USB Based T3 E3 Analysis and Emulation

GL Communications Inc.
818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878
Phone: (301) 670-4784 Fax: (301) 670-9187 Email: info@gl.com
Website: https://www.gl.com

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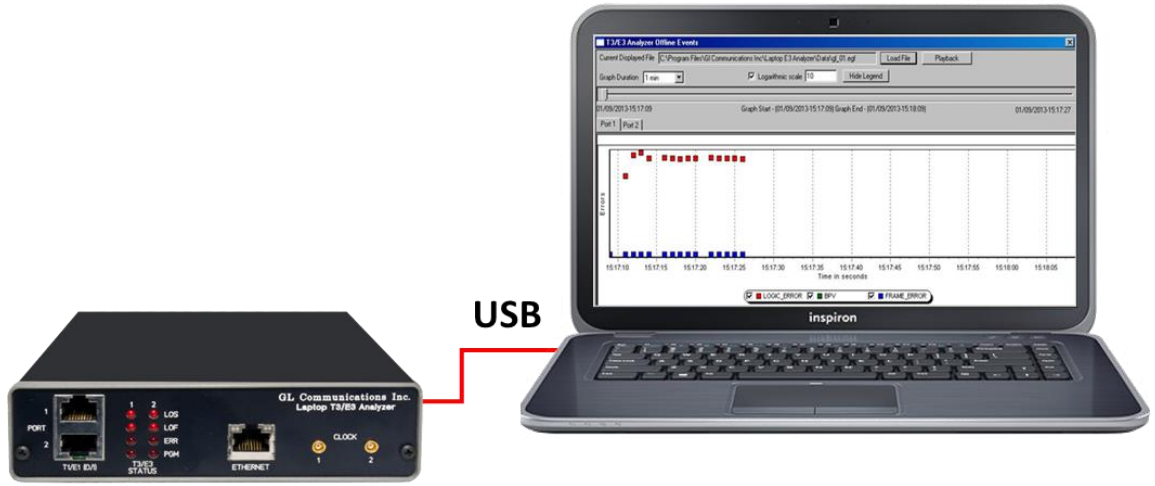
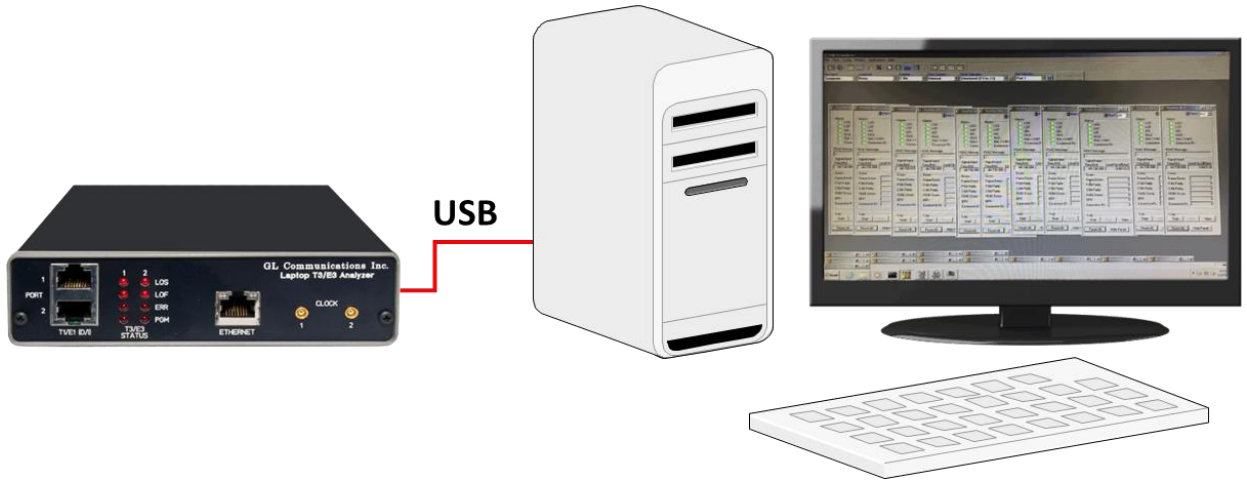
USB Based T3 E3 Analyzer

- Lightest (1.75 pounds) unit available in the market
- Small footprint, easy to carry in the pouch of a Notebook PC - perfect for air travel
- Cost Effective
- Connects to a PC via a USB 2.0 port and Ethernet Port
- T3, E3, T1, E1, Ethernet interfaces supported
- Remote access for controlling and monitoring





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Front and Rear Views of the Analyzer

- Used for installation, test, and troubleshooting of T3 E3 T1 E1 Ethernet lines
- Dual data stream capture capability
- Dropping and inserting T1 or E1
- Full Ethernet analysis
- HDLC, ATM, FR, and PPP analysis
- Used with GL's portable T1 E1 analyzer for individual T1, E1 analysis

Summary of Features and Benefits

- Software selectable T3 (DS3)/ E3 interface along with T1 (DS1) and E1 Drop and Insert
- Dual T3 E3 Receivers and Transmitters for non-intrusive and intrusive testing of both eastbound and westbound signals at the same time
- Simultaneously record/playback the entire T3 (DS3)/E3 in framed or unframed modes up to hard disk capacity
- Flexible clocking - internal, recovered (from T3 (DS3)/E3, T1 (DS1) or E1) and external

Summary of Features and Benefits (Contd.)

- General T3 (DS3)/E3 signal testing capabilities
  - Alarms – monitoring and logging
  - Monitor T3 (DS3)/E3 frequency, line level and various errors
  - Alarm generation and error injection
  - Decode and simulate Far End Alarm Channel (FEAC) messages
  - T3 (DS3)/E3 error counters
  - Dual BERT and G.821 Analysis
- Scripting and automation through GL's Windows Client Server (WCS) approach
- Monitor / manage the analyzer remotely via Ethernet port (future enhancement)

Summary of Features and Benefits (Contd.)

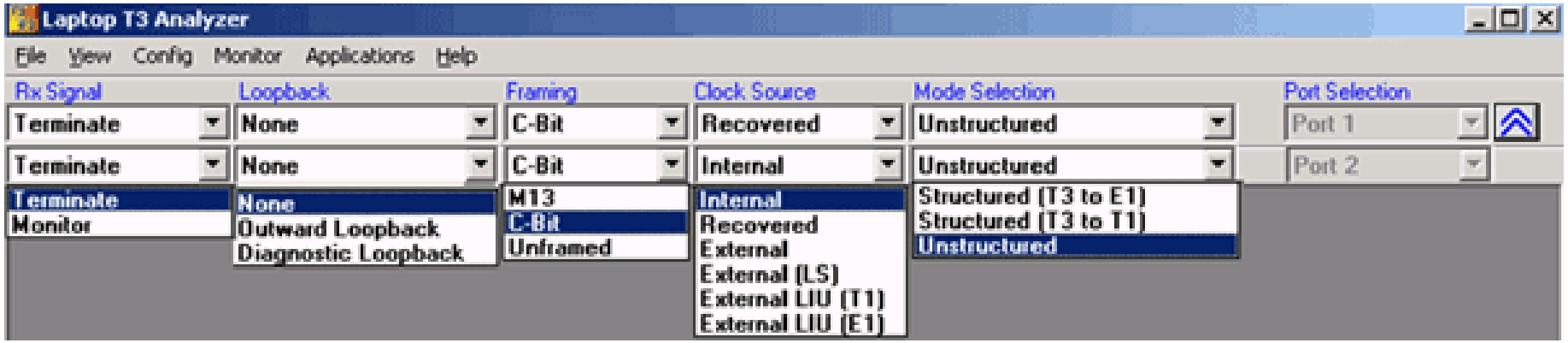
- Channelized (Structured) Testing
  - Multiplex/De-multiplex T1 (DS1)/E1 signals (Drop and Ins
  - Receivers for bidirectional monitoring with Dual T1 (DS1)/E1 drop
  - Transmit multiplexed externally inserted or internally generated T1 E1 streams into T3 (DS3)/E3
  - Stress test M13 (E13) multiplexers and 3/1 Digital cross connect systems
  - Dual channel drop and insert of T1 or E1 signals from any one of the T3 (DS3)/E3 signals
  - Broadcast or loopback individual T1 or E1 within the T3 (DS3) /E3
  - Generates 28 T1s or (21 E1s) signals within the T3 (DS3) or 16 E1s within E3 output
- Unchannelized Testing
  - WAN Testing
  - Protocol testing for ATM, PPP, HDLC, and Frame Relay
  - Transmit / Verify HDLC frames with user defined headers

Basic Applications

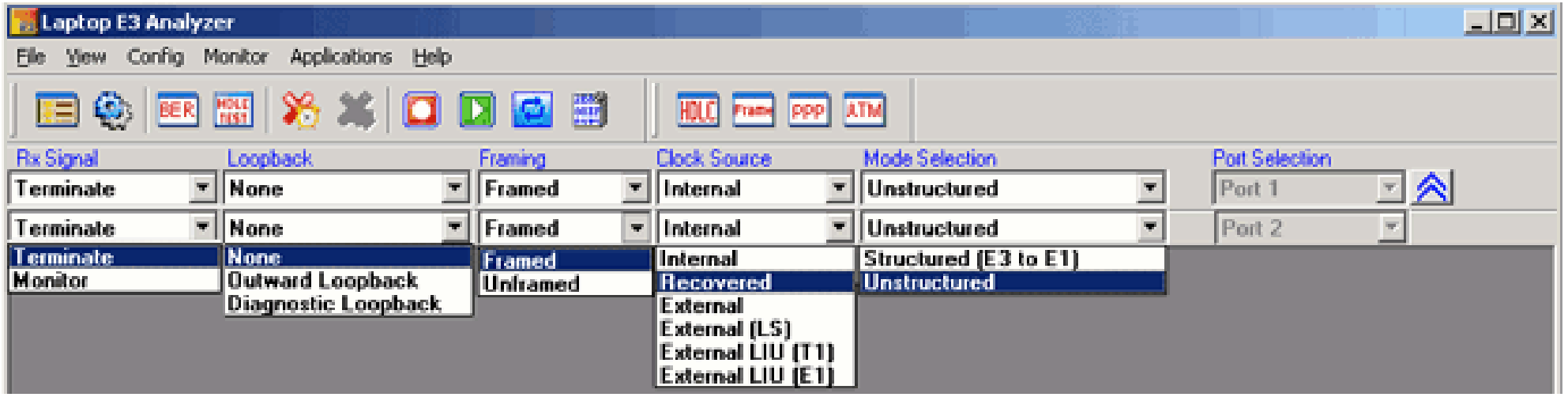
- Loopback Modes, Clock, Framing Formats, Structured/Unstructured Modes
- Transmit and Receive Configuration
- Monitor T3 E3 Lines
- Alarm Generation and Error Injection
- Tx Rx Memory Loopback
- Monitor Received Data
- Multiplex and De-multiplex T1 or E1 signals
- Bit Error Rate Test (BERT)

Loopback Modes, Clock, Framing Formats, Structured/Unstructured Modes

T3 Interface Configuration Parameters



E3 Interface Configuration Parameters



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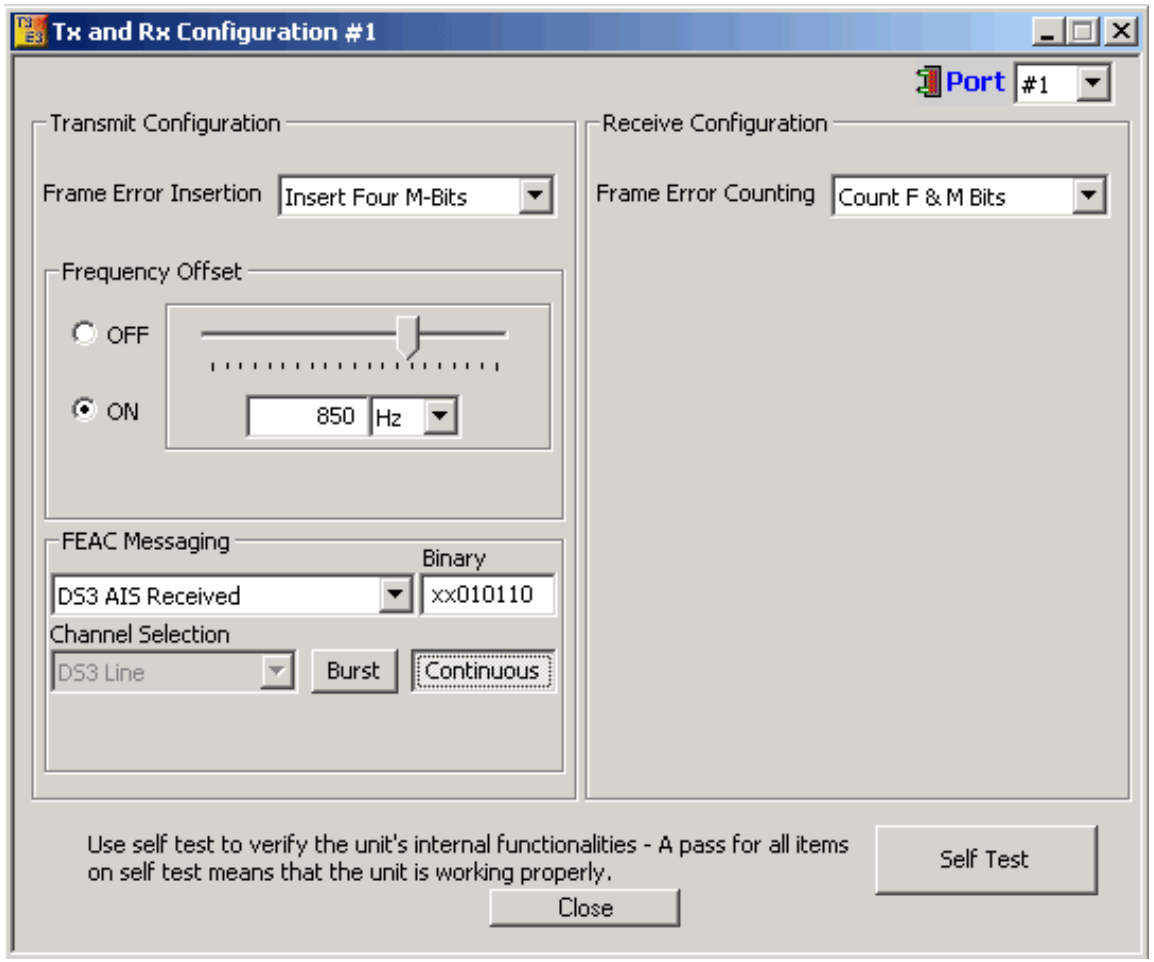
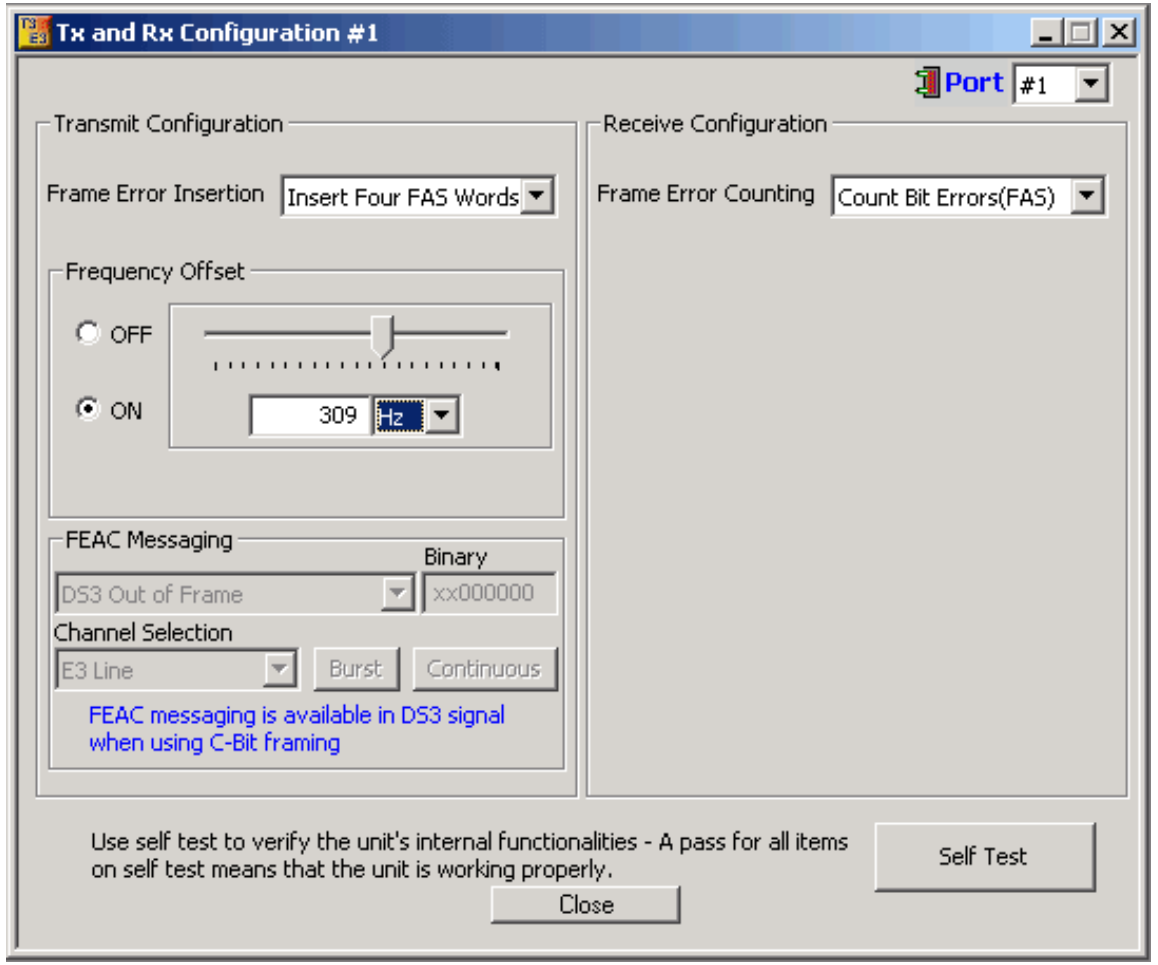
Transmit and Receive Configurations

