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.



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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.

onetSDHExpert™	Ĩ.				& D	ashboard 📑 Ports	🛢 Event Log 🛛 🖪 Admi
Dashboard		SONET/SDH	SONET	•		I	Servers i Device Information
Devices							•
Device	Serial#	Availability	User	Module Selec	tion	Status	Open App
Device1	188544	Reserved	Admin	OC3 - BERT	1 Unload	0	🖌 Open App
Ports						ී Reset /	All All Ports Laser ON OFF
Alarms Settings	Frequency	Interface					
Port	Laser	Interfac	e	SECTION	LINE	PATH	Pattern
Port1	Laser ON	No Alan	ms	No Alarms	No Alarms	No Alarms	No Alarms
Port2	Laser ON	No Alan	ms	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

left Communications Inc.

Bit Error Rate (BER) Testing (Contd.)

- 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

Alarms E	BERT Impairr	nents Gra	oh Sonet li	nterface	System Monitor				
iterface						Section			
Alarms		Status			Seconds	Alarms	Status	Seconds	Cou
LOS		•			0	Loss Of Frame	•	0	
Rx Frequence	су	•			0	B1 BIP	•	0	
Rx Power		•			0	Out Of Frame	٠	0	
Invalid Rx S	ignal	•			0				
Tx Frequence	:y	•			0	Line			
Tx Power		•			0	Alarms	Status	Seconds	Cou
						AIS-L	•	0	
BERT Alarms						RDI-L	•	0	
Alarm		Status	Se	conds	Count	B2 BIP	•	0	
Bit Error		•		0	0	REI-L	•	0	
Sync Loss		•		0	0				
						Path			
Frequency		From			Free Max	Alarms	Status	Seconds	Cou
Name	Freq (Hz)	Deviation	Alarm/Warning	Details	Deviation	AIS-P	•	0	
Rx	155 520 122	(ppm)			(ppm)	LOP-P	•	0	
Frequency	133,320,132	0.9			0.9	Loss	•	0	
Frequency	155,519,996	0			0	RDI-P	•	0	
						UNEQ-P	•	0	
SFP Real Time	Diagnostics					B3 BIP	•	0	
Name		Value	Alarm/Warning		Details	REI-P	•	0	
Rx Power (d	Bm)	-1.12				PLM	•	0	
Tx Power (d	Bm)	0.03				All Ones	•	0	
						OC Levels	•	0	
						Pointer Adjustments	•	0	

Figure: All Alarms

			Configuration	Results		
Alarms				Status		
Alarm	Status	Seconds	Count	Description	Тх	Rx
Bit Error	•	0	0	Status	Running	Running
Sync Loss	•	0	0	Running Time	21	22
				Start Time	Wed Jun 26 2024 11:01:54	Wed Jun 26 2024 11:01:52
Bits Analysis				End Time		
	Instantaneous		Total			
Bit Error Rate	0.00e+0		0.00e+0			
Bit Error Count	0		0			
Bits Received	149,760,000		3,384,538,560			

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



- 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)

Alarms BERT I	mpairments Graph Son	et Interface Syste	em Monitor	
larm Generation		Error Insertion		Sonet Pointer
Loss Of Frame		B1 BIP Sin	None	H1/H2 Pointer 522 (0-782) Apply
AIS-L		B2 BIP Sin	gle None 🔻	
RDI-L		REI-L Sin	gle	Insert Justification
AIS-P		B3 BIP Sin	gle None 🔻	Type Positive
LOP-P		REI-P Sin	qle	
RDI-P		Rit Error Sin		
LINEO-P		BILEITO	inone •	

Figure: BERT Impairments

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.

