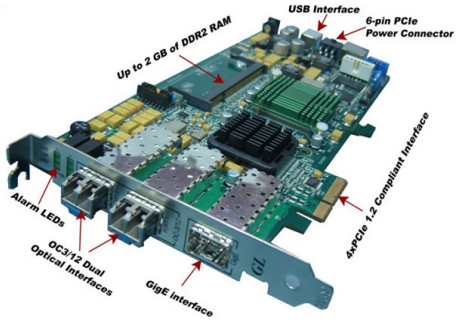
LightSpeed1000™ (w/ GigE and USB 2.0)

OC-3/STM-1, OC-12/STM-4 Analysis and Emulation Card



Overview

The LightSpeed1000™ is GL's high performance software selectable Dual OC-3/STM-1 and OC-12/STM-4 PCI-Express card for wire-speed processing, recording, playing back of ATM, PoS, RAW, and Ethernet traffic. The card's multiple connectivity using PCIe, Gigabit Ethernet (GigE), USB 2.0 and onboard DDR2 memory makes it suitable for various applications. The LightSpeed1000™ includes software for monitoring, BERT, emulation, and protocol analysis with a price tag that compares very favorably with similar test instruments at three times the price. Multiple cards are possible in a PC for analysis of four or more directions simultaneously.

LightSpeed1000™ supports various interfaces like PCI Express, USB 2.0, and Gigabit Ethernet opens many possibilities like enclosed (as shown above), USB 2.0 interface used to connect with a Notebook PC, Ethernet testing for BERT / RFC2544, SONET and Ethernet bridge, and so on. The analyzer card is built upon FPGA technology to upgrade it in the field.

For more details, please visit http://www.gl.com/OC3-OC12-analysis-emulation-card.html.

Main Features

- Wire-speed processing of ATM, PoS or RAW data for Tx and Rx for both ports
- Software selectable OC-3(STM-1) or OC-12(STM-4) for ATM, PoS or Transparent Traffic
- Ability to capture/playback to/from disk at full rate in both directions for both ports for detailed offline analysis.
- Simultaneous synchronous capture or transmit is possible on both optical ports.
- Comprehensive transmit/receive testing capabilities; transmitting and verifying data with incrementing sequence numbers with each packet/cell
- Industry proven Protocol Analyzer for ATM (AAL2, AAL5), UMTS, and PPP (IP and higher layer protocols)
- Easy to use and flexible Bit Error Rate Test (BERT) application for ATM, POS, and RAW
- Complex and flexible hardware based filtering options: sixteen 128 bit independently filters with bit masks, for both ports with AND/OR include/exclude conditions
- Hardware based precise time-stamping of cells with 10 nsec resolution, 1 ppm accuracy
- Single mode or multi mode SFP support
- High performance x4 PCIe interface with optimized DMA to perform Rx and Tx packets to/ from PC memory
- Flexible DMA circular buffer architecture to read and write cells and packets at wire-speed
- Multiple cards per system for super high capacity monitoring and test system
- Hardware independent of higher level protocol for easy adaptation of future protocols
- Field upgradable firmware; Optional onboard SODIMM memory (DDR2) – up to 2 Giga bytes
- API Toolkit to develop user specific applications. Supports MS-Windows® and Linux OS

Wirespeed Record/Playback/ Processing of ATM, PoS, RAW, and Ethernet Traffic

x4 PCIExpress, USB 2.0, and Gigabit Ethernet Connectivity

API Toolkit for Specialized Applications Development

SONET/SDH/ATM/PoS Alarms and Error Logging

Emulation & Analysis of PPP (IP and Higher Layers)

ATM (AAL0, AAL2, AAL5) and UMTS Protocol Analysis

BERT over ATM, PoS, and RAW formats

Multiple 128-bits Filters

Precise Time-stamping

Up to 2 GBytes of DDR2 RAM

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PoS Analyzer– Packet Over SONET / SDH

Overview

PoS, or Packet over SONET / SDH—OC-3/STM-1 and OC-12/STM-4 is supported at full rates over dual interfaces. Access, capture, analysis, and emulation of PPP and HDLC, all carrying IP traffic in real-time makes this card useful to many applications including routing, deep packet inspection, and other internet traffic applications.