Tx/Rx parameters for the T3 signal



Tx/Rx parameters for the E3 signal



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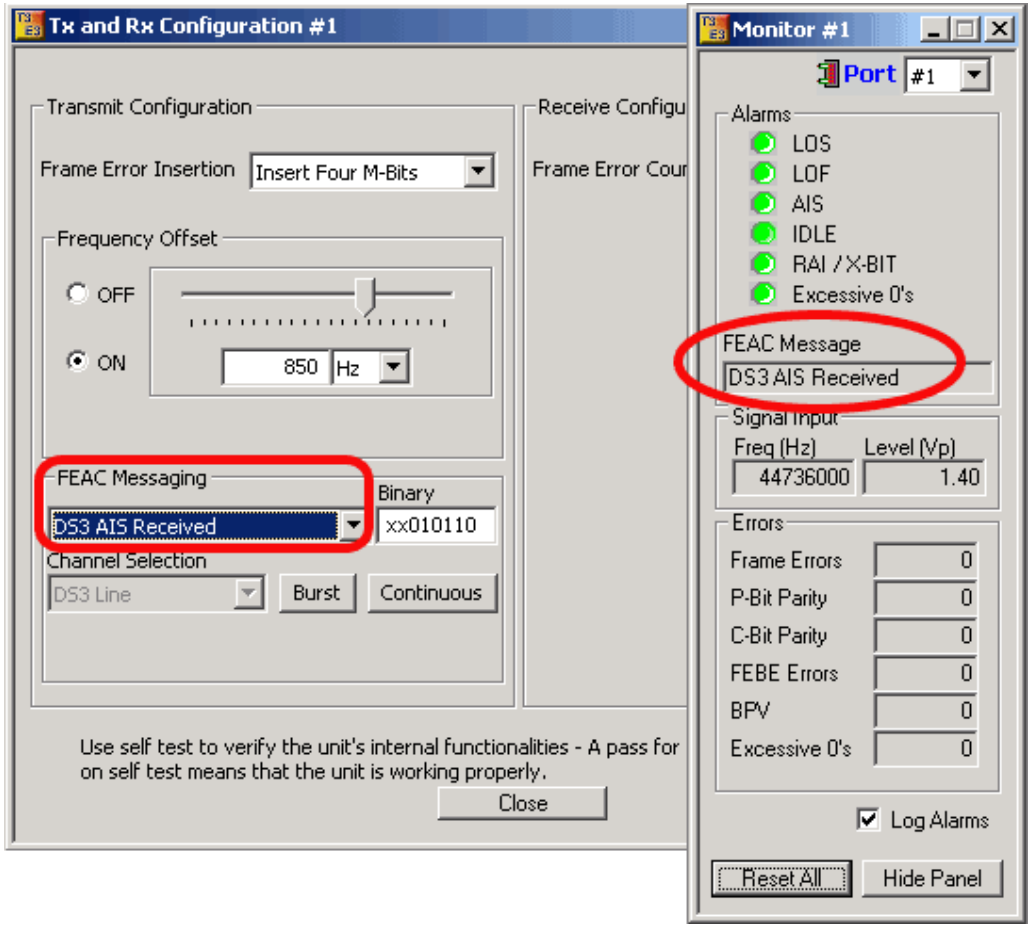
Transmit and Receive Configurations (Contd.)

- Possible frame error insertions in T3
  - Single FAS word (1111)
  - Single FAS word (0000)
  - Four FAS words (1100)
  - Four FAS words (0011)
- Possible frame error insertions in T3
  - Single F Bits
  - Single M Bits
  - Four F Bits
  - Four M Bits
- Frequency Offset ranging from +50 to -50 ppm for the internal clock source
- Standard and User-defined FEAC Message transmission (only for T3 Systems with C-Bit Parity Framing Format)
- Frame Error Counting
  - E3 - Bit Errors (FAS), Word Errors (FAS)
  - T3 - F and M Bits , F Bits , M Bits
- Self Test the unit

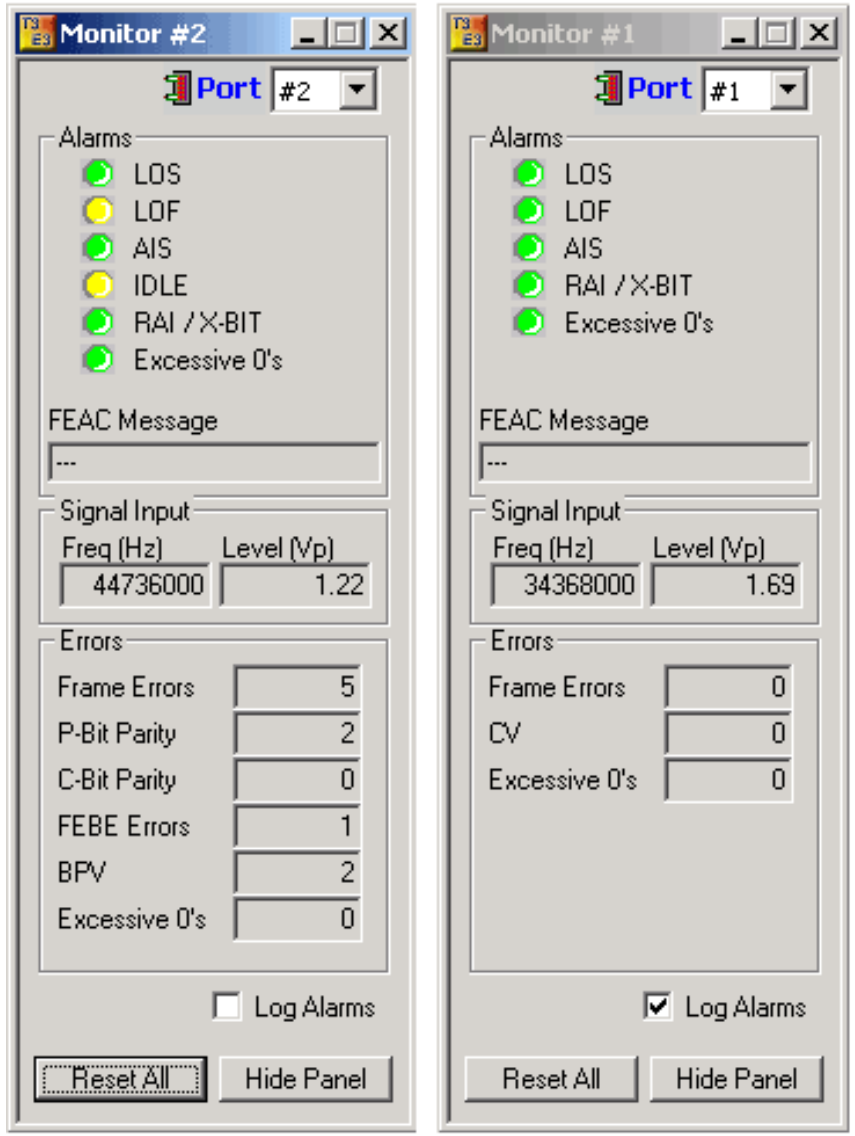
Transmit and Receive Configurations (Contd.)

FEAC Message (only for T3 Systems with C-Bit Parity Farming Format)



- Using the FEAC channel, alarm or status information from the far-end terminal can be sent back to the near-end terminal. The Monitor T3 Line indicates the incoming FEAC message

Alarm and Error Display for T3 (DS3) and E3



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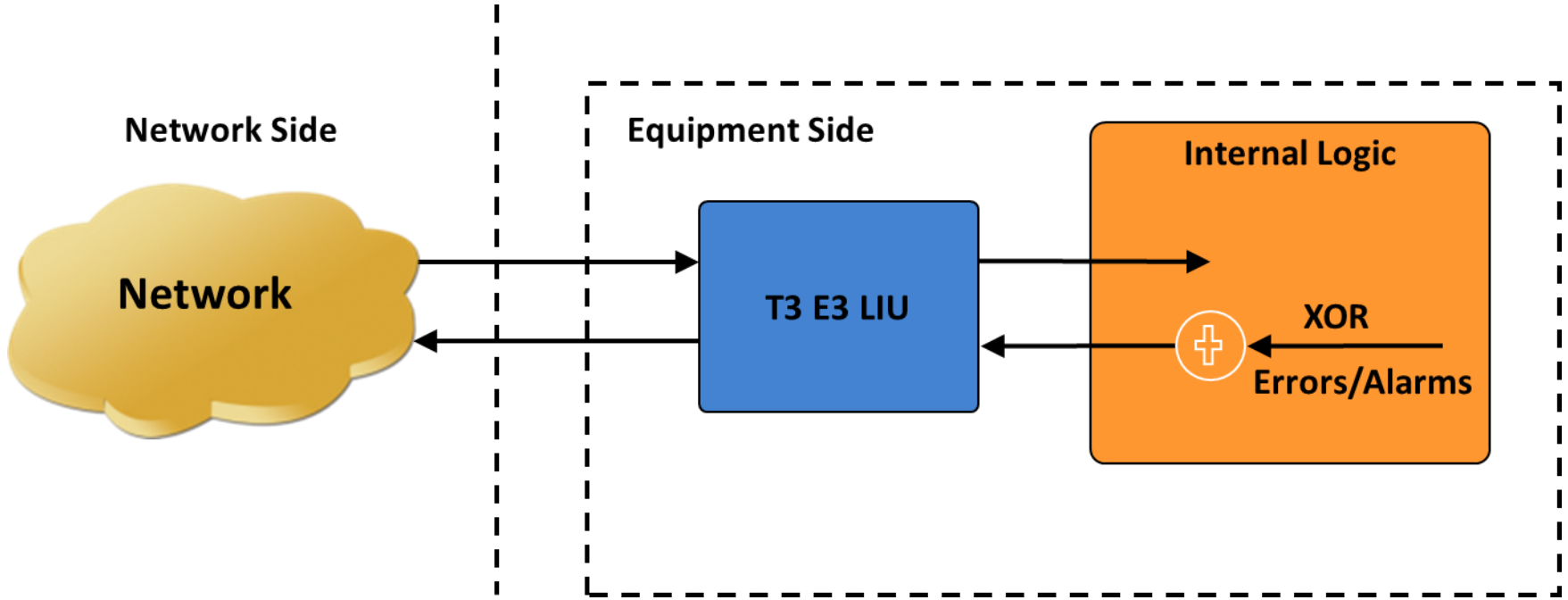
Alarm and Error Display for T3 (DS3) and E3 (Contd.)

- **Available alarms are –**
  - LOS - (Loss of Signal)
  - LOF - (Loss of Frames)
  - AIS - (Alarm Indication Signal)
  - Idle
  - RAI/X-Bit
  - Excessive 0’s

- **Error Indications**
  - Frame
  - P- Bit parity
  - C-Bit parity
  - FEBE
  - BPV
  - CV
  - Excessive zeros

Alarm Generation and Error Insertion

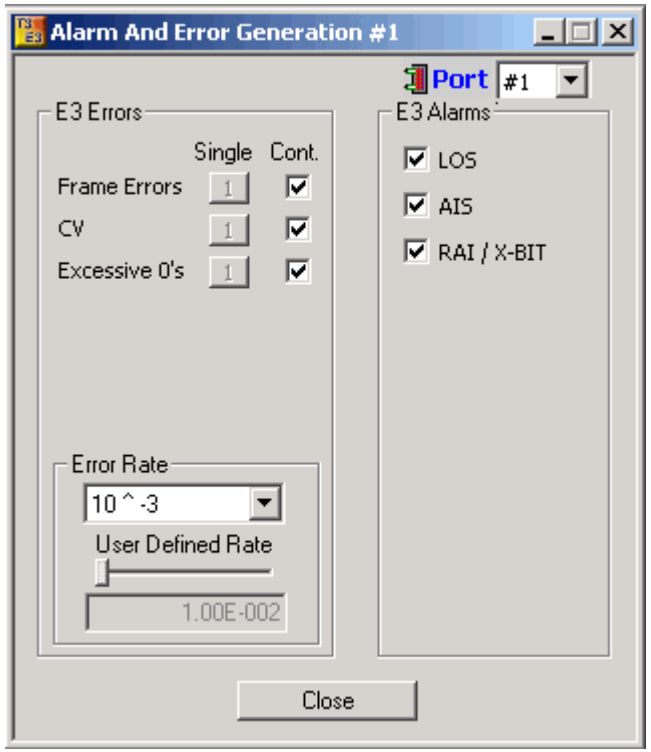
Logical diagram for alarm generation application

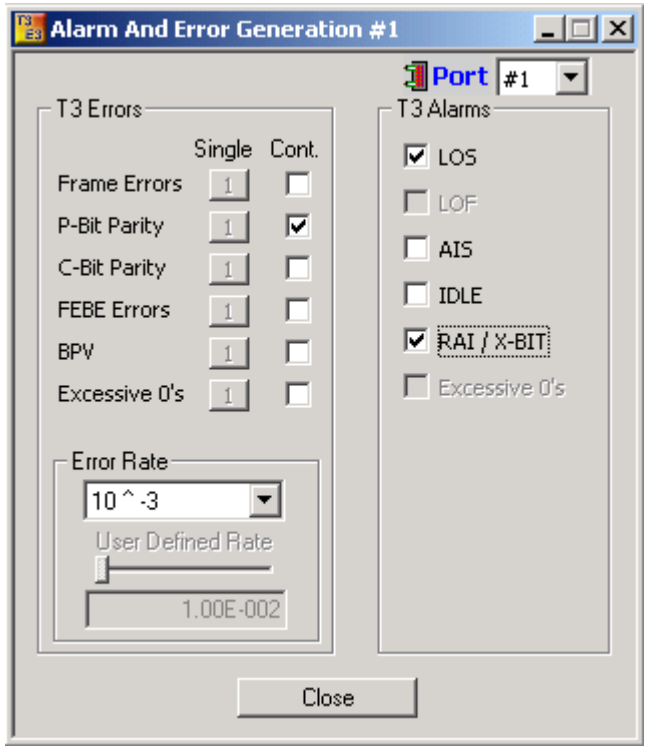


- Internally generates various types of errors and / or alarms and transmits them on the outgoing T3(DS3)/E3 stream
- Automatically inserts single bit errors or at regular intervals of time (secs)

Alarm Generation and Error Insertion (Contd.)