Configuration	Config	iguration Results
	Header Configuration	Tx/Rx Coupled
	1	TX/KX Configuration
	Source IP Address	s 192.168.1.100
	Destination IP Address	s 192.168.1.200
	T0S/DS	\$ 0 (0-255)
	TTL	. 128 (0-255)
	Protocol	1 17 UDP (0-255)
	Header Checksum	00-00 🛛 🖾 Auto Compute
	Identification	00-00 🛛 🖾 Auto Increment
		IDP I I I I I I I I I I I I I I I I I I
	Source Port	t 1000 (0-65535)
	Destination Port	t 2000 (0-65535)
	UDP Checksum	
	UUP UNECKSUM	ooo Pano ompute
	Payload Configuration	Tx/Rx Coupled
	т	Tx/Rx Configuration
	Pattern Type	9 PRBS_2E9_1 V
		Invert Pattern
	Frame Size and Rate	Ty Configuration
	IP Frame Size	1 1518 (45-2048) evolution 4 beter RDB hander and 4 beter RPS hander
	Rate	e 100 % (0.01-100)
	Thirt	

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	ration	Results		
onfiguration				🖺 Apply Defau	t 🗙 Can
	ATM Header Fields		Tx/Rx Coupled		
	Тх	/Rx Configu	ration		
	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		
	Тх	/Rx Configu	ration		
	Pattern Type	PRBS_2	2E9_1 ▼		
		🗌 Inve	rt Pattern		
	Traffic Rate				
	1	fx Configura	ition		
	Bandwidth Type	Cell Rat	tio 🔻		
	Traffic Cells	3	(1-99999)		
	Idle Celle	2	(1.00000)		

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			
RDI-P	HP-RDI			
UNEQ-P	HP-UNEQ			
B3 BIP	B3 BIP			
REI-P	HP-REI			
PLM	PLM			
All Ones	All Ones			
Pointer Adjustments	Pointer Adjustments			
New Pointers	New Pointers			

• 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			
Alarms	Status	Seconds	Count
Loss Of Frame	•	0	
B1 BIP	•	0	0
Out Of Frame	•	0	
line			
Alarms	Status	Seconds	Count
AIS-L	•	0	
RDI-L	•	0	
B2 BIP	•	0	0
REI-L	•	0	0
Path			
Alarms	Status	Seconds	Count
AIS-P	•	0	
LOP-P	•	0	
RDI-P	•	0	
UNEQ-P	•	0	
B3 BIP	•	0	0
REI-P	•	0	0
PLM	•	0	
All Ones	•	0	-
Pointer Adjustments	•	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 E	BERT Imp	pairments	Graph	Sonet	Interface	System M	Ionito	r				
SFP Module P	lugged In	1										
Interface								SFP Real Time Diagno	stics			
Alarms				Status		Seconds		Name	Valu	ie Alarm/	Warning	Details
LOS				•		0		Rx Power (dBm)	-0.3			
Rx Frequence	cy .			•		0		Tx Power (dBm)	-0.3	9		
Rx Power				•		0		Temperature (°C)	37.6	i6		
Invalid Rx Si	ignal			•		0						
Tx Frequenc	y			•		0		SFP Alarm and Warnin	ng Thresholds			
Tx Power				•		0		Name	Low Alarm	Low Warning	High Warning	High Alarr
SFP Fault				•		0		Rx Power (dBm)	-20	-18.01	2.01	3.01
								Tx Power (dBm)	-8.99	-7.99	3.01	4.01
Frequency								Temperature (°C)	-2560	-1280	75	80
Name	Frequen (H	cy Fi z) Deviat	req ion Ala m)	rm/Warning	Details	Freq Max Deviation (ppm)						
Rx Frequency	155,519,80	52 -	0.9			-0.9						
Tx Frequency	155,519,99	96	0			0						
SEP Info												
		Na	me Val	ue								
		Wavelen	gth 131	0 nm								
	N	Iodule Identi	fier SFF	P/SFP+								
		Connector Ty	rpe LC									

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)

onetSDHEx	(pert™			#	Dashboard	🛢 Ports 📑 E	vent Log 🔹 Admin
Dashboard		SONET/SDH	SONET	•		Serve	rs i Device Information
Devices							
Device	Serial#	Availability	User	Module Selection	n	Status	Open App
Device1	188544	Reserved	Admin	OC12 - BERT	📩 Unload	٠	┥ Open App
Ports Alarms	Settings Freque	ncy Interface				ී Reset All A	Il Ports Laser ON OFF
Port	Laser	Interface	SECTIO	N LINE	PATH	ł	Pattern
Port1	Laser ON	LOS +3	No Alar	rms No A	No A	Alarms	No Alarms
Port2	Laser OFF	Tx Power +3	No Alar	rms No A	Alarms	ter 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