- **PoS Protocol Analysis**

PPP Analyzer can be used to capture a host of PPP protocols exchanged between the two nodes over SONET/SDH link. User can obtain detailed analysis of higher later protocols (IP, TCP, UDP, HTTP, FTP, POP3 etc) and can perform various statistics measurements. Integrated Packet Data Analysis (PDA) in Real-time PPP Analyzer is an outstanding tool for live monitoring of VoIP traffic. It can segregate IP traffic into SIP / H323 / Megaco / MGCP calls and collects statistics, CDRs, ladder diagrams, and a host of other useful information about VoIP calls.

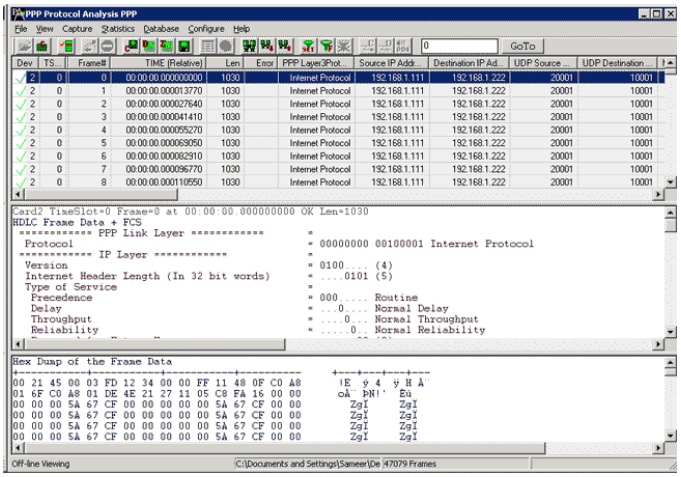

Figure: PPP Protocol Analyzer

- **PoS Tx / Rx Test**

An emulation and test capability that transmits fixed, random, or variable lengths test packets and checks packets on receive.

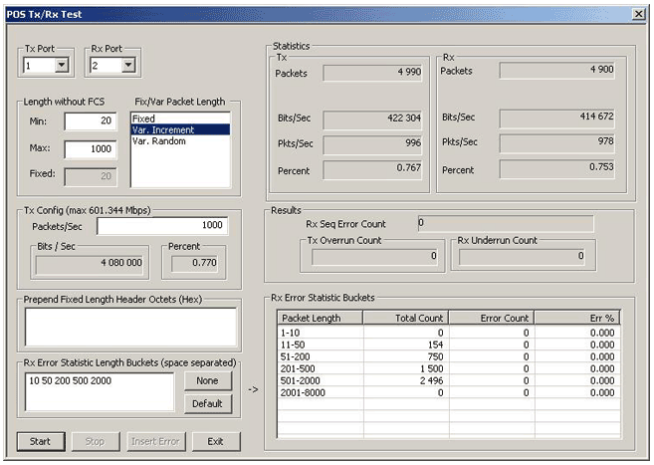

Figure: PoS Tx/Rx Test

- **PoS BERT**

Support for the following PRBS Patterns: 2^9 – 1, 2^11 – 1, 2^15 – 1, 2^20 – 1, 2^23 – 1, 2^29 – 1, 2^31 – 1, all one's, all zero's, alternate ones and zeros, user-defined pattern of lengths from 2 to 32 bits, invert and non-invert selections, single bit error insertion, error insert rate from 10^-1 to 10^-9, status for pattern sync, bit errors counters, and packet rate and packet gap configuration options, configurable header lengths and header information.