Alarm and Error Generation Options for T3 (DS3) and E3 Analyzer





- Alarms - LOS (Loss of Signal), LOF (Loss of Frames), AIS (Alarm Indication Signal), Idle, RAI/X-Bit, Remote Alarm Indication (RAI)
- Errors – Frame, P-Bit Error (T3 Only), C-Bit Error (T3 Only), FEBE Error (Far End Block Errors) (T3 Only), BPV - BiPolar Violation (T3 Only), Excessive 0's, CV Errors (E3 Only)

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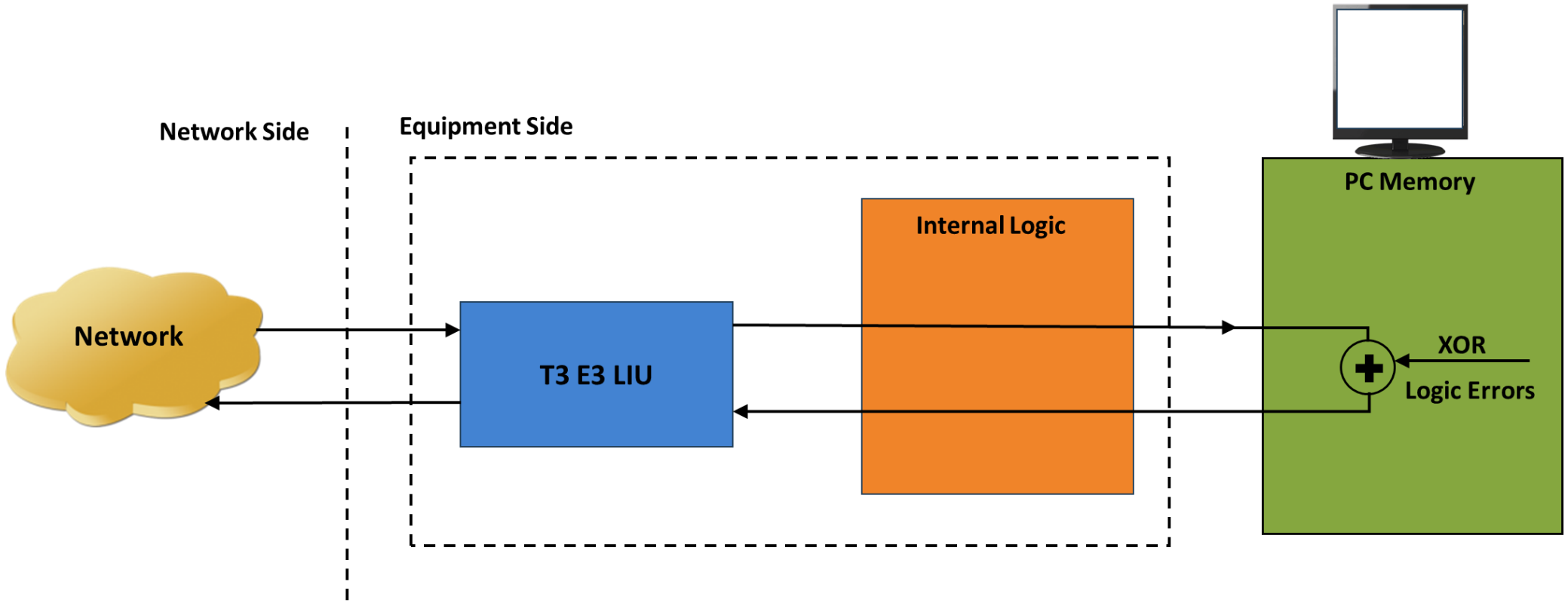
Tx Rx Memory Loopback

Logical Diagram for Transmit and Receive Memory Loopback for T3 (DS3)/E3 Analyzers



- With the loopback, the data received from the network is retransmitted back via the PC memory
- Optionally logic errors (XOR) can be inserted into the loopback stream during loopback
- Allows insertion of single bit errors manually

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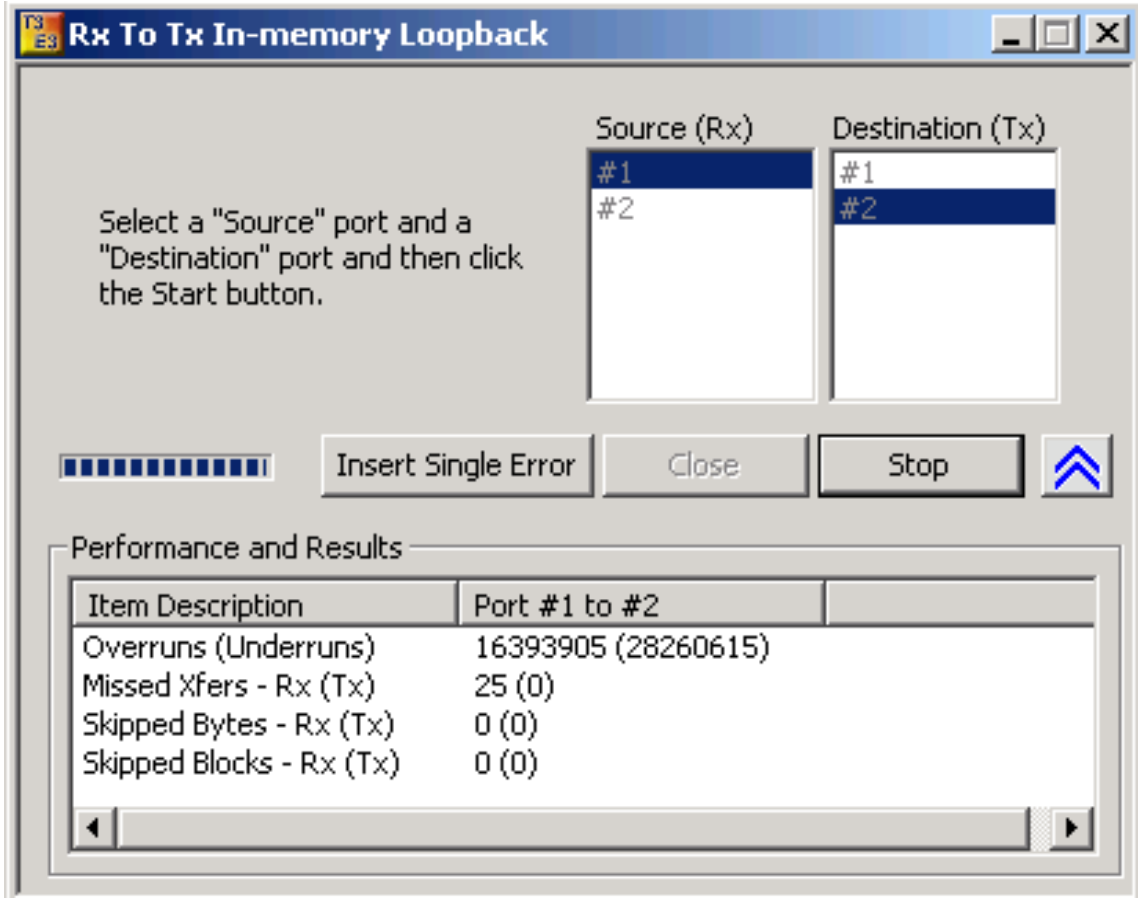
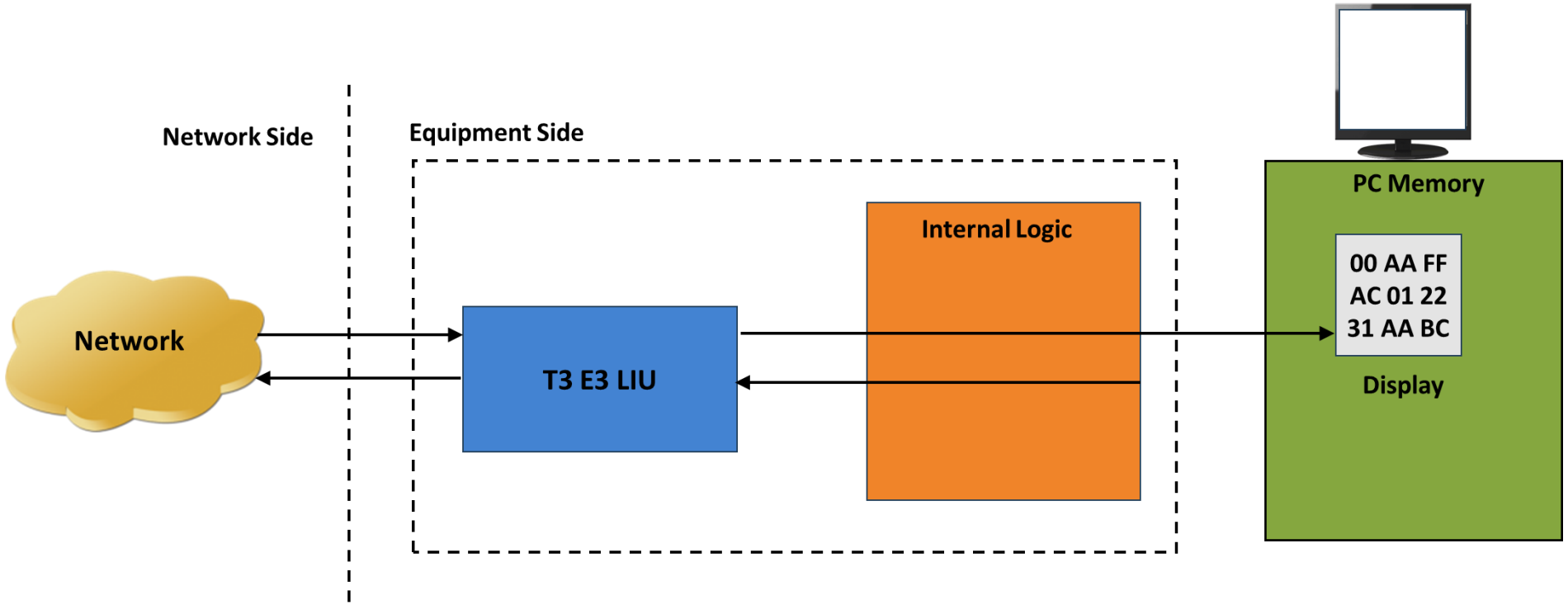
Tx Rx Memory Loopback (Contd.)



- Used for diagnostic purposes
- Memory Loopback and Bit Error Rate Test applications can be run on two different ports simultaneously to verify the operation of the analyzer unit

Monitor Received Data

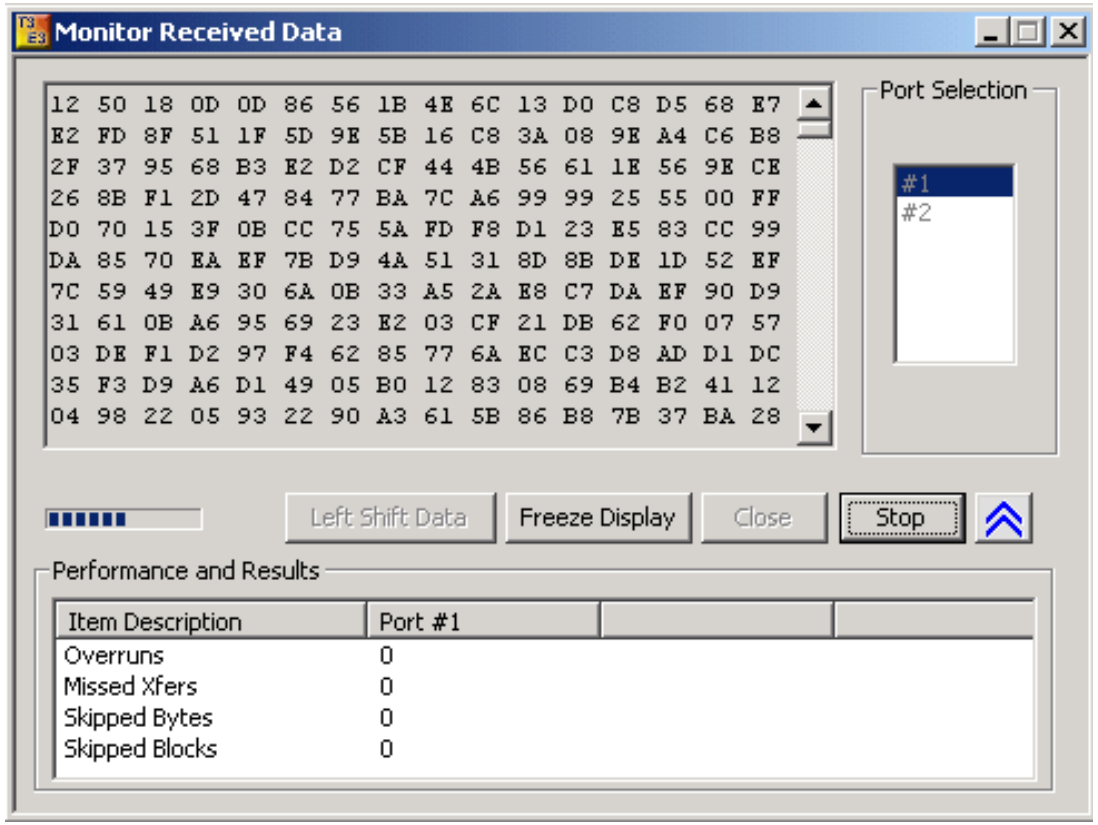
Logical diagram for the Monitor Received Data application



- This application can monitor raw bit values on the selected ports. The raw bytes received from the network at the T3 interface are monitored and displayed on the selected ports

Monitor Received Data (Contd.)

