FFFFFF
00 A1. 06 J0 09 Ro 60 Ro 87 Ro 0E B1 11 E1 14 F1 17 Ro 6E Ro C5 Ro 1C D1 17 Ro 17 Ro 10 Ro 10 Ro 10 Ro 11 E1 11 E1 1	AlAlA2A2A2 v1 Bytes v1 Bytes v1 Bytes 1 v2 Bytes v2 Bytes v2 Bytes	1-87 88-174 75-261		 xF6F6F6F6F6F6 xF6F6F6282828282 xF6F6F628282828282 x6E4F4F8787 x4E44E44F8787 x4E4E4E44F8787 x4E4E4E44F8787 x878787 x878787 x88888888886866666 x888888886666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x88888888666666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888666666666 x8888888866666666 x8888888866666666 x888888866666666 x888888866666666 x888888866666666 x888888866666666 x88888866666666 x88888866666666 x888888866666666 x888888866666666 x888888866666666 x88888866666666 x888888666666666 x888888666666666 x888888666666666 x888888666666666 x888888666666666 x88888866666666 x888888666666666 x8888866666666 x88888666666666 x88886666666 x88888666666666 x8888866666666 x8888866666666 x88888666666666 x888886666666666666666 x8888866666666666666666666666666666666	7B7B7B7888 7B7B78888 F6F6F6F9393	388888888888 38888888888 39393939393800 3939393938000	6F6F6F6F6 6F6F6F6F9 0C0C0C0C0C0	F9393939393 39393939393 FFFFFFFFFFFFFFF	3938C0C0C0 38C0C0C0C0 7FF8181811 781818181	0C0C0FFFF 0C0FFFFFF 81818E4E4 818E4E4E4	FFFFFF818 FFFFF818 E4E4E4FB E4E4FB7B	8181818181 818181818 7878787878 78787878	18E4E4E4E 14E4E4E4E4 1888888888888888888	4E4FB7B7 4FB7B7B7 8888F6F6F 8F6F6F6F	B7B7B788 B7B78888 6F6F6F93 6F6F9393	888888888 888888888 19393939393 1939393938C	8F6F6F6F 6F6F6F6F 8C0C0C0C 0C0C0C0C	6F6F939 6F93939 0C0FFFF 0FFFFFF
00 Å1. 06 J0 09 Ro 60 Ro 0E Ro 0E B1 11 E1 14 F1 17 Ro 6E Ro C5 Ro 10 D1 10 D1 11 D1 10 D1 11 D1 1	AlAlA2A2A2 v1 Bytes v1 Bytes v1 Bytes 1 v2 Bytes v2 Bytes v2 Bytes	1-87 88-174 75-261 1-87 88-174 75-261		- FGFFFFFFFF - FGFFFFFFF - FGFFFFFFFFFFF	7878787888 787878888 76767679 767679393 767939393	388888888888 38888888888 39393939393800 3939393938000	6F6F6F6F6 6F6F6F6F9 0C0C0C0C0C0	F9393939393 39393939393 FFFFFFFFFFFFFFF	3938C0C0C0 38C0C0C0C0 7FF8181811 781818181	0C0C0FFFF 0C0FFFFFF 81818E4E4 818E4E4E4	FFFFFF818 FFFFF818 E4E4E4FB E4E4FB7B	8181818181 818181818 7878787878 78787878	18E4E4E4E 14E4E4E4E4 1888888888888888888	4E4FB7B7 4FB7B7B7 8888F6F6F 8F6F6F6F	B7B7B788 B7B78888 6F6F6F93 6F6F9393	888888888 888888888 19393939393 1939393938C	8F6F6F6F 6F6F6F6F 8C0C0C0C 0C0C0C0C	6F6F939 6F93939 0C0FFFF 0FFFFFF