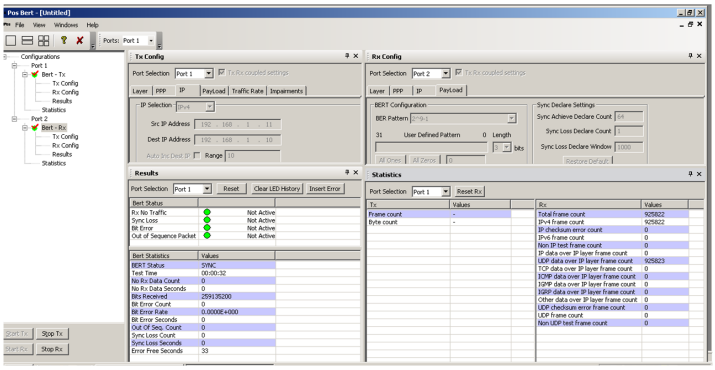

Figure: PoS BERT

PoS Port Configuration

PoS Port Configuration allows users to select FCS type, control FCS stripping on Rx and FCS appending on Tx.

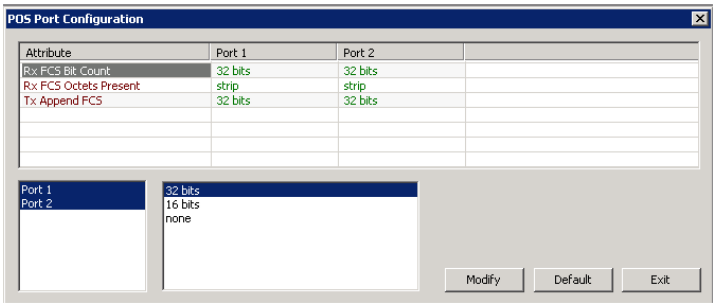

Figure: PoS Port Configuration

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ATM Analyzer– Asynchronous Transfer Mode Over SONET / SDH

Overview

ATM over SONT/SDH— OC-3/STM-1 and OC-12/STM-4 is supported at full rates over dual interfaces. Access, capture, analysis, and emulation of ATM cells at wire-speed make this interface capability applicable for wide ranging next generation networks.

- **ATM Protocol Analyzer**

ATM Analyzer is used to analyze and view ATM protocols across the U-plane for both NNI and UNI interface carrying AAL0, AAL2 and AAL5 traffic.

- **UMTS Protocol Analyzer**

UMTS analyzer is capable of capturing, decoding and performing various test measurements across various interfaces i.e. Iub, Iur, IuCs and IuPs interfaces of the UMTS network. In addition, it supports ATM as the transport layer. It helps in fault diagnosis and troubleshooting UMTS network.

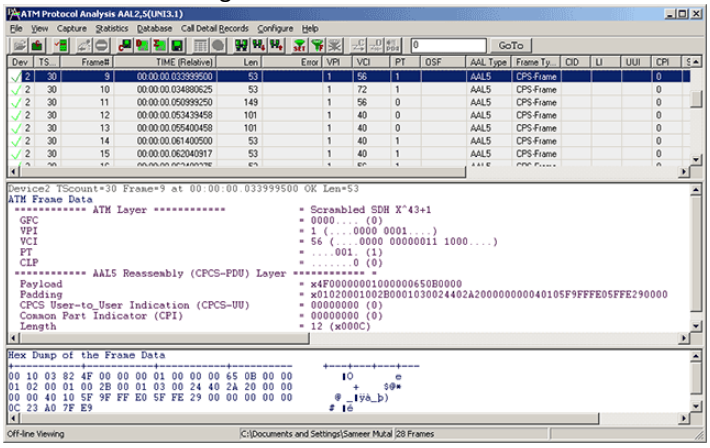

Figure: ATM Protocol Analyzer

- **ATM Tx / Rx Test**

An emulation and test capability that transmits ATM test cells and / or analyzes the received cells.