Record To File I Recorder (Raw) Select Record Type Recorder (Raw) Select Ports Port 10 Port 2 Port 2 Split Recording Split Recording Status Name Value Status Running Time Progress Status Recording	SonetSDHExpert™		æ		를 Ports ·	Application	🛢 Event Log	🕒 Admin
I recorder 1 (Raw) Image: Configuration Summary Select Record Type RW DATAPIPE Select Ports Image: Configuration Summary Port Name Port ID Port 1 Image: Configuration Summary Select Ports Select File Test.hdl Port 2 Image: Configuration Summary Split Recording Select File Test.hdl Status Running Name Value Status Running Running Time 00:00:01 Progress 34/2,048 MB (1.67%)	Decord To Eile							
I racks Image: Configuration I recorder1 (Raw) Select Ports Port Name Port I I Port2 Split Recording Split Recording Status Running Time 000001 Progress 34/2,048 MB (1.67%) Summay Summay Summay Summay Summay Summay Select Record Type Running Time 00:00:01 Progress 34/2,048 MB (1.67%) Summay Summay <th>NELOID IO THE</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	NELOID IO THE							
1 Recorder! (Raw) 1 Recorderl (Raw) Select Record Type RAW DATAPIPE Select Forts Select File Port Name Port 0 Image: Contraction of the select file Port 1 0 Port 2 1 Port 2 Image: Contraction of the select file Split Recording Split Recording Status Running Name Value Status Running Running Time 00:00:01 Progress 3/2,048 MB (1.67%)	# Tasks 📑 🛅			Configuration	on Summary			
Select Ports Port Name Port1 Port2 Image: Select File Test.hdl Capture Size 2048 Size MBytes	1 Recorder1 (Raw)		Select	t Record Type	RAW DATAPIPE V	STOP		
Port NamePort IDPort10IctailsPort21IctailsSplit RecordingSplit RecordingStatusStatusNameValueStatusRunningStatusRunningStatus34/2,048 MB (1.67%)Progress34/2,048 MB (1.67%)		Select Ports			Select File	e Test.hdl		
Port1 0 Port2 1 Split Recording Status Name Value Status Running Status Running Time 00:00:01 Progress 34/2,048 MB (1.67%)		Port Name	Port ID		Capture Size	e 2048	Size MBvtes 🔻	
Port2 1 Split Recording Status Name Value Status Running Status Running Progress 34/2,048 MB (1.67%) Status Status Status Running Time 00:00:01 Progress 34/2,048 MB (1.67%) Status Status Status Running Time 0 Packets Received 14,748		Port1	0 🖪 De	tails				
Split Recording Status Status Statistics Name Value Name Value Status Running Disk Write Bytes/Sec 19,603,122 Running Time 00:00:01 Disk Write Buffer Utilization 0 Progress 34/2,048 MB (1.67%) Packets Received 14,748		Port2	1 🖌 🖌 De	tails				
StatusStatisticsNameValueNameValueStatusRunningDisk Write Bytes/Sec19,603,122Running Time00:00:01Disk Write Buffer Utilization0Progress34/2,048 MB (1.67%)Packets Received14,748		Split Recording						
NameValueNameValueStatusRunningDisk Write Bytes/Sec19,603,122Running Time00:00:01Disk Write Buffer Utilization0Progress34/2,048 MB (1.67%)Packets Received14,748		Status			Statistics			
StatusRunningDisk Write Bytes/Sec19,603,122Running Time00:00:01Disk Write Buffer Utilization0Progress34/2,048 MB (1.67%)Packets Received14,748		Name	Value		Name		Value	
Running Time 00:00:01 Disk Write Buffer Utilization 0 Progress 34/2,048 MB (1.67%) Packets Received 14,748		Status	Running		Disk Write	Bytes/Sec	19,603,	122
Progress 34/2,048 MB (1.67%) Packets Received 14,748		Running Time	00:00:01		Disk Write	Buffer Utilization	0	
		Progress	34/2,048 MB (1.679	6)	Packets R	eceived	14,748	
Failure Reason File Bytes Written 36,088,356		Failure Reason			File Bytes	Written	36,088,3	356