000 A1. 006 J0 009 Ro 007 Ro 00E B1 11 E1 14 F1 17 Ro 66 Ro CS Ro 11 E1 14 F1 17 Ro 66 Ro 10 E1 11 E1 14 F1 17 Ro 66 Ro 10 E1 11 E1 14 F1 17 Ro 66 Ro 88 88 88 88 88 88 88 88 10 C 0 10 E1 10	AlAlA2A2A2 el Bytes el B	1-07 80-174 75-261 1-07 80-174 75-261 F6 F6 F6 F6 F6 F6 F6 F6 F6 F6 F6 F6 28 28 02 10 40 0 BC 2F 0C 0C 0F F1 28 28 02 01 04 0 BC 2F 0C 0C 0F F1 6F 6F 6F 6F 6F 6F 9 F7 B7 B7 B7 B7 B7 87 87 39 39 39 39 30 81 81 81 81 81 81 80 88 88 80 88 88	5 28 28 28 28 3 06 05 08 07 7 B7 B7 B7 B7 B7 9 39 39 39 39 3 93 93 93 39 3 18 18 18 18 8 88 88 88 2 0C 0 C 0 C 0 4 44 44 44	 xF6F6F6F6F6F6 xF6F6F6282828282 xF6F6F628282828282 x6E4F4F8787 x4E44E44F8787 x4E4E4E44F8787 x4E4E4E44F8787 x878787 x878787 x88888888886866666 x888888886666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x88888888666666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888866666666 x8888888666666666 x8888888866666666 x8888888866666666 x888888866666666 x888888866666666 x888888866666666 x888888866666666 x88888866666666 x88888866666666 x888888866666666 x888888866666666 x888888866666666 x88888866666666 x888888666666666 x888888666666666 x888888666666666 x888888666666666 x888888666666666 x88888866666666 x888888666666666 x8888866666666 x88888666666666 x88886666666 x88888666666666 x8888866666666 x8888866666666 x88888666666666 x888886666666666666666 x8888866666666666666666666666666666666	129787878880 1787878880 F6F6F6F95 F6F6F939 F6F939393 	388888888888 38888888888 39393939393800 3939393938000	6F6F6F6F6 6F6F6F6F9 0C0C0C0C0C0	F9393939393 39393939393 FFFFFFFFFFFFFFF	3938C0C0C0 38C0C0C0C0 7FF8181811 781818181	0C0C0FFFF 0C0FFFFFF 81818E4E4 818E4E4E4	FFFFFF818 FFFFF818 E4E4E4FB E4E4FB7B	8181818181 818181818 7878787878 78787878	18E4E4E4E 14E4E4E4E4 1888888888888888888	4E4FB7B7 4FB7B7B7 8888F6F6F 8F6F6F6F	B7B7B788 B7B78888 6F6F6F93 6F6F9393	888888888 888888888 19393939393 1939393938C	8F6F6F6F 6F6F6F6F 8C0C0C0C 0C0C0C0C	6F6F939 6F93939 0C0FFFF 0FFFFFF