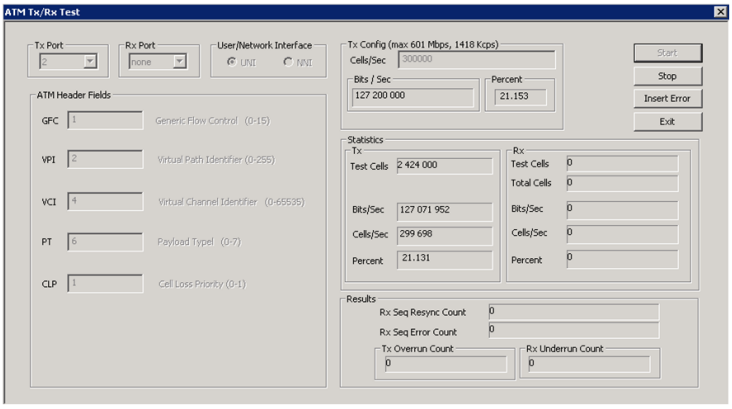

Figure: ATM Tx/Rx Test

- **ATM BERT**

Support for the following PRBS Patterns: 2^9 – 1, 2^11 – 1, 2^15 – 1, 2^20 – 1, 2^23 – 1, 2^29 – 1, 2^31 – 1, All one's, all zero's, alternate ones and zeros, user defined pattern of lengths from 2 to 32 bits, invert and non-invert selections, single bit error insertion, error insert rate from 10^-1 to 10^-9, HEC error insertion, on receive filtering is provided for idle cells, GFC, VPI, VCI, CL, and PT cells, statistical details for total cells, valid cells, idle cells, filtered cells, and filtered out cells.

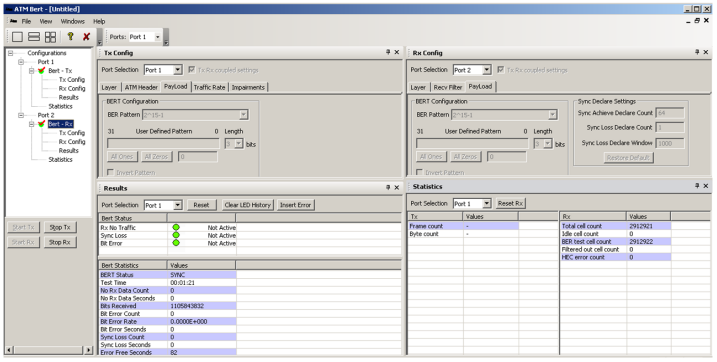

Figure: ATM BERT

ATM Configuration

ATM Configuration allows user to either pass or drop the Idle cells at the receiving stream.

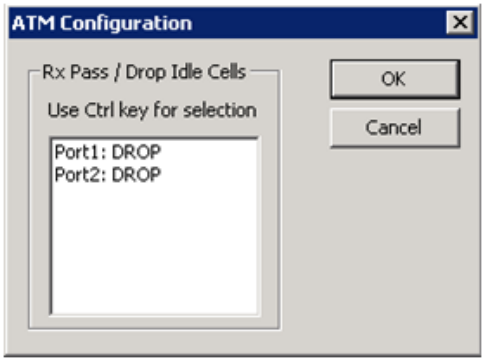

Figure: ATM Port Configuration

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Record, Playback Packets and Cells

These modules allow users to transmit and capture packets from file or to a file over OC-3/STM-1 and OC-12/STM-4 interfaces. Offline utility can convert it into GL's HDL file format or PCAP format.

Receive Packets to File

- Hardware provided **versatile multiple filters** can be applied to incoming data on each individual port to allow traffic of interest only. ATM and PoS traffic can be filtered at hardware level to target traffic of interest only.
- Allows Wirespeed capture of all payload from SONET/SDH envelop transparent of transport level.
- Captures the received packets on both ports simultaneously into a file up to hard drive capacity.
- Packets can be captured continuously (till user manually stops the capture or up to hard drive capacity) or limited by a specified size in MB, a packet count, or a specified time limit.
- Capture incoming packets synchronously on multiple boards

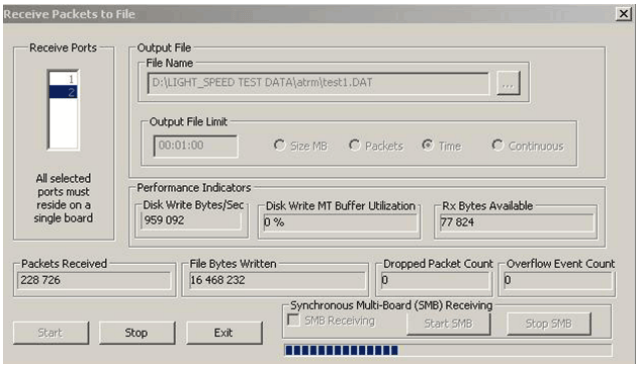

Figure: Receive Packets to File

Software Loopback (Rx-To-Tx Memory Loopback)

This application is used for diagnostic purposes. It loops all the received packets / cells from the SONET to the transmitting ports and displays the Tx and Rx information. Memory Loopback application uses both ports on the selected board.