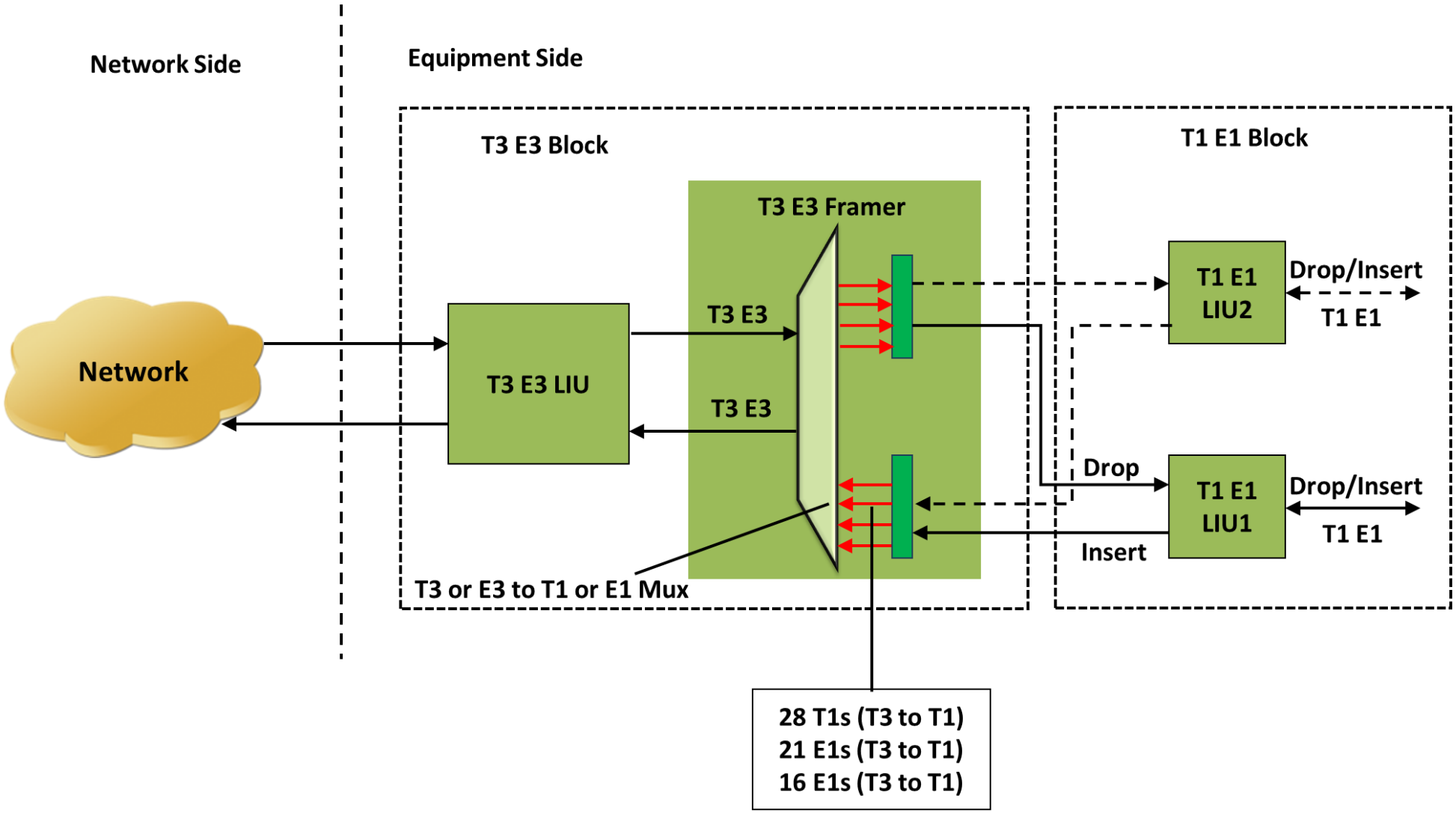
User Interface for the Monitor Received Data Application



- Can be used for quickly testing the byte alignment of the received data
- Underruns, MissedXfer, Skipped Bytes, and Skipped Blocks display provides the receive data pipe performance

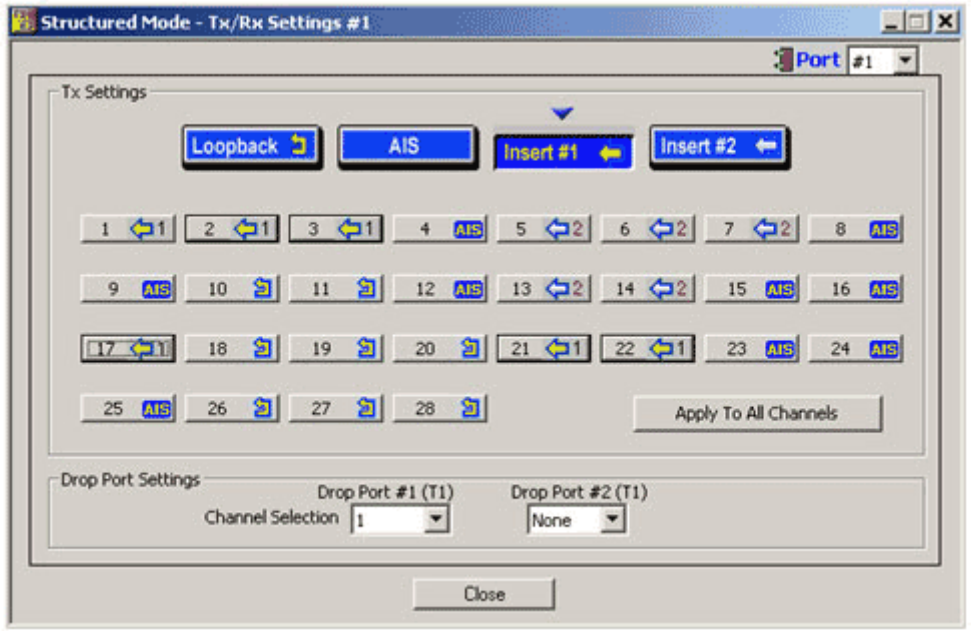
Multiplex and De-multiplex T1 or E1 signals

Logical Diagram for Drop and Insert Structured Mode



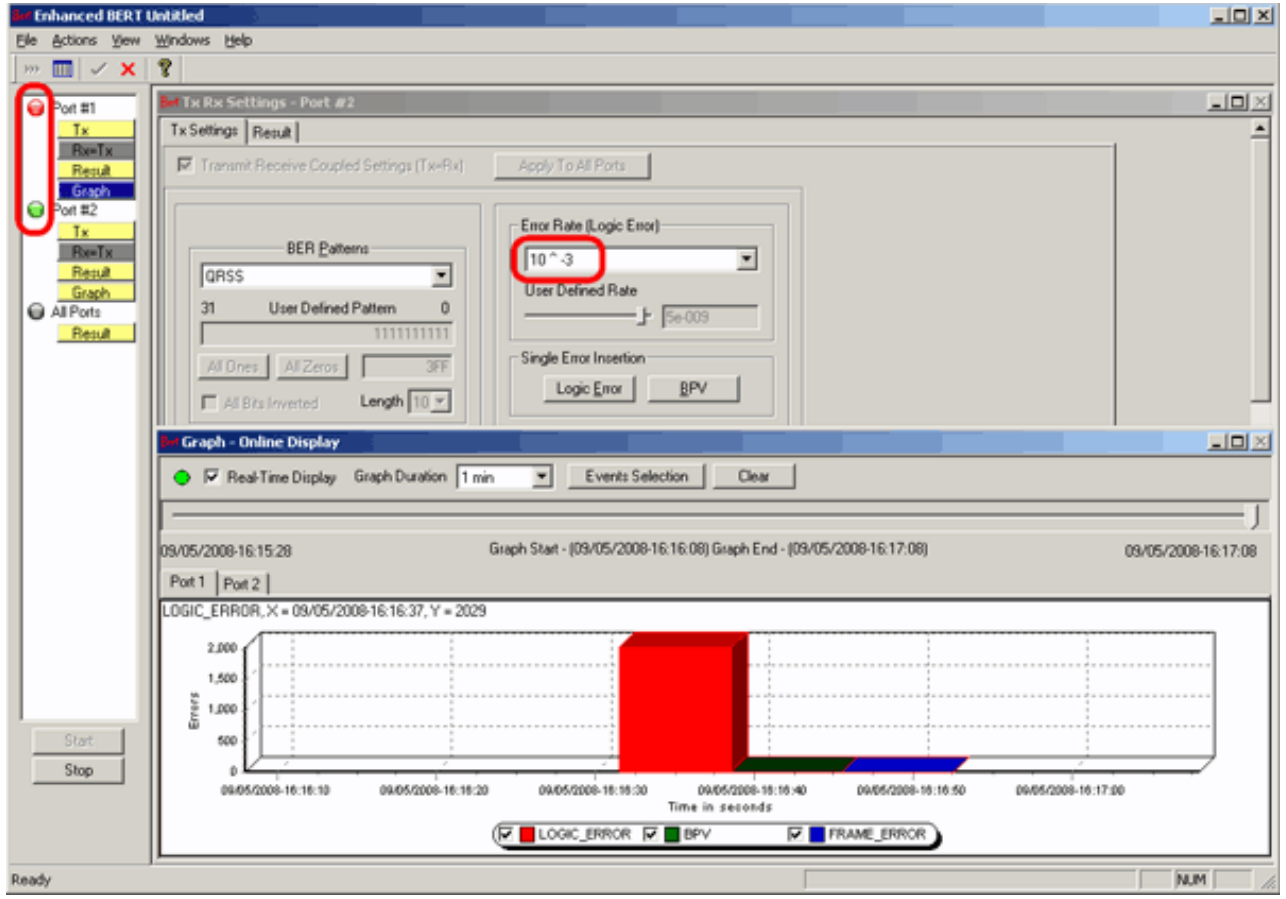
Multiplex and De-multiplex T1 or E1 signals (Contd.)

User interface for the Structured Mode (Drop / Insert) Settings



- Up to two user selected T1 (or E1) channels can be externally inserted using the T1 or E1 input/output interface into any one of the transmitted T3 (DS3) or E3 signal
- The inserted T1 or E1 signal can be selectively transmitted through one or more of the T1 or E1 transmit channels or broadcasted through all the T1 or E1 channels
- Up to two user selected T1 or E1 channels can be dropped

Bit Error Rate Test - BERT (Full Frame and Unframed)

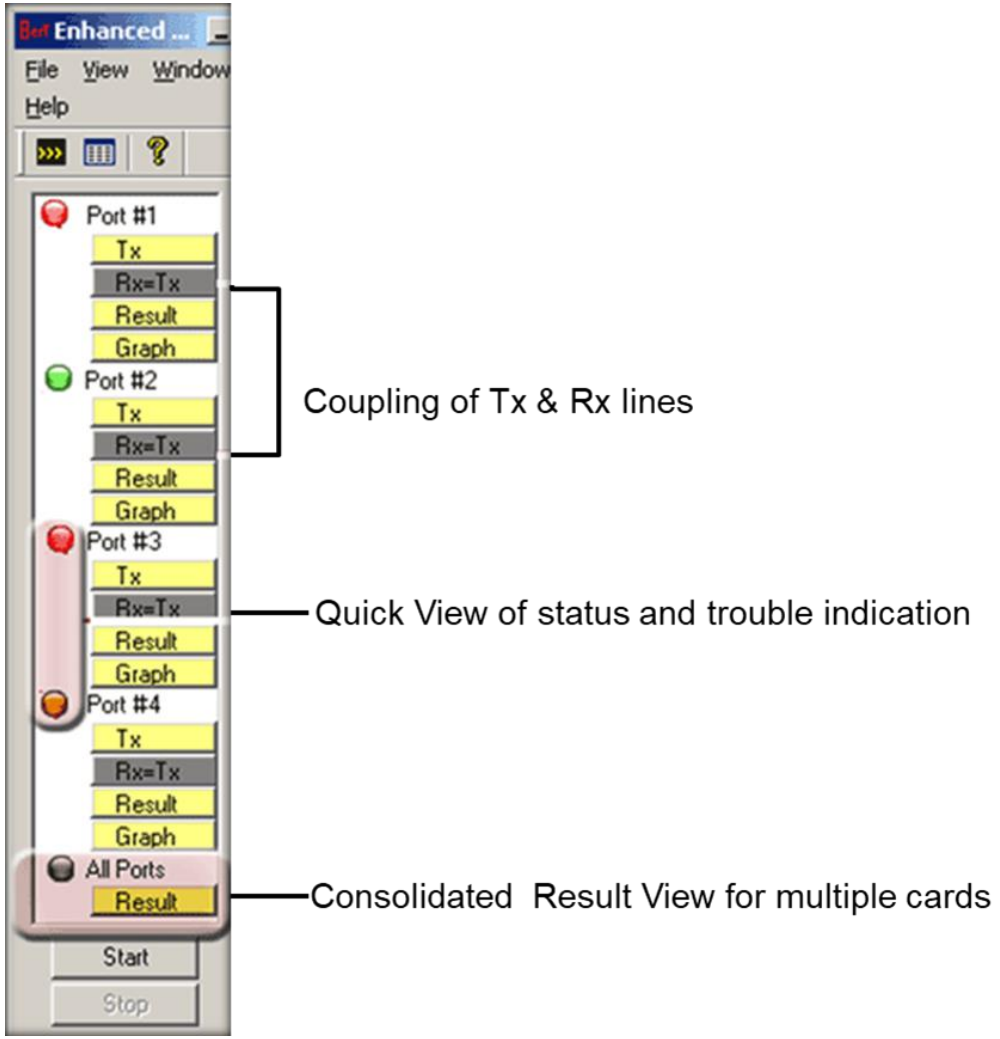


- GL's T3 E3 Bit Error Rate Tester application measures the correctness of data received on T3 E3 channels for a repetitive fixed or pseudorandom pattern for the given transmission

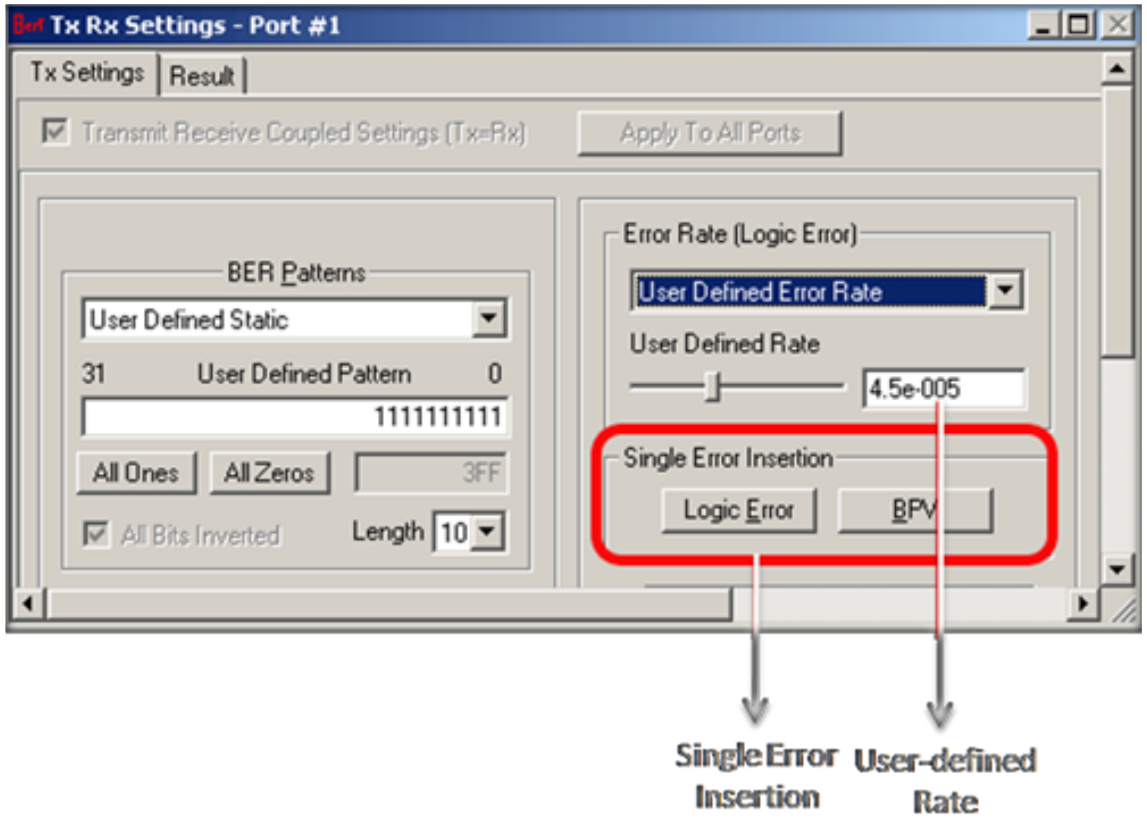
GL Communications

Selection of Port – View Error Status, Results

- Quick view of the status and trouble indication
- Supports testing on multiple ports simultaneously with consolidated result view
- Tx and Rx settings for multiple ports can be independently controlled or they can be coupled (Apply to All) from a single card to all cards



Error and Bit Patterns Insertion



- Supports predefined and user defined error insertion rate ranging from 10^-2 to 10^-9 (0.01 to 1e-009)
- Automatic insertion of Logic and BPV errors at regular intervals of time (secs) or just insert single bit errors into the transmit stream