Figure: Protocol Summary, Detail, and Hex Dump Views in RAW Protocol Analysis

SCAN Application

SonetExpert[™] scans incoming SONET/SDH traffic, analyzes the frames, detects and reports the traffic structure of the incoming traffic down to the T1 E1 level. It identifies the various sub pipes within the main pipe, and also the entire structure of each sub pipe down to the T1 E1 level.

- Graphical display of the traffic structure for easy visualization
- Identifies and displays sub channels down to T1 E1 level
- Indicates Equipped (display channel details) and Unequipped sub channels in different colors for easy identification
- User selectable SONET or SDH terminology supported on both the ports independently

Below are the results of scanning incoming traffic on OC-192. The SCAN displays that the OC-192 contains four OC-48 pipes within, and display details of each of the four OC-48s in a separate tab.

netSDHExp	ert™							🍘 Dashboard	📰 Ports	Application	📰 Event Log	🖪 Admir
lect Port Port	t1 (OC192 - RAW DATAPIPE	:) ▼ STATUS Done							► S	CAN Equipp Direqu		
					oc	:192 #1						
0C48 #1 00	C48 #2 OC48 #3 O	C48 #4 Four	OC-48 Pipes									
OC12 #1_1			0C12 #1_2			0C12 #1_3			OC12 #1_4			
	STS-1 #1	Unequipped		STS-1 #13	Unequipped		STS-1 #25	Unequipped		STS	1 #37	Unequipped
OC3 #1_1_1	STS-1 #2	Unequipped	OC3 #1_2_5	STS-1 #14	Unequipped	OC3 #1_3_9	STS-1 #26	Unequipped	OC3 #1_4_1	3 STS	-1 #38	Unequipped
	STS-1 #3	Unequipped		STS-1 #15	Unequipped		STS-1 #27	Unequipped		STS	-1 #39	Unequipped
	STS-1 #4	Unequipped		STS-1 #16	Unequipped		STS-1 #28	Unequipped		STS	-1 #40	Unequipped
OC3 #1_1_2	STS-1 #5	Unequipped	OC3 #1_2_6	STS-1 #17	Unequipped	OC3 #1_3_10	STS-1 #29	Unequipped	OC3 #1_4_1	4 STS	-1 #41	Unequipped
	STS-1 #6	Unequipped		STS-1 #18	Unequipped		STS-1 #30	Unequipped		STS	-1 #42	Unequipped
	STS-1 #7	Unequipped		STS-1 #19	Unequipped		STS-1 #31	Unequipped		STS	-1 #43	Unequipped
OC3 #1_1_3	STS-1 #8	Unequipped	OC3 #1_2_7	STS-1 #20	Unequipped	OC3 #1_3_11	STS-1 #32	Unequipped	OC3 #1_4_1	5 STS	-1 #44	Unequipped
112120	STS-1 #9	Unequipped		STS-1 #21	Unequipped		STS-1 #33	Unequipped		STS	1 #45	Unequipped
	STS-1 #10	0C3->STS-1->VT1.5 >>>		STS-1 #22	Unequipped		STS-1 #34	Unequipped		STS	-1 #46	Unequipped
0C3		FLOAT VT MODE	OC3 #1_2_8	STS-1 #23	Unequipped	OC3 #1_3_12	STS-1 #35	Unequipped	OC3 #1_4_1	6 STS	-1 #47	Unequipped
#1_1_4	STS-1 #11	Unequipped		STS-1 #24	Unequipped		STS-1 #36	Unequipped		STS	1 #48	Unequipped
	STS-1 #12	Unequipped										

Figure: OC-48s in Separate Tab



SCAN Application (Contd.)

- For each OC-48 further displays details of the OC-12s, and in turn details of the OC-3s within the OC-12s down to the STS-1 level
- For each STS-1, it display the details of traffic structure contained within the STS-1
- The equipped channels are marked as shown below

OC48 #1 (DC48 #2	OC48 #3	0	C48 #4	
OC12 #1_1					
		STS-1 #1			Unequipped
OC3 #1_1_1		STS-1 #2			Unequipped
# '_'_'		STS-1 #3			Unequipped
		STS-1 #4			Unequipped
OC3 #1_1_2		STS-1 #5			Unequipped
		STS-1 #6			Unequipped
		STS-1 #7			Unequipped
OC3 #1_1_3		STS-1 #8			Unequipped
		STS-1 #9			Unequipped
	;	STS-1 #10			
0C3 #1_1_4	:	STS-1 #11			Unequipped
		STS-1 #12			Unequipped
STS-1 #10	Equipped		1		
VT1_5 #10_1_1	VT1_5 #10	_1_2 VT	1_5 #1	0_1_3	VT1_5 #10_1_4
VT1_5 #10_2_1	VT1_5 #10	_2_2 VT	1_5 #1	0_2_3	VT1_5 #10_2_4
VT1_5 #10_3_1	VT1_5 #10	_3_2 VT	1_5 #1	0_3_3	VT1_5 #10_3_4
VT1_5 #10_4_1	VT1_5 #10	_4_2 VT	1_5 #1	0_4_3	VT1_5 #10_4_4
VT1_5 #10_5_1	VT1_5 #10	_5_2 VT	1_5 #1	0_5_3	VT1_5 #10_5_4
VT1_5 #10_6_1	VT1_5 #10	_6_2 VT	1_5 #1	0_6_3	VT1_5 #10_6_4
VT1_5 #10_7_1	VT1_5 #10	_7_2 VT	1_5 #1	0_7_3	VT1_5 #10_7_4

Figure: OC-192 with Substructure

In this scenario, OC-48#1 contains an equipped channel -> OC-12 #1 (OC-12 #1_1) -> OC-3 #4 (OC-3#1_1_4) -> STS-1 #1 (STS #10 overall STS numbering). The STS-1 #1 is equipped channel, which contains VT1.5s within it. Upon clicking the substructure button, the detailed substructure will be displayed. It shows twenty eight VT1_5 channels and within it the VT1_5 on Row2, column 3 is equipped as shown in Green.