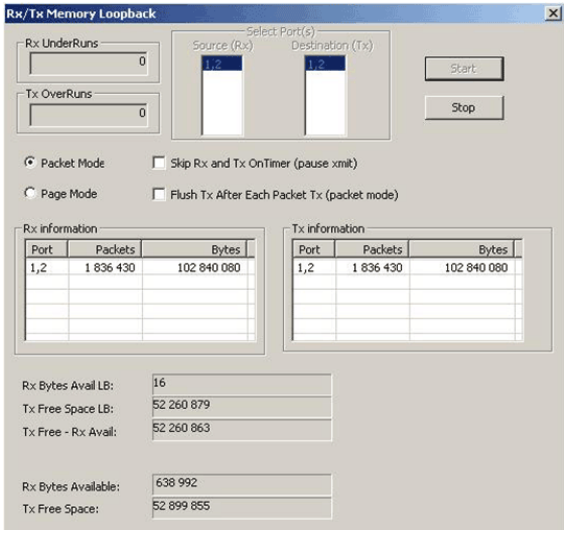

Figure: Memory Loopback

Transmit Packets from File

- Transmits packets / cells from the file.
- Packets can be transmitted either continuously, limited by number of packets/cells, or till the end of file (EOF).
- Transmit packets/cells at a user configurable rate.
- Transmits on the same port as captured, swaps ports or uses a specified port.
- Provides the statistics of the transmitted cells at both line level and payload level.
- Transmit packets synchronously on multiple boards

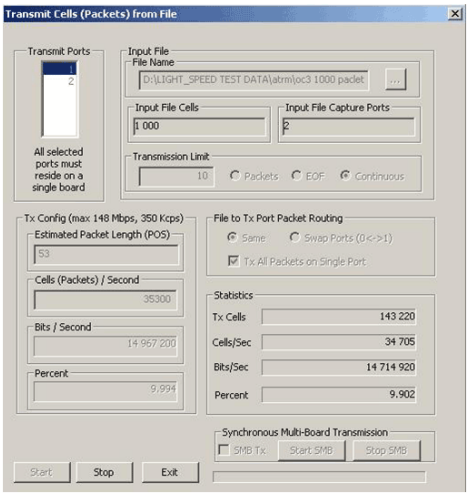

Figure: Transmit Packets from File

Alarms and Errors Counters Monitoring

The alarms and error monitoring window provided for each of the OC-3/OC-12 port displays detailed status of the communication with the other end.
Hardware LEDs are provided on the card to read line alarms.

Monitored Alarms and error counts include –

- Line errors such as OOF, LOS, LOF, AIS, RDI, and APSBF
- FCS, Rx / Tx Abort, and MIN / MAX Length
- Line, Path, and Section error counts

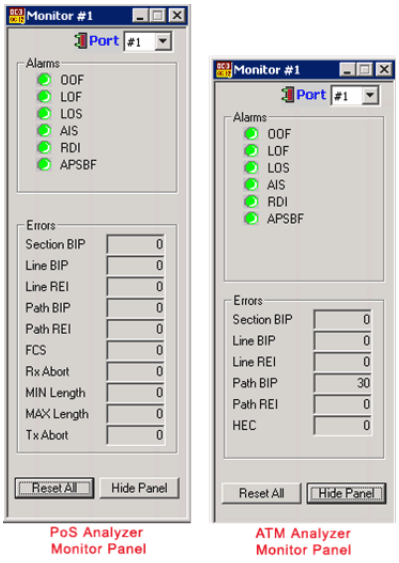

Figure: Monitoring Alarms

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SONET/SDH RAW (or Transparent) Payload