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 🛛 🖪 App	plication 🛛 🛢 Event Lo	g 🗳 Admin
Playback From File					
# Tasks 🚼 🛅		Configuration	Summary		
1 Playback1 (Raw)	Server1	Select Playback Type	RAW DATAPIPE V	STOP	
	Playback Ports	pping corded in each frame n PortId in file does not	Select File Tes	t.hdl	
	Status	File Info		Statistics	
	Name Value	Name	Value	Name	Value
	Status Running	Frames In File	864,312	Tx Frames	1,956
	Running Time 00:00:01	Ports In File	0		
	Progress 1,956/864,312 (0.23)%				
	Failure Reason				
	Action Drop Frame Status Name Value Status Running Running Time 00:00:01 Progress 1,956/864,312 (0.23)% Failure Reason	File Info Name Frames In File Ports In File	Value 864,312 0	Statistics Name Tx Frames	Value 1,956

Figure: Playback Application



Protocol Analysis Applications

ATM Analyzer

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.

13	ATM Protocol Analysis AAL2 5(UNI3.1) 64-bit												
File	View	Canture	Statistics Datab	ase Call Detail Records (onfigure	Help							
1 2	-						원, 백, 0		GoTo				
Dev	<u> </u>	TScount	Frame#	TIME (Relative)	Len	Error Fra	ame Type ATM	VCI ATM	VPI ATM	PT ATM	PID Multi Protocol Encapsulation	Ether Type Multi Protocol Enca	e apsulation
)		0 41207570	00:00:29.166894306	52	ATM-Cell	2	00	356	1			
$\sqrt{0}$)		41207571	00:00:29.166895026	52	ATM-Cell	2	00	356	1			
V ()		41207572	00:00:29.166895746	52	ATM-Cell	2	00	356	1			
$\sqrt{0}$)		41207573	00:00:29.166896364	52	ATM-Cell	2	00	356	1			
V ()		41207574	00:00:29.166897594	52	ATM-Cell	2	00	356	1			
$\sqrt{0}$)		41207575	00:00:29.166898320	52	ATM-Cell	2	00	356	1			
\checkmark)		41207576	00:00:29.166898932	52	ATM-Cell	2	00	356	1			
$\sqrt{0}$)		41207577	00:00:29.166899652	52	ATM-Cell	2	00	356	1			
V.)		41207578	00:00:29.166900270	52	ATM-Cell	2	00	356	1			
1)		41207579	00:00:29.166900990	52	ATM-Cell	2	00	356	1			~
<													>
0000 0000 0000	000 YPI = 356 (00010110 0100) 001 YCI = 200 (0000 0000100 1000) 003 PT =001. (1) 103 CLP =1 (1) 1004 HEC = 00000110 (6)												
Hex	Dump	of the	Frame Data										
16 EF CF 72 1	6 40 0C 83 06 F7 44 5B 9D 65 32 F1 13 66 B5 0C F 59 C5 28 D4 D0 27 23 1B 5D C3 88 7C 98 40 68 I +D[e2K fµ I XA(OP *]AI IPh IKyoIPIIIcovàv 68 ré5												
Runn	ning. Utilization 0.00% C:\Program Files\GL Communications Inc\SonetEx Captured 43 136 796 frames												

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

Protocol Analysis Applications (Contd.)

PoS Analyzer

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.