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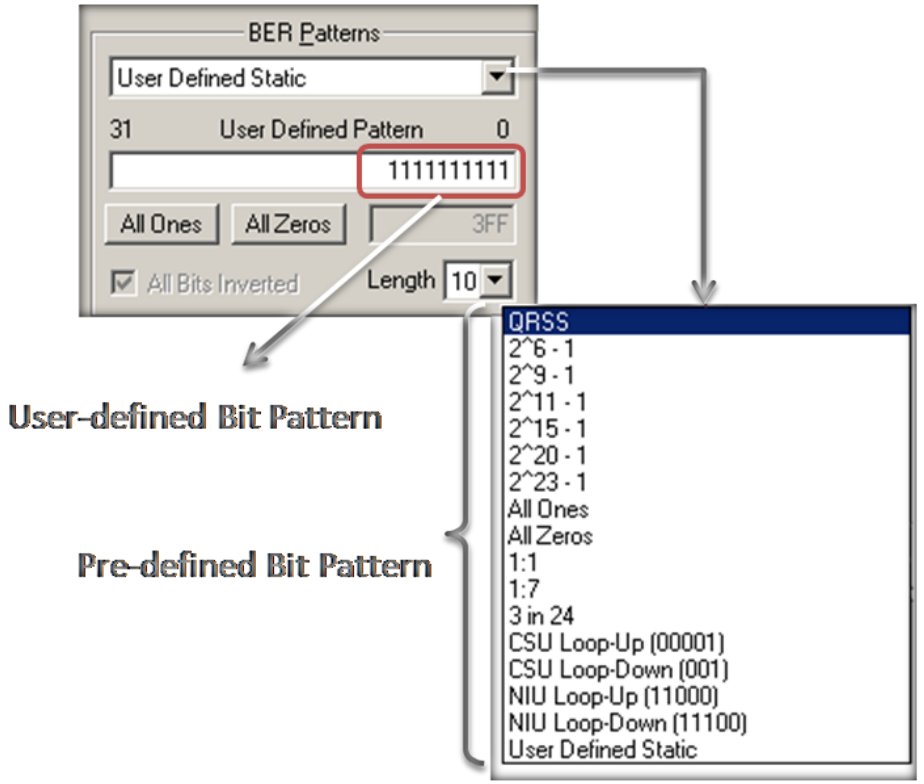
Static and User-Defined Pattern Selection



- Generates standard static bit patterns such as - QRSS, 2^5-1, All ones, All zeros, 1:1, CSU Loop-Up (0001), CSU Loop-down (001), NIU Loop-UP (11000), NIU Loop-Down (11100), and more
- Generates user-defined static patterns of size up to 32 bits

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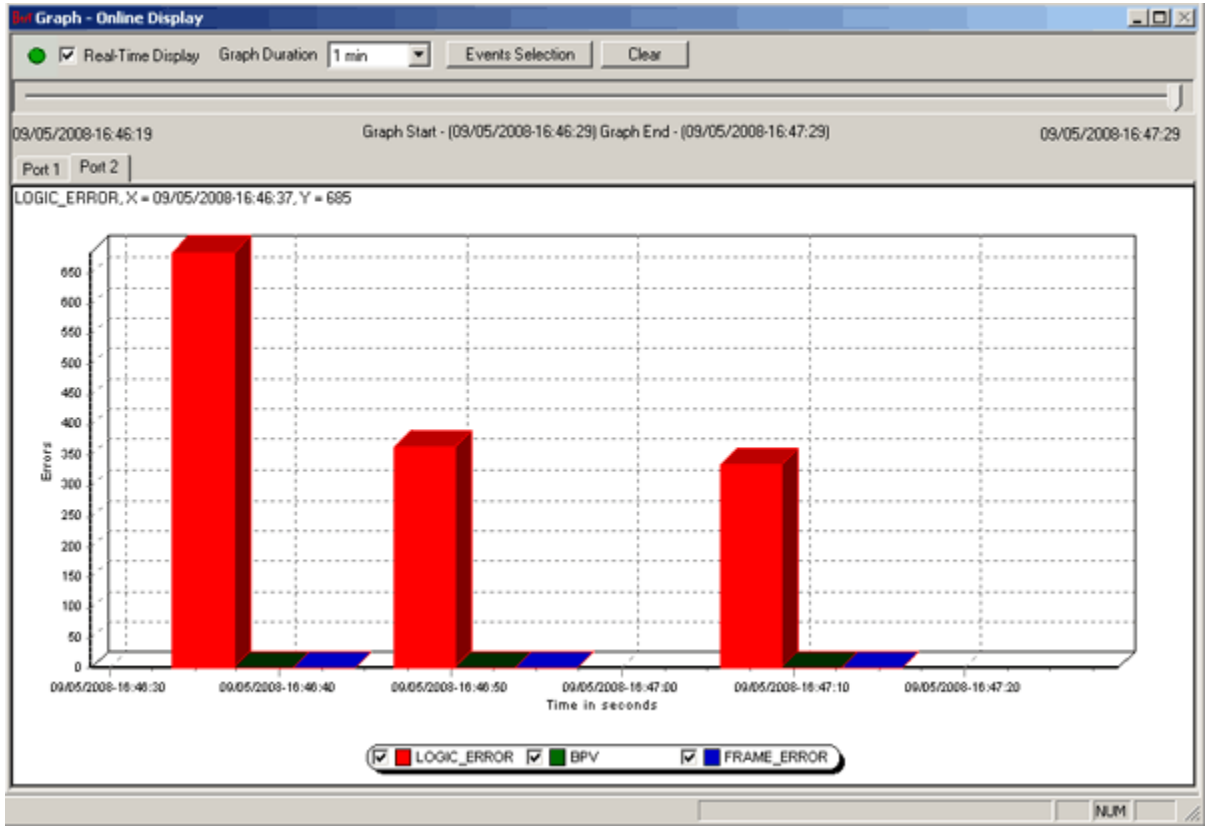
Graphical Result



- The Error Count Vs Time graph of the bit error test results is displayed
- For real-time graph, the predefined or the user defined bit pattern and the errors can be inserted
- Offline graph display the saved (*.xml) files are loaded for analysis
- Any of the events such as LOGIC_ERROR, BPV, or FRAME_ERROR can be set for the display

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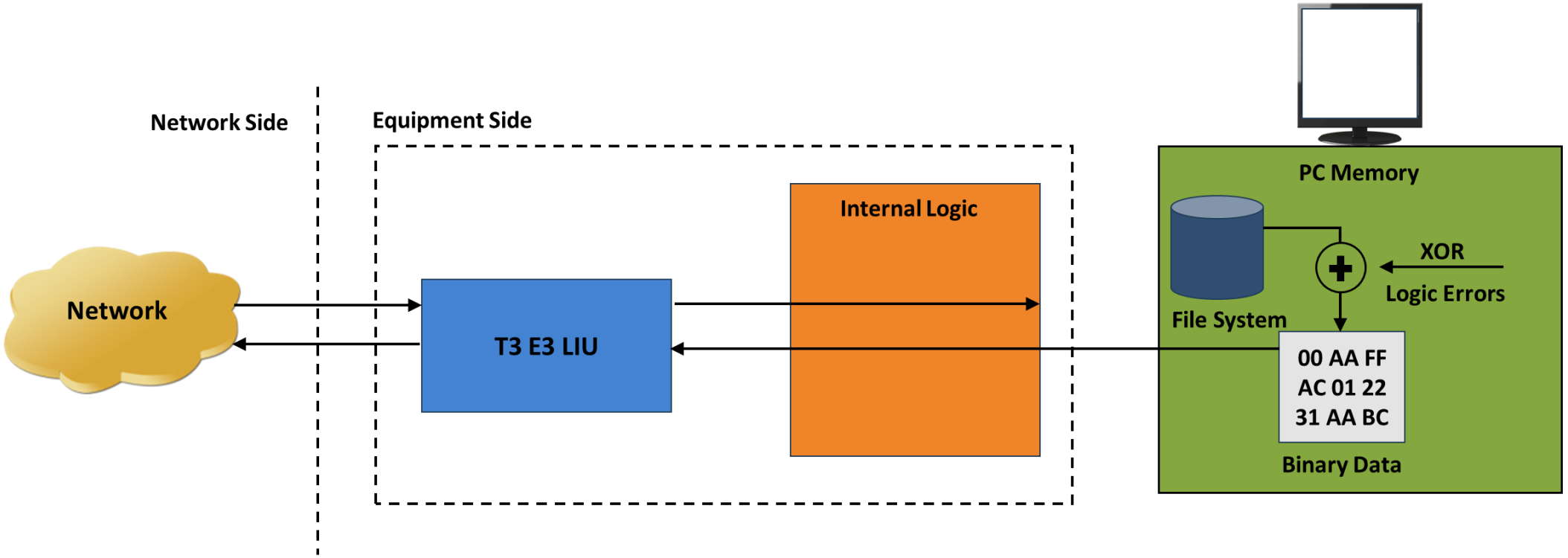
Optional Applications

- Record and Playback Software
  - Playback (Transmit from File)
  - Record (Capture to File)
- Protocol Analysis
  - HDLC, PPP, ATM, Frame Relay
- Protocol Emulation
  - HDLC, PPP
- Scripting and Automation

Playback (Transmit from File)

Logical diagram for transmit from file (playback) application



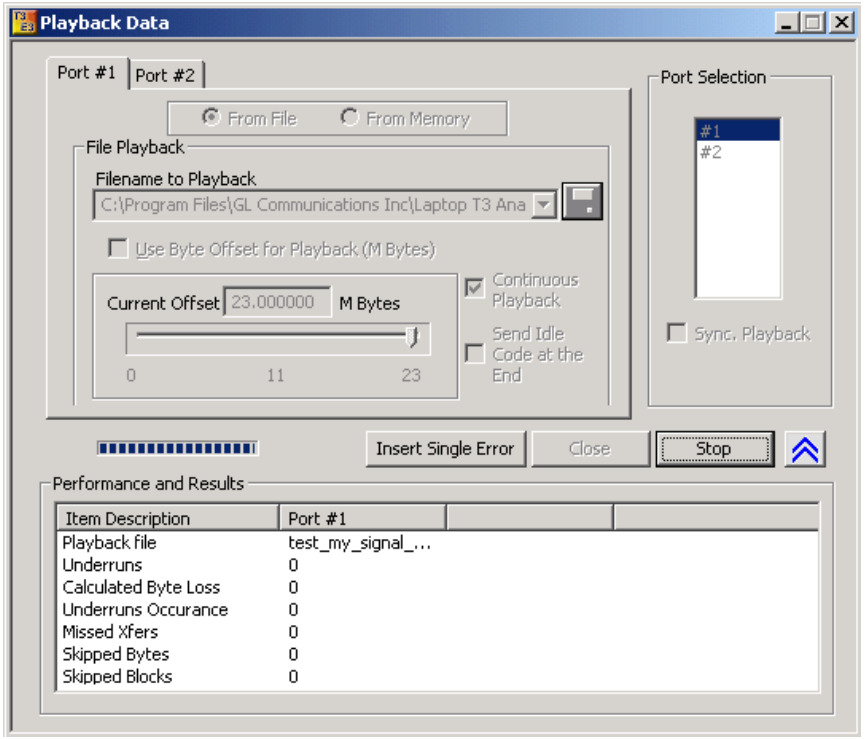
- The transmit file application permits transmission of a file of any length or transmission of data from memory in hex format

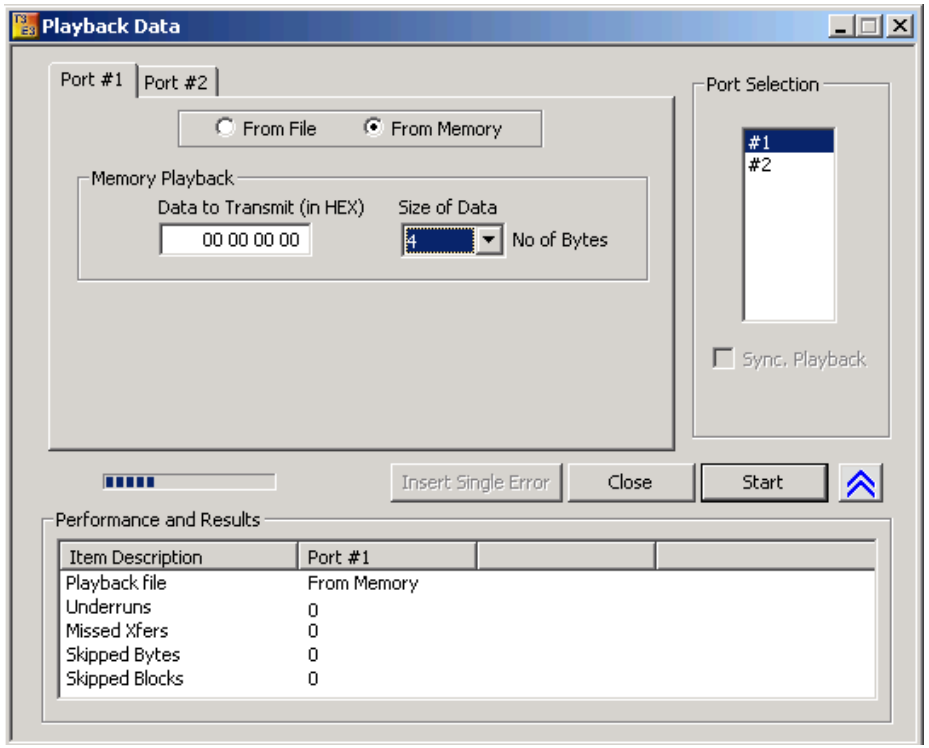
Playback (Transmit from File) (Contd.)

- Transmit flat binary file or user selected file over T3 E3
- Playback over framed or unframed T3 E3
- Continuous playback or single instance playback
- Manual insertion of single error along with the data stream play back
- Statistics such as Underruns, MissedXfer, Skipped Bytes and Blocks can be observed for the selected port

Playback (Transmit from File) (Contd.)

User Interface for transmit from file/memory (playback) application





- From Memory and /or File Playback
- In file playback, files of any length can be transmitted continuously (without loss)
- In memory playback, data to be transmitted (in HEX) with maximum size of 4 bytes

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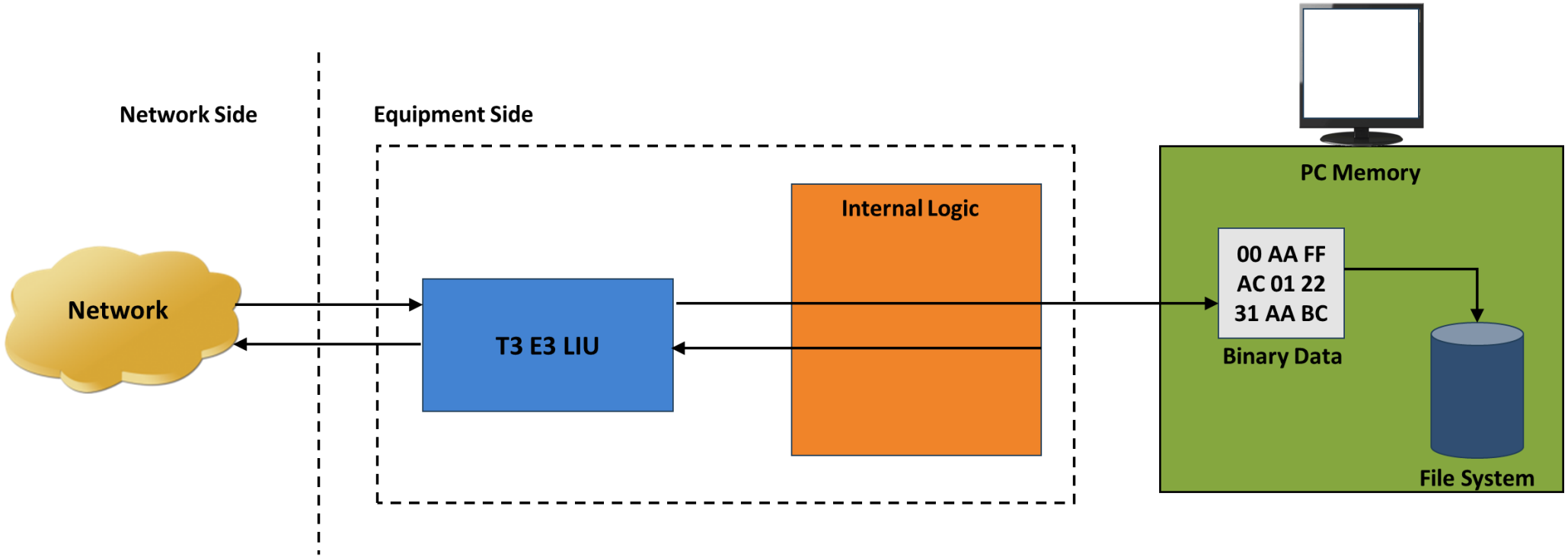
Record (Capture to File)