The SCAN result also supports concatenated format. The below displays the concatenated OC-192 traffic with a single pipe containing STS-192C signal.

SonetSDHExpert™		DASHBOARD	E PORTS	APPLICATION -	SE EVENT LOG	🛾 Admin 🔻
Si	elect Port Port1 (0C192 - RAW DATAPIPE) V STATUS	Done		► SCA	Equipped	ed
		STS-192C				

Figure: SCAN Results in Concatenated Format (OC-192)

SCAN Application (Contd.)

The SCAN application provides option to change the terminology (SONET/SDH) at anytime. The below shows the SCAN result of SDH.

netSDHExp	ert™						£ 89 D	ashboard 🗮	Ports 🖪 Applicat	on 📑 Event Log	🖪 Admin
elect Port Por	rt1 (STM64 - RAW DATAF	IPE) ▼ STATUS - Dor	ne						► SCAN	Equipped	
					STM	164 #1					
STM16 #1	STM16 #2 STM16 #	#3 STM16#4	Four STM16 P	Pipes							
STM4 #1_1			STM4 #1_2			STM4 #1_3			STM4 #1_4		
	VC3 #1	Unequipped		VC3 #13	Unequipped		VC3 #25	Unequipped		VC3 #37	Unequipped
STM1 #1_1_1	VC3 #2	Unequipped	STM1 #1_2_5	VC3 #14	Unequipped	STM1 #1_3_9	VC3 #26	Unequipped	STM1 #1_4_13	VC3 #38	Unequipped
	VC3 #3	Unequipped		VC3 #15	Unequipped		VC3 #27	Unequipped		VC3 #39	Unequipped
	VC3 #4	Unequipped		VC3 #16	Unequipped		VC3 #28	Unequipped		VC3 #40	Unequipped
STM1 #1_1_2	VC3 #5	Unequipped	STM1 #1_2_6	VC3 #17	Unequipped	STM1 #1_3_10	VC3 #29	Unequipped	STM1 #1_4_14	VC3 #41	Unequipped
	VC3 #6	Unequipped		VC3 #18	Unequipped		VC3 #30	Unequipped		VC3 #42	Unequipped
	VC3 #7	Unequipped		VC3 #19	Unequipped		VC3 #31	Unequipped		VC3 #43	Unequipped
STM1 #1_1_3	VC3 #8	Unequipped	STM1 #1_2_7	VC3 #20	Unequipped	STM1 #1_3_11	VC3 #32	Unequipped	STM1 #1_4_15	VC3 #44	Unequipped
	VC3 #9	Unequipped		VC3 #21	Unequipped		VC3 #33	Unequipped		VC3 #45	Unequipped
	VC3 #10	STM1->AUG1->AU3-		VC3 #22	Unequipped		VC3 #34	Unequipped		VC3 #46	Unequipped
STM1		>VC3->TUG2->TU11 >>> FLOAT VT MODE	STM1 #1_2_8	VC3 #23	Unequipped	STM1 #1_3_12	VC3 #35	Unequipped	STM1 #1_4_16	VC3 #47	Unequipped
#1_1_4	VC3 #11	Unequipped		VC3 #24	Unequipped		VC3 #36	Unequipped		VC3 #48	Unequipped
	VC3 #12	Unequipped									