Raw or transparent mode allows direct access to the SONET / SDH payload for BERT, data transmit and receive applications. Current applications include:

- **RAW BERT** - support for the following PRBS Patterns: 2^9 – 1, 2^11 – 1, 2^15 – 1, 2^20 – 1, 2^23 – 1, 2^29 – 1, 2^31 – 1, all one's, all zero's, alternate ones and zeros, user defined pattern of lengths from 2 to 32 bits, invert and non-invert selections, single bit error insertion, error insert rate from 10^-1 to 10^-9, status for pattern sync, and bit errors counters.
- **Wirespeed capture of raw data** to hard disk on one or both ports simultaneously. The data is recorded in 64 bytes block with appropriate header.
- **Playback of recorded data** from file at wirespeed on one or both ports.
- **Alarms and Error** monitoring and logging at SONET/SDH level.

Specifications

Interfaces:

- 2 x OC-3 / STM-1 / OC-12 / STM-4
- 1 x Gigabit Ethernet
- Single Mode or Multi Mode Fiber SFP support with LC connector

Protocols:

- RFC 2615 compliance
- PoS compliance specs needed

Tx Clock:

- Internal or Recovered

Alarm LEDs:

- **LOS** – LOS (Loss of Signal) is a physical layer error, which indicates loss in optical signal.
- **LOF** - LOF (Loss of Frames) becomes active when receiving interface detects errors in the framing pattern for three milli-seconds. This will be indicated using the frame alignment bytes A1 and A2. LOF is cleared when two consecutive valid A1/A2 framing patterns are received.
- **User** – A user-defined LED can be configured by the user as per the requirements.

Bus Interface:

- PCIe Specification 1.2 Compliant
- USB 2.0

Power and Dimensions:

- +12 volts, 3.5 Amps
- 4.2” x 9.2”

Supported Protocols

- **ATM—**Implements the ATM Forum User Network Interface Specification and the ATM physical layer for Broadband ISDN according to CCITT Recommendation I.432.
- **PPP over SONET (PoS)** - Implements the Point-to-Point Protocol (PPP) over SONET/SDH specification according to RFC 2615 (1619) / 1662 of the PPP Working Group of the Internet Engineering Task Force (IETF).
- **OC-3/OC-12/STM-1/STM-4 Transparent Payload—**Analyzer processes SONET/SDH payload in transparent (RAW) mode without any transport protocols.

Buyers Guide:

LTS100 - Dual OC-3/STM-1 and OC-12/STM-4 PCI Express Card

LTS105 - Portable Dual OC3 / OC12 Unit

OC-3/STM-1 Related Software

LTS200 – OC-3/STM-1 ATM Monitor, BERT, Tx/Rx Test, RAW

LTS201 – OC-3/STM-1 PoS Monitor, BERT, Tx/Rx Test, RAW

LTS202 – OC-3/STM-1 ATM and RAW Record / Playback

LTS203 – OC-3/STM-1 PoS and RAW Record / Playback

LTS204 – OC-3/STM-1 ATM Protocol Analysis

LTS205 – OC-3/STM-1 PoS Protocol Analysis

LTS206 – OC-3/STM-1 UMTS Analysis

OC-12 / STM-4 Related Software

LTS300 – OC-12/STM-4 ATM Monitor, BERT, Tx/Rx Test, RAW

LTS301 – OC-12/STM-4 PoS Monitor, BERT, Tx/Rx Test, RAW

LTS302 – OC-12/STM-4 ATM and RAW Record / Playback

LTS303 – OC-12/STM-4 PoS and RAW Record / Playback

LTS304 – OC-12/STM-4 ATM Protocol Analysis

LTS305 – OC-12/STM-4 PoS Protocol Analysis

LTS306 – OC-12/STM-4 UMTS Analysis

Related Hardware

DDR2 Options – 512 MB, 1GB, 2GB

SFP Options –

Fiber Cables, Fiber connectors

OC-3/STM-1 OC-12/ STM-4 Monitor Parts

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