Logical diagram for capture (record) application



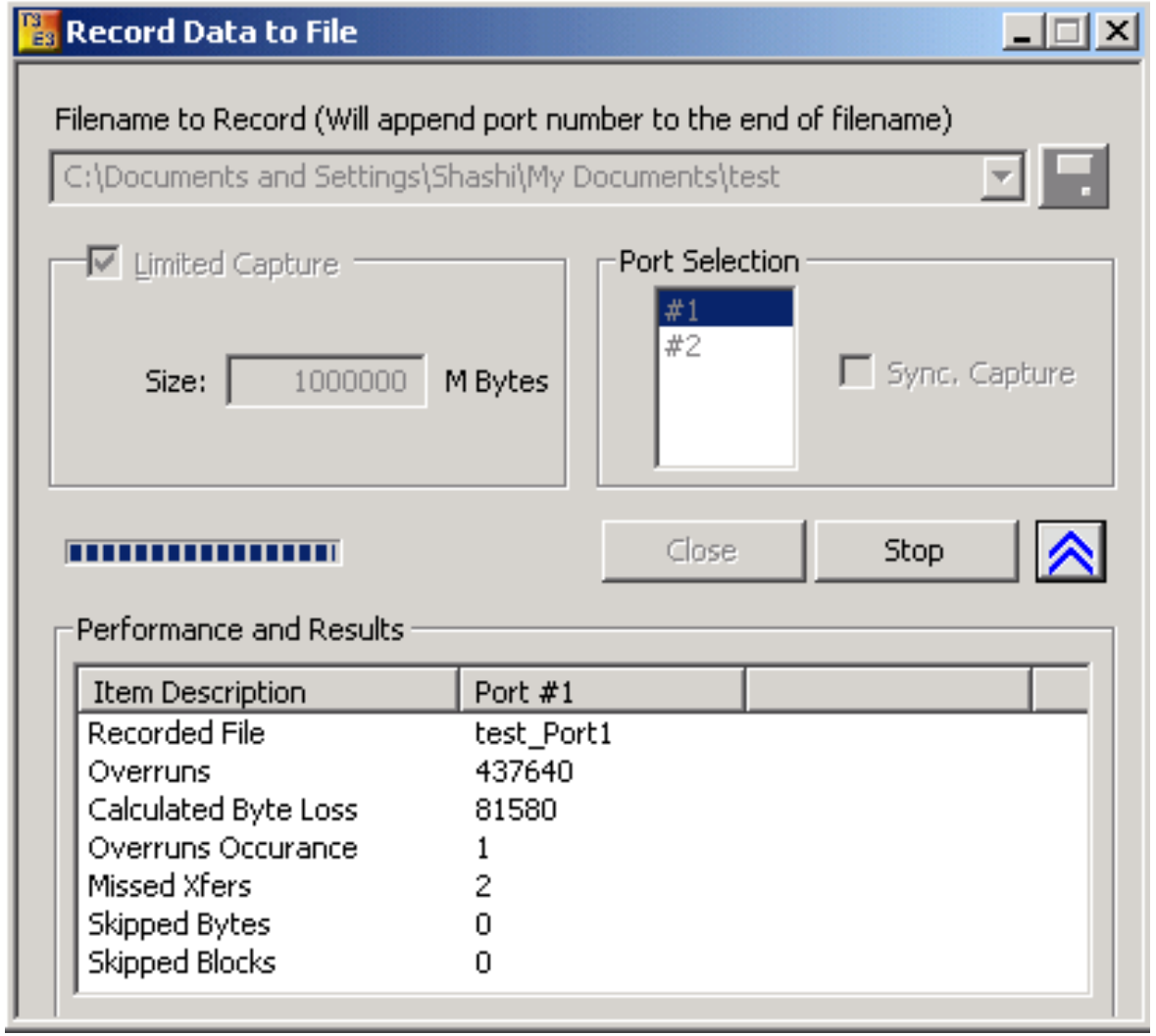
- Permits continuous or limited capture of data on the T3 or E3 lines
- Save the captured data in binary file format
- Supports synchronized capture for multiple cards

GL Communications

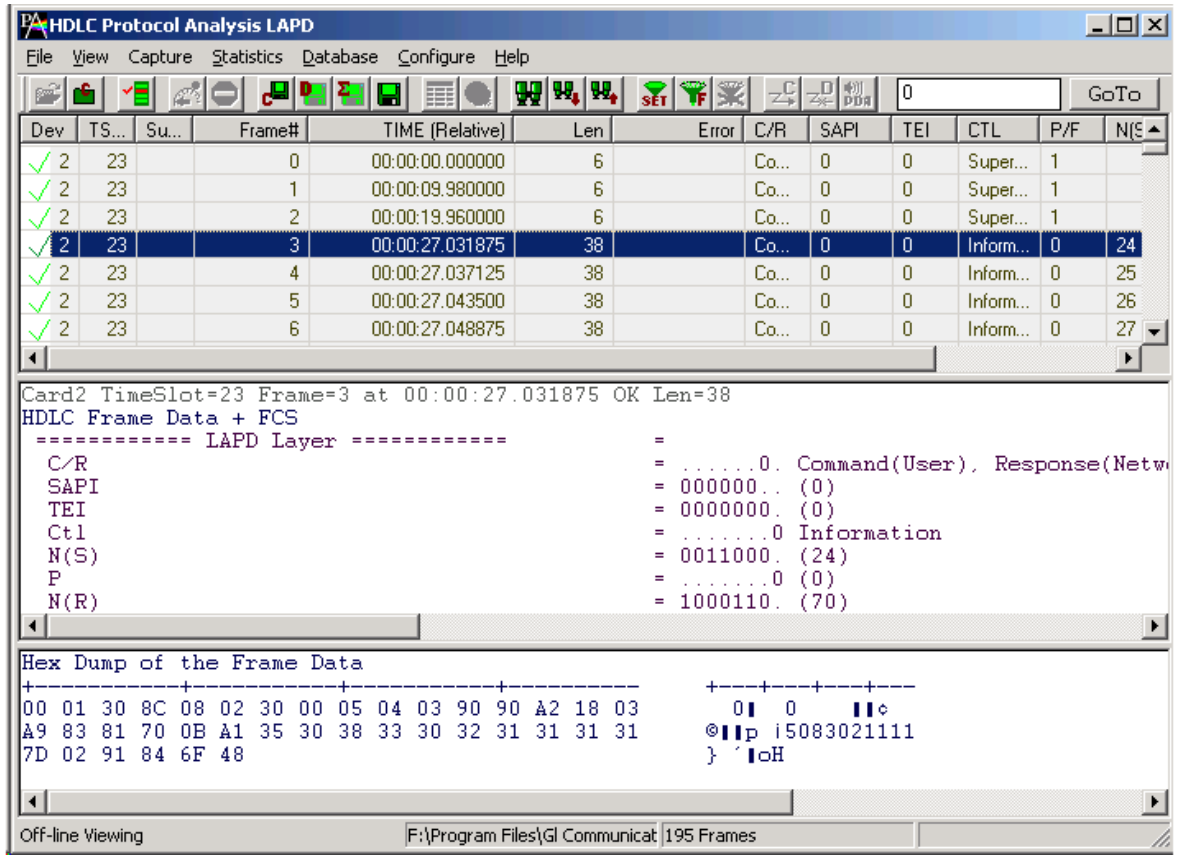
Record (Capture to File) (Contd.)

User Interface for capture (record) application

- Capture incoming data into binary flat file
- Synchronized capture from both ports
- Unframed T3 E3 or Framed T3 E3 Capture
- Limited Capture (specific number of Megabytes)

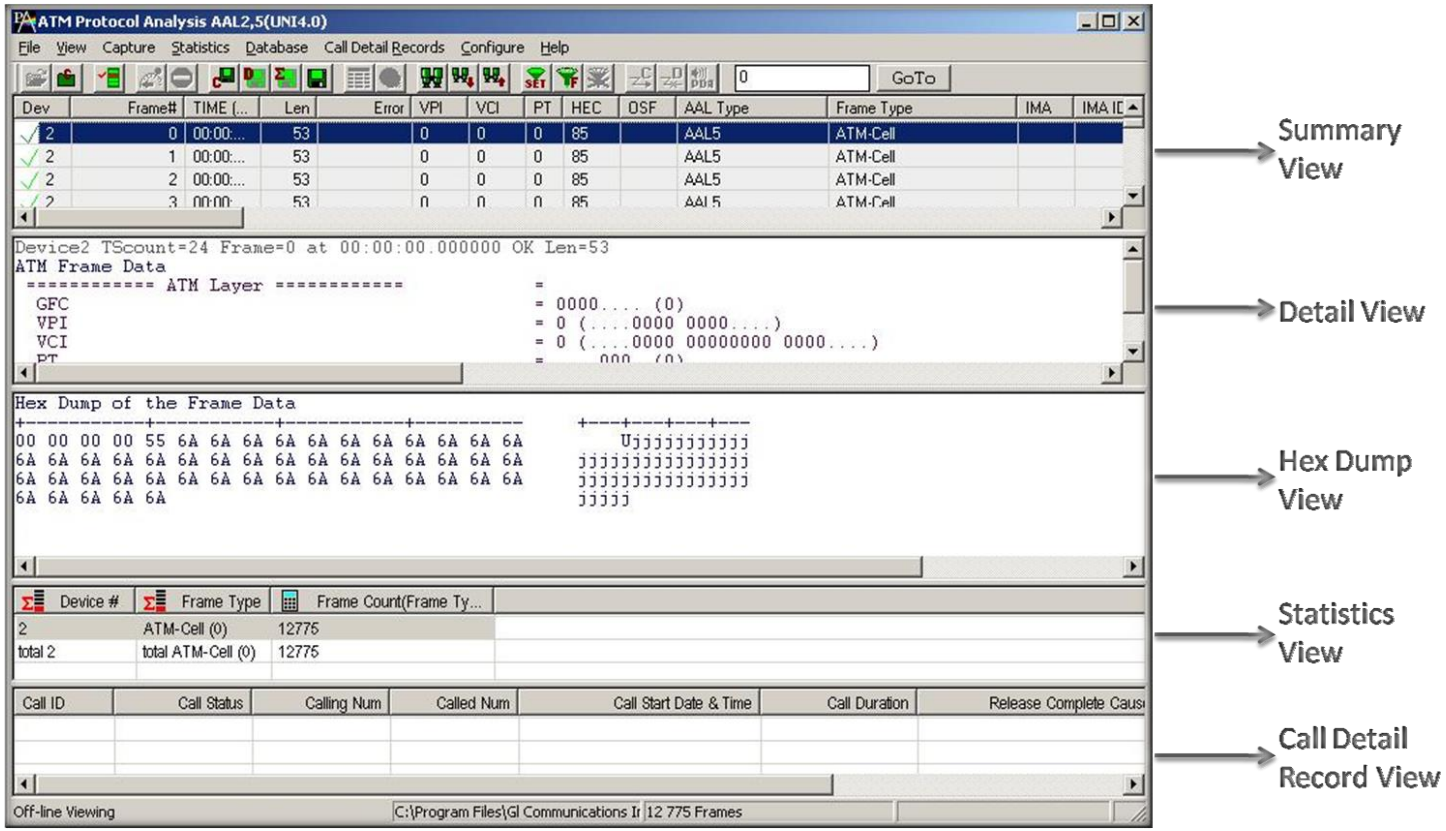


HDLC Protocol Analysis



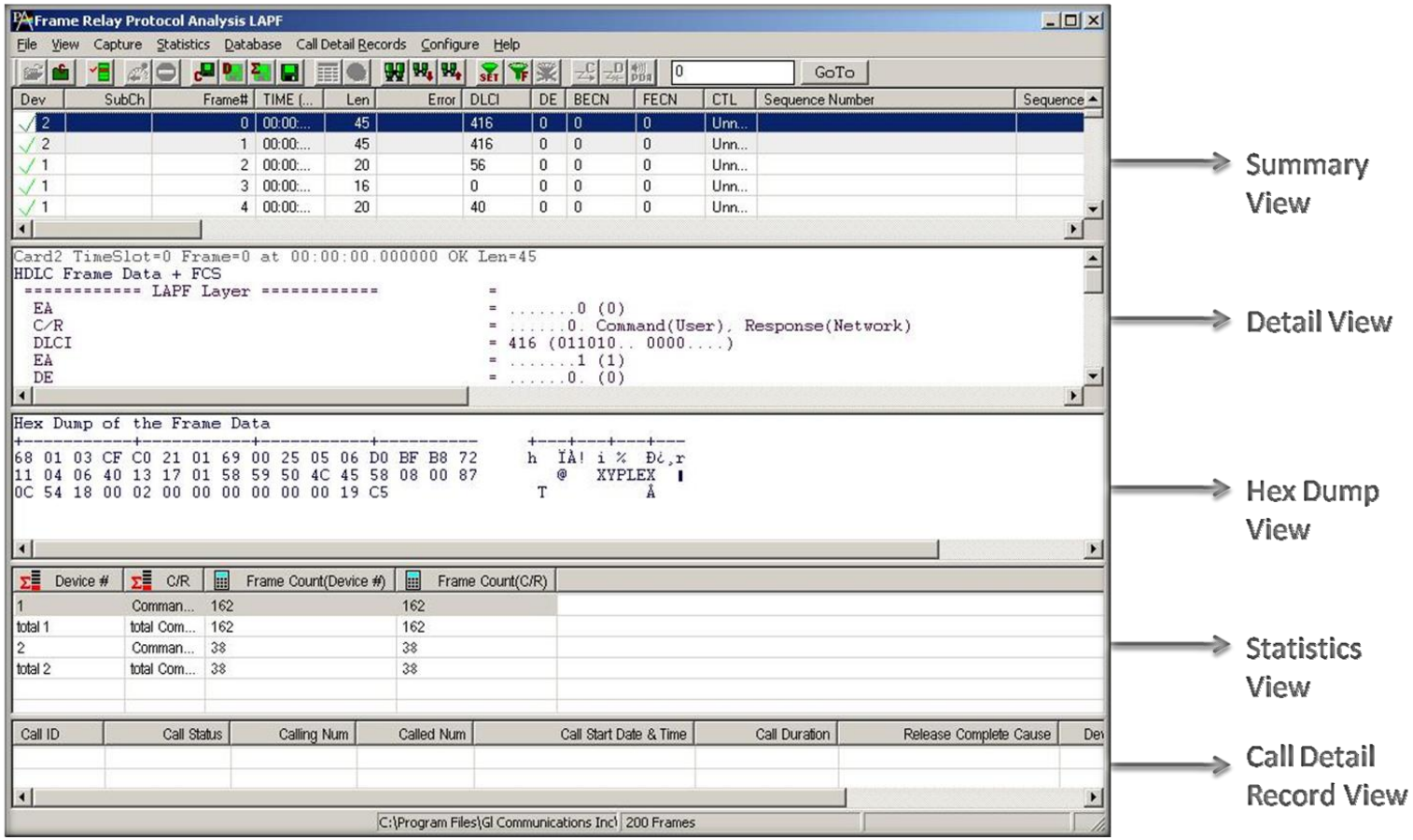
- GL's T3 (DS3)/E3 analyzer supports protocol decoding and analysis of ATM, Frame Relay, PPP, and HDLC. All the protocol analyzers are based on similar architecture and supports sophisticated filtering, statistics and real-time capture options