Figure: STM-16s in Separate Tab

STM16 #1	STM16 #2	STM16 #3	STM16 #4
STM4 #1_1			
		VC3 #1	Unequipped
STM1		VC3 #2	Unequipped
#1_1_1		VC3 #3	Unequipped
		VC3 #4	Unequipped
STM1 #1_1_2		VC3 #5	Unequipped
#1_1_2		VC3 #6	Unequipped
		VC3 #7	Unequipped
STM1 #1_1_3		VC3 #8	Unequipped
#1_1_0		VC3 #9	Unequipped
STM1		VC3 #10	STM1->AUG1->AU3- >VC3->TUG2->TU11 >>> FLOAT VT MODE
#1_1_4		VC3 #11	Unequipped
_	•	VC3 #12	Unequipped
VC3 #10	Equipped	┚ᆃ┐	
C11 #10_1_1	C11 #10_1_2	C11 #10_1_3	C11 #10_1_4
C11 #10_2_1	C11 #10_2_2	C11 #10_2_3	C11 #10_2_4
C11 #10_3_1	C11 #10_3_2	C11 #10_3_3	C11 #10_3_4
C11 #10_4_1	C11 #10_4_2	C11 #10_4_3	C11 #10_4_4
C11 #10_5_1	C11 #10_5_2	C11 #10_5_3	C11 #10_5_4
C11 #10_6_1	C11 #10_6_2	C11 #10_6_3	C11 #10_6_4
C11 #10_7_1	C11 #10_7_2	C11 #10_7_3	C11 #10_7_4

Figure: STM-64 with Substructure

Hardware Specifications of SonetExpert[™]

SonetExpert[™] contains four ports, out of which two ports (Optical Port 1 and Port 2) are designated for SONET/SDH Channelized and Unchannelized carrying many Channelized unframed/framed T1 or E1 streams, and Unchannelized RAW, PoS, and ATM streams for OC-3/STM-1 and OC-12/STM-4.

Connecting the optical SFPs to the fiber optic ports, the two ports (Port 1, Port 2) on the unit are available for OC-3/STM-1, OC-12/STM-4, OC-48/STM-16 and OC-192/STM-64 Unchannelized testing.

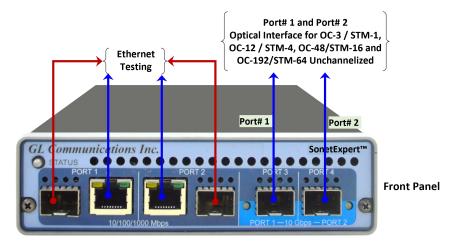


Figure: SonetExpert[™] Hardware Unit (Front Panel)

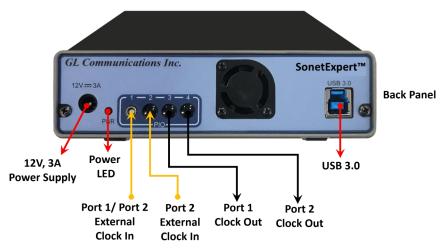


Figure: SonetExpert[™] Hardware Unit with External Clock Feature (Back Panel)

Interfaces	 2 x Unchannelized Ports (OC-3 / STM-1, OC-12 / STM-4, OC-48/STM-16 and OC-192/STM-64) Single Mode or Multi Mode Fiber SFP support with LC connector USB 3.0 Port External Clock: Input Port 1, Port 2 and Output Port 1, Port 2
Dimensions	 Length: 8.45 in. (214.63 mm) Width: 5.55 in. (140.97 mm) Height: 1.60 in (40.64 mm)
Power	 +12 Volts (Medical Grade), 3 Amps (For portable units having serial number ≥ 188400)

Page	18
------	----

	Physical Specifications	Height: 1U RackLength: 16 InchesWidth: 19 Inches
Port# 1 and Port# 2 Port# 1 and Port# 2 Optical Interface for OC-3/192 - STM-1/64 Unchannelized Figure: SonetExpert™ mTOP™ 1U rack solution (Front Panel View)	SonetExpert™ interfaces (1 unit)	 Two-Unchannelized Ports (OC-3/STM- 1/, OC-12/STM-4, OC-48/STM-16 and OC-192/STM-64) Single Mode or Multi Mode Fiber SFP support with LC connector
Back Panel	SBC Specifications	 Embedded SBC, 1x SonetExpert[™] Intel Core i3 or optional i7 NUC Equivalent, Windows[®] 11 64-bit Pro operating system USB 2.0 and USB 3.0 Ports, ATX Power Supply USB Type C ports, Ethernet 2.5GigE port 256 GB Hard drive, 16GB Memory (Min) Two HDMI ports for display
	Order information	 MT001/MT001E - 1U mTOP rack with SBC (Intel Core i7) SonetExpert[™] Unchannelized Analyzer part numbers as required (OC-3/STM- 1, OC-12/STM-4, OC-48/STM-16 and OC-192/STM-64)