PPP	🕅 ppp Protocol Analysis ppp 61-bit													
File Vie	w Canture St	atistics Database Configure	Help											
i 📾 💼			1 H H ST W	業 -5	1 0	GoTo								
Frame#	TIME (Relative)	Error Protocol PPP Link	Code Link Control	Code IPCP	Source IP Address IP	Destination IP Address IP	Source Port UDP	Destination Port UDP	Source Port TCP	Destination Port TCP	SIP Method SIP	Payload type RTP	SIP From SIP	SIP To SIP
15	00:31:33.565620	Link Control	Echo-Reply											
16	00:34:19.023960	Link Control	Echo-Reply											
17	00:45:30.702080	Link Control	Echo-Request											
18	00:46:43.004170	Internet Protocol (IPv4)			192.168.22.86	192.168.22.211	5060	5060			INVITE		0001@192.168.22.86	0001@192.168.22.211
19	00:46:43.535940	Internet Protocol (IPv4)			192.168.22.211	192.168.22.86	5060	5060			100 Trying		0001@192.168.22.86	0001@192.168.22.211
20	00:46:44.564060	Internet Protocol (IPv4)			192.168.22.211	192.168.22.86	5060	5060			180 Ringing		0001@192.168.22.86	0001@192.168.22.211
21	00:46:57.851040	Internet Protocol (IPv4)			192.168.22.211	192.168.22.86	5060	5060			200 OK		0001@192.168.22.86	0001@192.168.22.211
22	00:46:58.009900	Internet Protocol (IPv4)			192.168.22.86	192.168.22.211	5060	5060			ACK		0001@192.168.22.86	0001@192.168.22.211
23	00:46:59.330730	Internet Protocol (IPv4)			192.168.22.86	192.168.22.211	1026	1026						
24	00:46:59.842190	Internet Protocol (IPv4)			192.168.22.211	192.168.22.86	1026	1026						
25	00-47-01-306770	Internet Protocol (IPu/I)			192169 22 211	1921692296	1026	1026						
0000 A 0001 C 0002 P 0004 C 0005 I 0006 L	Open Address IllIIII (255) 0001 Address - 00000011 (3) 0002 Protocol - 1100000 00100010 Link Control 0004 code - 00001101 Echo-Reply 0005 Identifier - 2 (x02) 0005 Identifier - 0 (x0000000) Megic-Number - 0 (x0000000) Data - x474C20434FAD4D Data - x1AF0													
Henry Dur	n of the Fr	ana Data												
FF 03 4F 4D	0 21 0A 02 D 1A F0	00 OF 00 00 00 00 47	4C 20 43 ÿ	++ λι ми δ	GL C									
Off-line V	iewing			C	\Program Files\GL C	ommunications Inc\So	netExpertRe	stServer\PPP_SIP	HDL	6 432 Frames				

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

left Communications Inc.

Protocol Analysis Applications (Contd.)

RAW Analyzer

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.