ATM Protocol Analysis



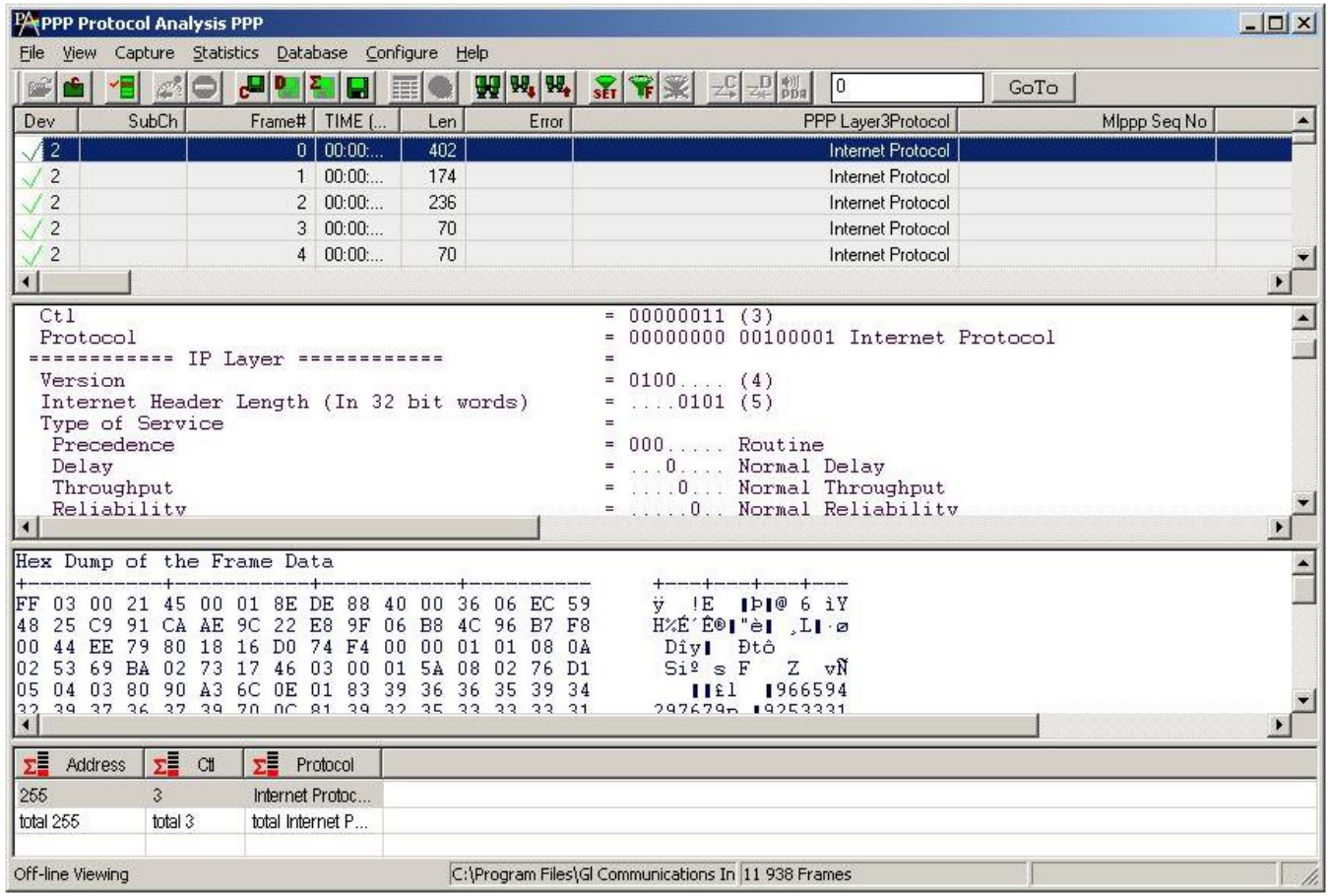
- Asynchronous Transfer Mode (ATM) is a flexible network, which carries voice, video, and data in the same way, i.e., fixed length cells
- Displays Summary, Detail, Hex-dump, Statistics, and Call Trace Views

Frame Relay Protocol Analysis



- Frame Relay is commonly used data link protocol based on packet switching technology. It is mainly incorporated by the corporate data networks due to its cost-effective data transmission, and flexible bandwidth
- Displays Summary, Detail, Hex-dump, Statistics, and Call Trace Views

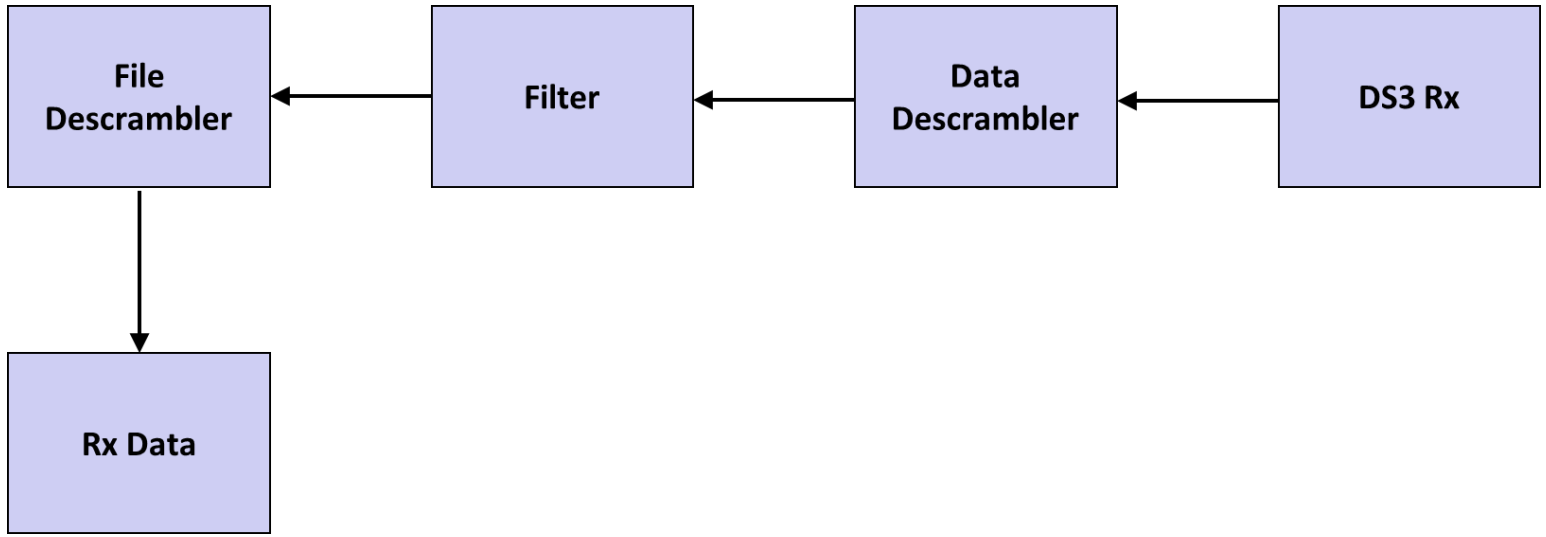
PPP Protocol Analysis



- It provides useful analysis of the PPP, MLPPP, and MC-MLPPP protocols which includes distribution of protocols, protocol fields, frame lengths and frame status

DSU Subrate

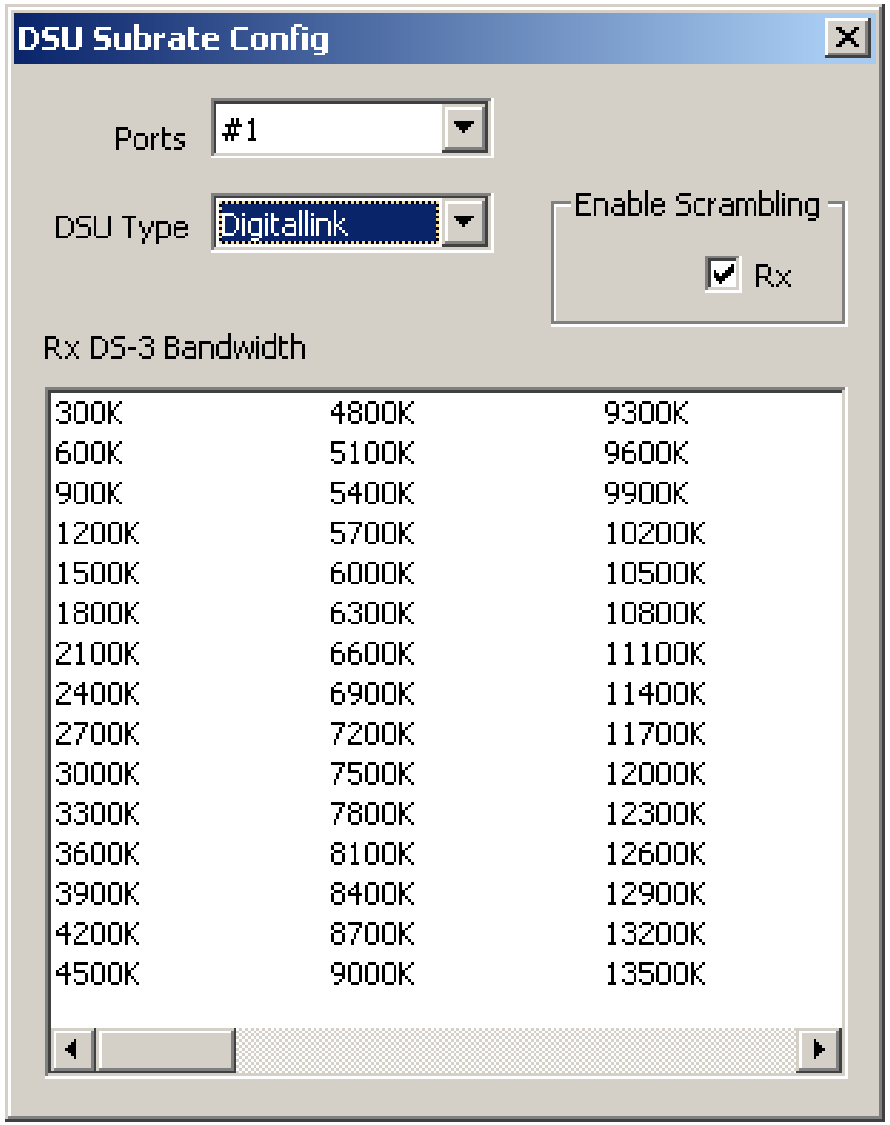
- Provides the ability to configure the DS3 subrates in each DSU mode
- Enable/Disable Scrambling for Tx and Rx depends on DSU selected



Digital Link Subrate

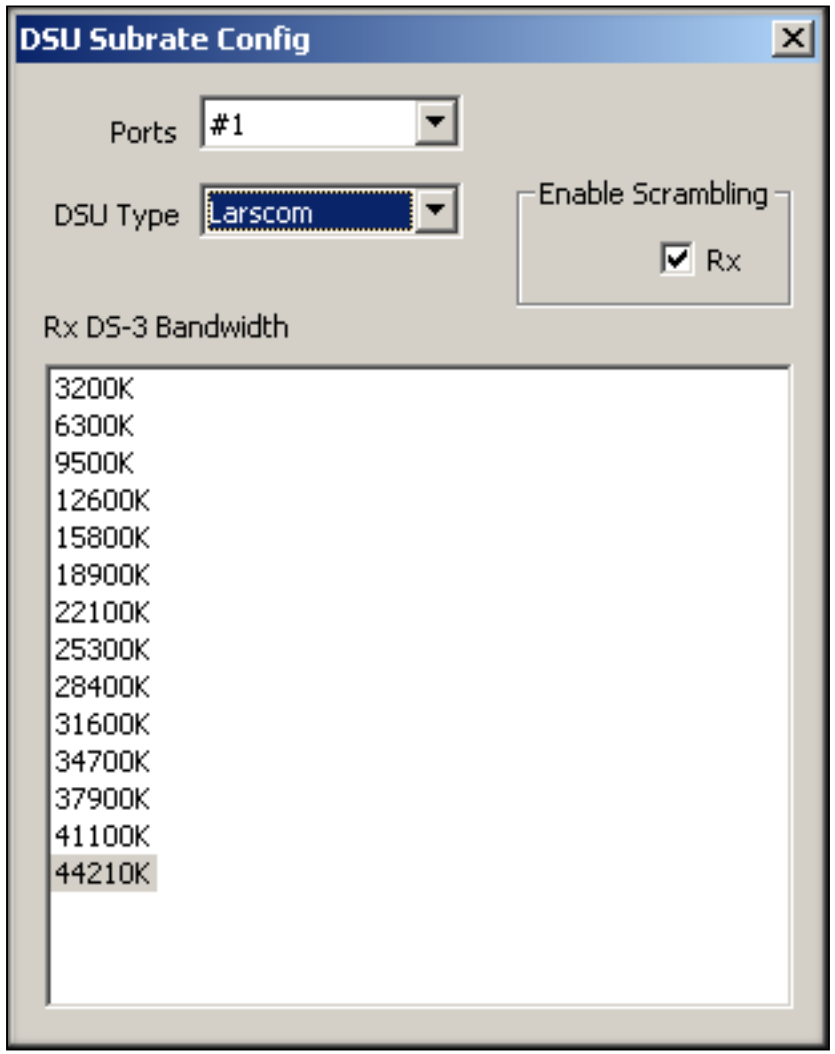
Supports the following DSU vendors' algorithms for T3 interface:

- Digital Link
- Larscom
- Verilink
- Adtran



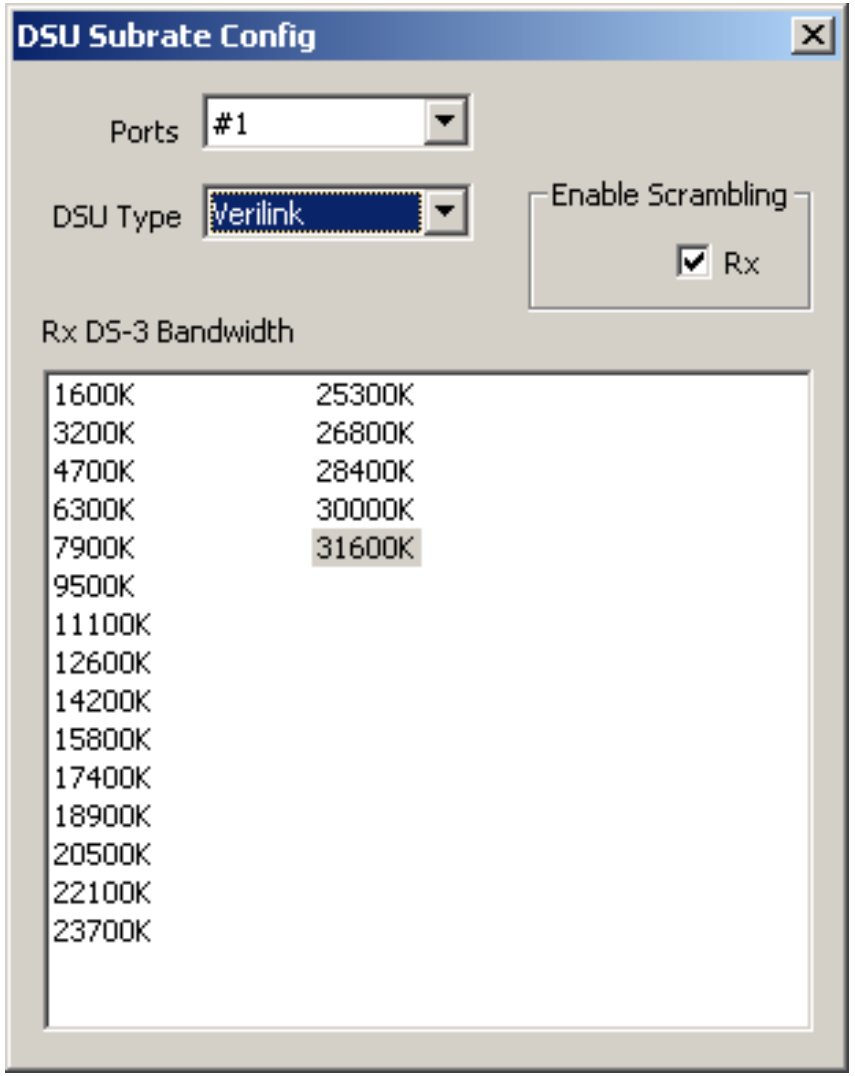
Larscom Subrate

DSU Subrate



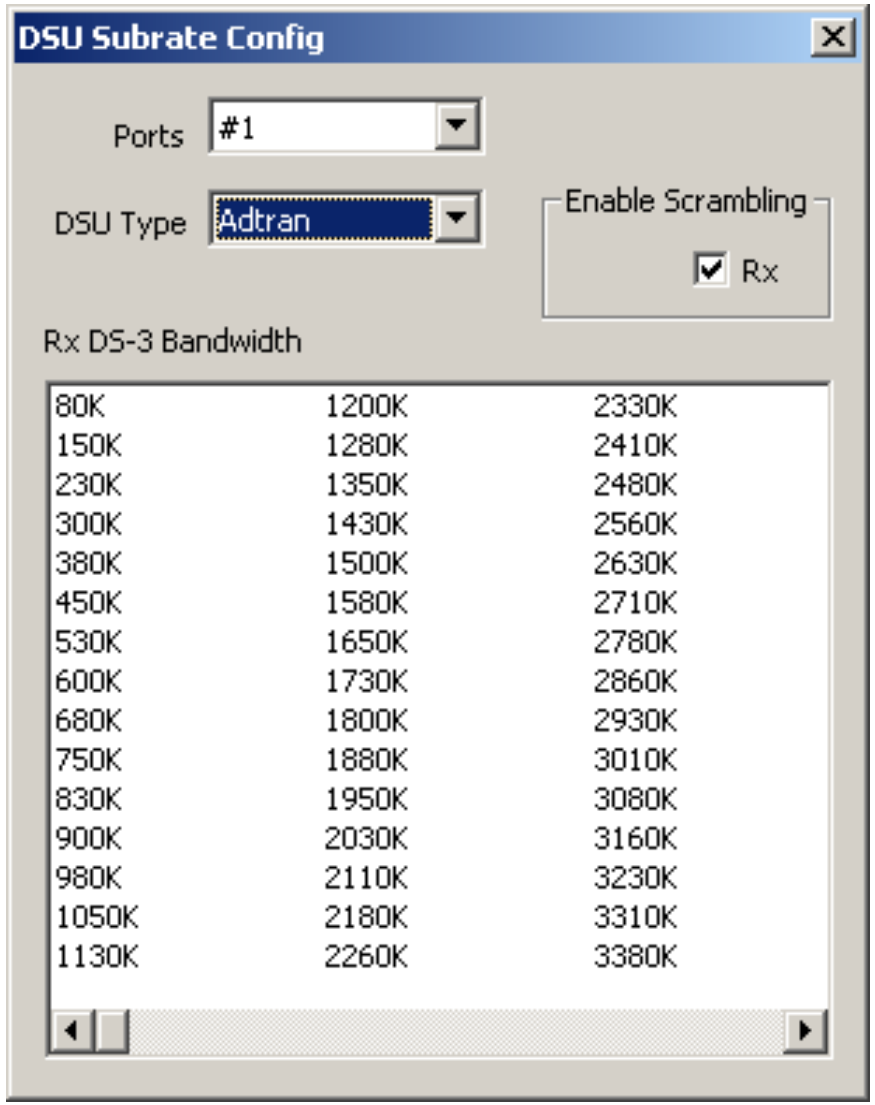
Verlink Subrate

DSU Subrate



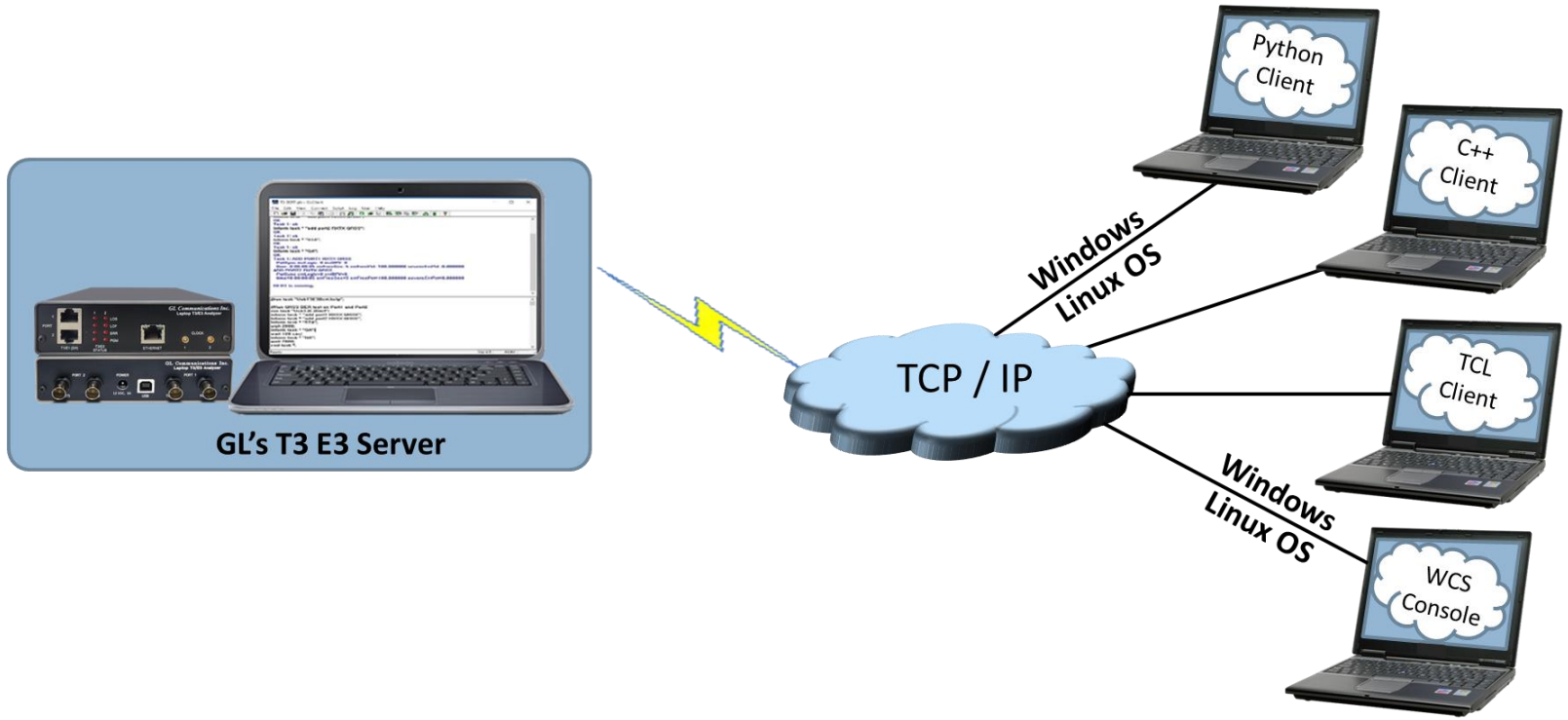
Adtran Subrate

DSU Subrate



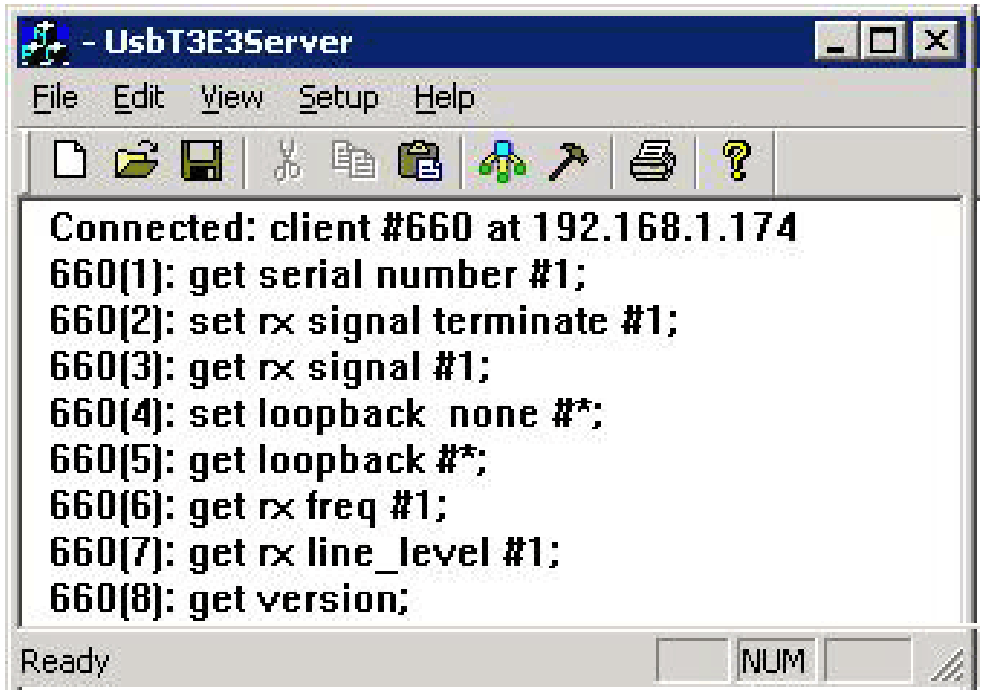
Windows Client Server for T3 E3 Analysis

- GL's Windows Client/Server software is a non-GUI based program for remote, scripted, and automated control of T3 E3 configuration, capture, transmission and more
- Supported clients are C++, C#, Windows TCL, and Windows/Linux Python

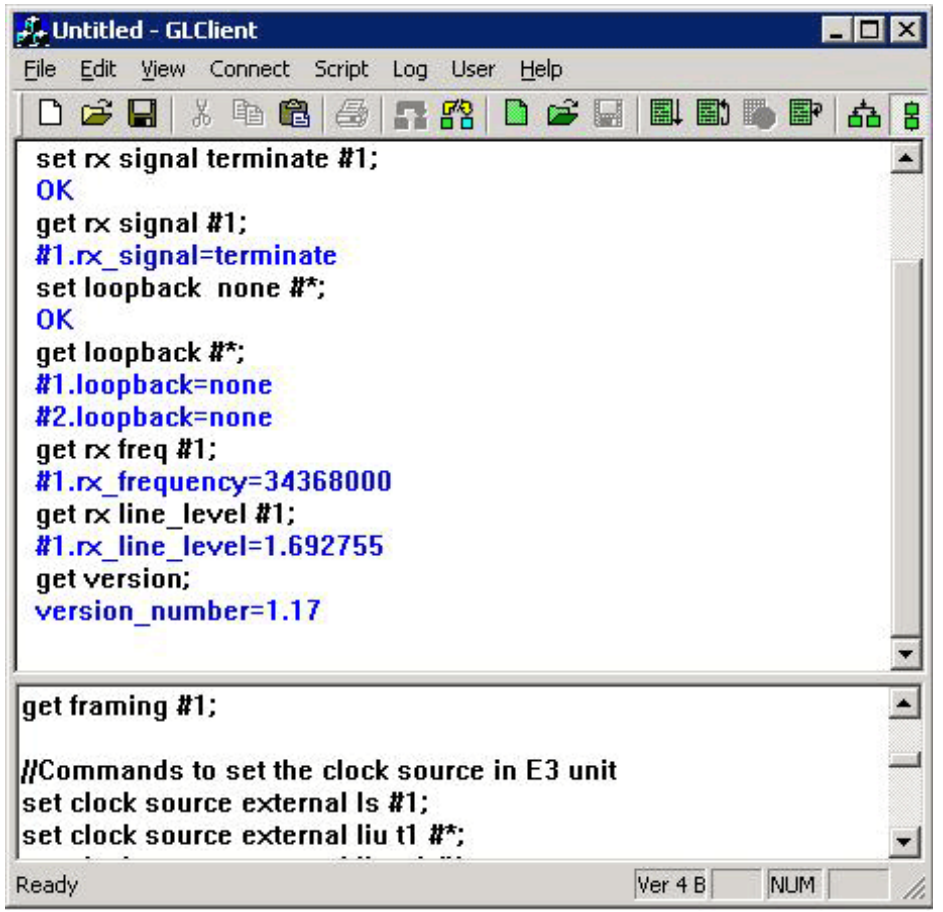


Windows Server and Client Interface

Server Interface

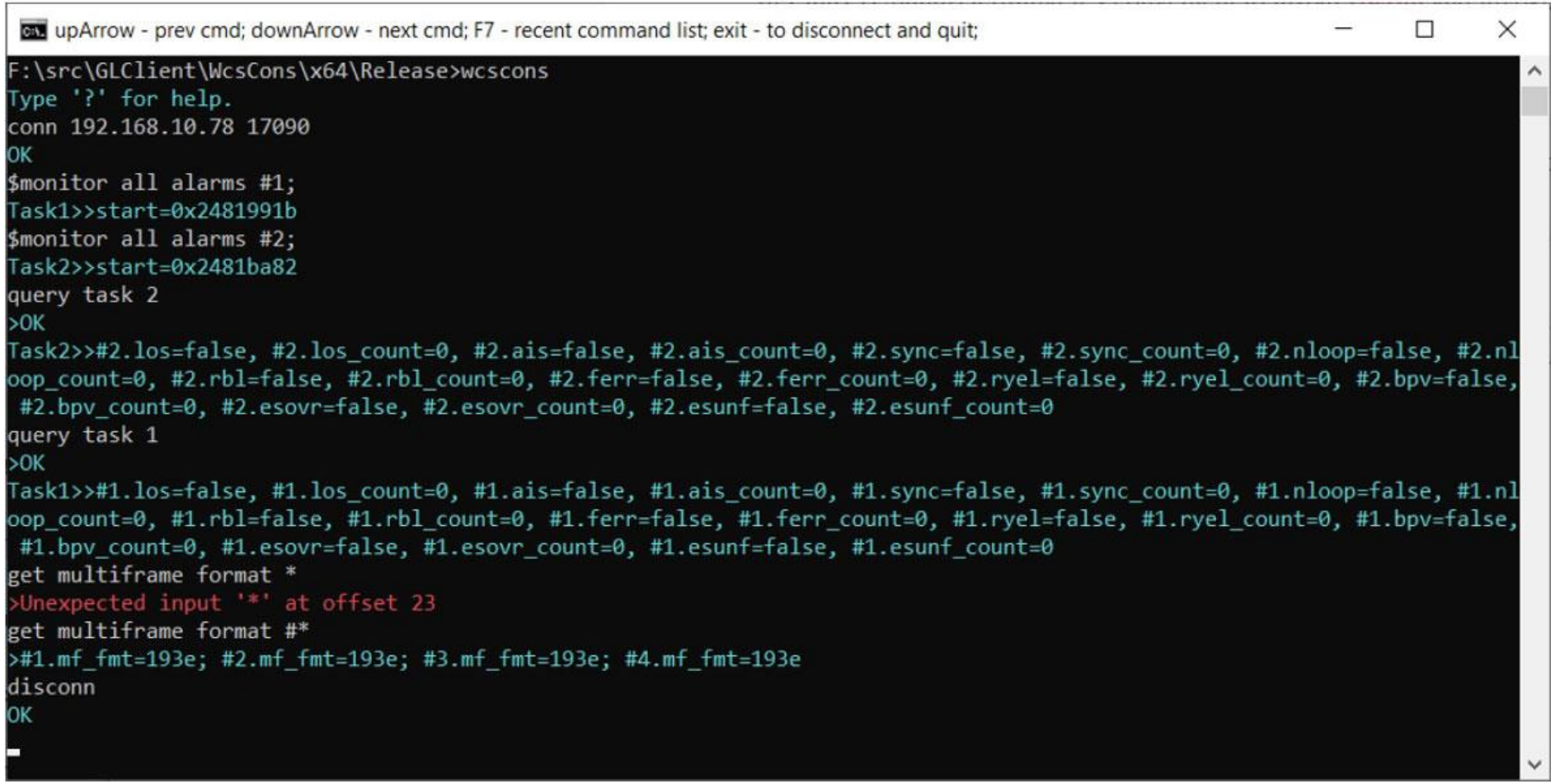


Client Interface



Windows/Linux Client Console

- Windows/Linux Client (WLC) is a Command Line Interface (CLI) application that issues commands to T1 E1 WCS server and display replies into Console/PowerShell/Terminal Windows. WLC works in Windows® and Linux® versions. However, through SSH or another remote access terminal it can be used on any operating system. WLC is a portable Windows/Linux WCS client communication library compatible with WCS server



Thank you