SonetExpert[™] mTOP[™] 1U Rack Solution Specifications

SonetExpert[™] mTOP[™] Probe Specifications



Figure: SonetExpert[™] mTOP[™] Probe unit (Front Panel View)



Figure: SonetExpert[™] mTOP[™] Probe unit (Rear Panel View)

Physical Specifications	 Height: 3.0 Inches (76.2 mm) Length: 10.4 Inches (264.16 mm) Width: 8.4 Inches (213.36 mm)
SonetExpert™ interfaces	 4x 1G Base-X Optical OR 10/100/1000 Base-T Electrical 2x 10G Base-SR, -LR -ER Optical option 2 x 100 Mbps Base-FX optical interface Single Mode or Multi Mode Fiber SFP support with LC connector Optional 4-Port SMA Jack Trigger Board (TTL Input/Output) External USB based Wi-Fi adaptor
External Power Supply	• +12 Volts (Medical Grade), 3 Amps
SBC Specifications	 Intel Core i3 or optional i7 NUC Equivalent, Windows® 11 64-bit Pro Operating System USB 2.0 or and USB 3.0 Ports, ATX Power Supply USB Type C ports, Ethernet 2.5GigE port 256 GB Hard drive, 16GB Memory (Min) Two HDMI ports for display



Buyer's Guide

Item No	Product Description
<u>SEU100</u>	SonetExpert™ Dual OC-3/12 STM-1/4 USB Unit Accessories
	Includes OC-3/OC-12/STM-1/STM-4 SFPs (customer preference of MM or SM) USB Cable 3.0 (1)
	Power adapter +12 Volts, 3 Amps (1)
<u>SEU901</u>	SonetExpert™ Unchannelized RAW BERT for OC-3/STM-1 and OC-12/STM-4 Rates
<u>SEU902</u>	SonetExpert™ Unchannelized RAW BERT for OC-3/STM-1, OC-12/STM-4, OC-48/STM-16, OC-192/STM-64 Rates
<u>SEU300</u>	SonetExpert™ Unchannelized OC-3/STM-1/OC-12/STM-4 ATM Monitor, BERT, Tx/Rx Test
<u>SEU301</u>	SonetExpert™ Unchannelized OC-3/STM-1/OC-12/STM-4 PoS Monitor, BERT, Tx/Rx Test
<u>SEU302</u>	SonetExpert™ Unchannelized ATM Record Playback for OC-3/STM-1/OC-12/STM-4
<u>SEU303</u>	SonetExpert™ Unchannelized PoS Record Playback for OC-3/STM-1/OC-12/STM-4
<u>SEU304</u>	SonetExpert™ Unchannelized ATM Protocol Analysis for OC-3/STM-1/OC-12/STM-4
<u>SEU305</u>	SonetExpert™ Unchannelized PoS Protocol Analysis for OC-3/STM-1/OC-12/STM-4
<u>SEU503</u>	SonetExpert™ Unchannelized RAW Record Playback for OC-3/STM-1/OC-12/STM-4 includes SCAN feature
<u>SEU315</u>	SonetExpert™ Unchannelized Packet Data Analysis (PDA) for PoS
Item No	Optional Applications
<u>SEU110</u>	SonetExpert [™] Upgrade to PXN100
<u>SEU120</u>	SonetExpert™ Upgrade to PXN101
<u>PXN100</u>	PacketExpert™ 10GX
<u>PXN101</u>	10G option for PXN100
<u>PXN00</u>	Optical Multiport Tap/Repeater
<u>PXN01</u>	Multi-rate Multimode SFPs and FO Cables
<u>PXN02</u>	Multi-rate Singlemode SFPs and FO Cables

For more information, visit <u>SonetExpert[™] Unchannelized Analyzer</u> webpage.