Sonet Prot	ocol Analysis SC	ONET 64-bit								- 0
File View C	apture Statisti	ics Database Config	ure Help							
: 🛋 💼 🔚		Para	99 CU W. W.	2 8 9 9 2	_B 创		GoTo			
Device	Frame#	TIME (Difference)		Length (Bytes)	Error	WireLen				
$\sqrt{0}$	0	00:00:00.000	000000	243)					
V 0	1	00:00:00.000	124998	243)					
	2	00:00:00.000	125004	243	1					
	4	00:00:00.000	124998	243	,)					
V 0	5	00:00:00.000	125004	243)					
V 0	6	00:00:00.000	124998	2431)					
V 0	7	00:00:00.000	124998	243)					
	8	00:00:00.000	120004	243) 1					
Device0 En	ammand at 02	0.00.00.000	2 OV Ten=243	1	,		*** Right click t	SHOW/HIDE laver details on con		
Ethernet F:	rame Data		2 OK 101-243	,			and Right Click (S Show HIDE Tayer details of cop	<i>y</i>	
	STS-	-3c Layer ======								
010E Row2 1	Header			- xro ro ro 20 20 - x00 00 00 00 00		0 00				
021C Row3 1	Header			= x00 00 00 00 00	00 00 0	0 00				
032A Row4 1 0438 Row5 1	Header Header			= x60 93 93 04 FF = x91 FD 4C 00 00	EE 93 9	3 93				
0546 Rov6 1	Header			×00 00 00 00 00	00 00 0	0 00				
0654 Row7 1 0762 Row8 1	Header Header			= x00 00 00 00 00 = x00 00 00 00 00		0 00				
0870 Row9 1	Header			×00 00 00 00 00	00 00 0	õ õõ				
0009 Row1 1	Payload byt	es 1-87		x000000000000000000000000000000000000	000000000	000900000000000				
00B7 Row1 1	Payload byt	es 175-261		= x0000000000000000	000000000	000000000000000000000000000000000000000		100000000000000000000000000000000000000	100000000000000000000000000000000000000	000000000000000000000000000000000000000
0117 Row2 1	Payload byt	es 1-87		×000000000000000	00000000	000900000000000			100000000000000000000000000000000000000	100000000000000000000000000000000000000
01C5 Row2 1	Payload byt Pavload byt	es 175-261		= x000000000000000000000000000000000000	0000000000	000000000000000000000000000000000000000				100000000000000000000000000000000000000
0225 Row3 1	Payload byt	es 1-87		x00000000000000	00000000	000000000000000000000000000000000000000	000000000000000000000000000000000000000	000000000000000000000000000000000000000	000000000000000000000000000000000000000	000000000000000000000000000000000000000
027C Row3 1 02D3 Row3 1	Payload byt Payload byt	es 88-174		* x0000000000000000	000000000	000000000000000000000000000000000000000			000000000000000000000000000000000000000	100000000000000000000000000000000000000
0333 Row4 1	Payload byt	es 1-87		= x000000000000000	000000000	000900000000000000000000000000000000000	000000000000000000000000000000000000000	100000000000000000000000000000000000000	100000000000000000000000000000000000000	000000000000000000000000000000000000000
038A Rov4 1	Payload byt	es 88-174		×000000000000000	000000000	000000000000000000000000000000000000000				
0441 Row5 1	Pavload byt	es 1-87		= x00000000000000000	000000000	000000000000000000000000000000000000000				000000000000000000000000000000000000000
0498 Row5 1	Payload byt	es 88-174		x000000000000000	00000000	000000000000000000000000000000000000000	000000000000000000000000000000000000000	100000000000000000000000000000000000000	100000000000000000000000000000000000000	000000000000000000000000000000000000000
054F Rov5 1	Payload byt Pavload byt	es 175-261 es 1-87		×0000000000000000000000000000000000000	0000000000		000000000000000000000000000000000000000	100000000000000000000000000000000000000	000000000000000000000000000000000000000	100000000000000000000000000000000000000
<										:
Hex Dump o	f the Frame	e Data								
+	9 29 29 00	CC CC 00 00 00 0	+	+++						
00 00 00 0	0 00 09 00	00 00 00 00 00 00	00 00 00 00	000(((111						
00 00 00 0	0 00 00 00	00 00 00 00 00	00 00 00 00							
		00 00 00 00 00 00								
00 00 00 0	0 00 00 00	00 00 00 00 00	00 00 00 00							
00 00 00 0	0 00 00 00	00 00 00 00 00	00 00 00 00							
00 00 00 0	0 00 00 00	00 00 00 00 00	00 00 00 00							
		00 00 00 00 00 0								
00 00 00 0	0 00 00 00	00 00 00 00 00 00	00 00 00 00							
	0 00 00 00	00 00 00 00 00	00 00 00 00							
00 00 00 0		00 00 00 00 00 00	00 00 00 00							
Stopped, Mouse	RClick + CTRL	button down for search	/filter.		C:\Pro	gram Files\GL Com	munications Inc\SonetExpertRestServer\ter	e. 31 857 frames	Missed Frames : 0	Activate Windows
					1.0.10					

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.

SonetSDHExpert™ & Bashboard											Log 🖪 Admin
Select Port	Port1 (OC192 - RAW DATAPIPI	E) V STATUS Done							► SCAN	Equipped	
					00	C192 #1					
OC48 #1	OC48 #2 OC48 #3 O	0C48 #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
0C3 #1.1.1	STS-1 #2	Unequipped	0C3 #1_2_5	STS-1 #14	Unequipped	OC3 #1_3_9	STS-1 #26	Unequipped	OC3 #1_4_13	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
0C3 #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_14	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
0C3 #1_1_3	STS-1 #8	Unequipped	0C3 #1_2_7	STS-1 #20	Unequipped	OC3 #1_3_11	STS-1 #32	Unequipped	OC3 #1_4_15	STS-1 #44	Unequipped
	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	CTC-1 #11	Hogwinned	0C3 #1_2_8	STS-1 #23	Unequipped	OC3 #1_3_12	STS-1 #35	Unequipped	OC3 #1_4_16	STS-1 #47	Unequipped
¥1_1_4	STS-1 #12	Unequipped		STS-1 #24	Unequipped		STS-1 #36	Unequipped		STS-1 #48	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 C	0C48 #2 0C48	3 #3	OC48 #4	
OC12 #1_1				
	STS-	1 #1		Unequipped
0C3	STS-	1 #2		Unequipped
#1_1_1	STS-	1 #3		Unequipped
	STS-	1 #4		Unequipped
0C3 #1 1 2	STS-	1 #5		Unequipped
# 1_1_L	STS-	1 #6		Unequipped
	STS-	1 #7		Unequipped
0C3 #1 1 3	STS-	1 #8		Unequipped
# 1 <u>_1</u> _0	STS-	1 #9		Unequipped
	STS-1	#10	003	>STS-1->VT1.5 >>>
0C3	STS-1	#11	-	
12121	STS-1	#12		Unequipped
	auipped			
STS-1 #10		VT1 5	#10 1 2	VT1 5 #10 1 4
VT1_5 #10_1_1	VT1_5#10_1_2	VT1 5	#10_1_3 #10_2_3	VT1_5 #10_1_4
VT1_5 #10_3_1	VT1_5 #10_3_2	VT1_5	#10_3_3	VT1_5 #10_3_4
VT1_5 #10_4_1	VT1_5 #10_4_2	VT1_5	#10_4_3	VT1_5 #10_4_4
VT1_5 #10_5_1	VT1_5 #10_5_2	VT1_5	#10_5_3	VT1_5 #10_5_4
VT1_5 #10_6_1	VT1_5 #10_6_2	VT1_5	#10_6_3	VT1_5 #10_6_4
VT1_5 #10_7_1	VT1_5 #10_7_2	VT1_5	#10_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	S PORTS	A APPLICATION -	SE EVENT LOG	🖪 Admin 🝷
	Select Port Port1 (0C192 - RAW DATAPIPE) V ST	TATUS - 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.

SonetSDH	Expert™						48a D	ashboard 📑	Ports 🖪 Applicatio	n 🛢 Event Log	📑 Admin
Select Port	Port1 (STM64 - RAW DATA	PIPE) V STATUS Dor	ne						► SCAN	Equipped Unequipped	
					ST	M64 #1					
STM16 #1	STM16 #2 STM16	#3 STM16 #4	Four STM16 I	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	3 STM16#4
STM4 #1_1			
		VC3 #1	Unequipped
STM1		VC3 #2	Unequipped
#1_1_1		VC3 #3	Unequipped
		VC3 #4	Unequipped
STM1		VC3 #5	Unequipped
#1_1_2		VC3 #6	Unequipped
-			
		VC3 #7	Unequipped
STM1 #1_1_3		VC3 #8	Unequipped
		VC3 #9	Unequipped
		VC3 #10	STM1->AUG1->AU3- >VC3->TUG2->TU11 >>> FLOAT VT MODE
\$1M1 #1_1_4		VC3 #11	Unequipped
	- L	VC3 #12	Unequipped
	Equipped		
VC3 #10			
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)

	Physical Specifications	Height: 1U RackLength: 16 InchesWidth: 19 Inches
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 Back Panel Back Panel 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
ζ μτι τ'	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 and OC-12/STM-4 ATM Monitor, BERT, Tx/Rx Test
<u>SEU301</u>	SonetExpert™ Unchannelized OC-3/STM-1 and OC-12/STM-4 PoS Monitor, BERT, Tx/Rx Test
<u>SEU302</u>	SonetExpert™ Unchannelized ATM Record Playback for OC-3/STM-1 and OC-12/STM-4
<u>SEU303</u>	SonetExpert™ Unchannelized PoS Record Playback for OC-3/STM-1 and OC-12/STM-4
<u>SEU304</u>	SonetExpert™ Unchannelized ATM Protocol Analysis for OC-3/STM-1 and OC-12/STM-4
<u>SEU305</u>	SonetExpert™ Unchannelized PoS Protocol Analysis for OC-3/STM-1 and OC-12/STM-4
<u>SEU503</u>	SonetExpert™ Unchannelized RAW Record Playback for OC-3/STM-1 and 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

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

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

