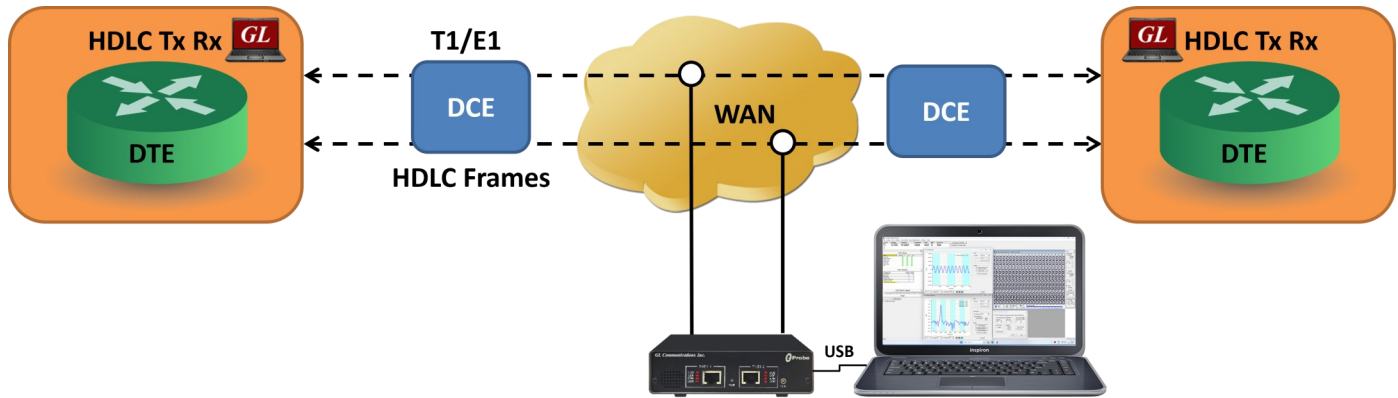# HDLC Analysis / Playback / Simulation

GL's HDLC Analysis and Emulation

Overview

The HDLC is a protocol operating at the data link layer. HDLC is a Layer 2 "backbone" protocol for reliable transport of data, voice, and video. GL's HDLC protocol analyzer provides the capability to capture, and analyze HDLC data on a full duplex T1 E1 lines. The data channel may utilize all or a fractional part of the T1 E1 lines. Also there may be multiple data channels within the T1or E1 line.

After setting the HDLC data channel parameters and starting the decoding process, the main screen displays the received HDLC frames in hex format. Flags are stripped; all other data is presented, including CRC bytes. GL Communications supports the following types of HDLC analyzers:

- **Real-time HDLC Analyzer** (Pre-requisites: T1/E1 internal cards or units, required licenses)
- **Remote/Offline HDLC Analyzers** (Pre-requisites: Hardware Dongles)

In addition, GL offers HDLC Playback, HDLC Impairment Utility, and HDLC Tx/Rx Test applications. These applications further help in transmitting and capturing pre-defined HDLC frames

For more details, refer to HDLC Protocol Analyzer webpage.

Main Features

Display

- Displays Summary, Detail, Hex-dump, and Statistics Views
- Detail View
  - Displays decodes of a user-selected frame from the summary view
  - Provides options to display or hide the required protocol layers
  - Contents of this view can also be copied to clipboard
  - Provides option to toggle detail view vertically or horizontally as feasible for the user
- Summary View displays timeslot, sub channel, frame#, device#, LAPD, LAPF specific information and IP information like source/destination IP address, TCP source port, TCP destination port, and so on in a tabular format
- Any protocol field can be added to the summary view, filtering, and search features providing users more flexibility to monitor required protocol fields
- Option to combine data from multiple columns under one column
- Option to create multiple aggregate column groups and prioritize the groups as per the requirement to display the summary results efficiently.

Supported Protocols

- LAPF, LAPD, LAPD+IP, LAPX+IP, X.25, Cisco HDLC Protocols

Filtering and Search

- Advanced filtering and search based on any user selected protocol fields
- Real-time capture filter can be set for filtering frames based on frame length
- Allows the user to automatically create search/filter criteria from the current screen selection

Capturing Streams

- Streams can be captured on the selected time slots (contiguous or non-contiguous), sub-channels or full bandwidth
- Frames can be transmitted/captured in either 64 kbps, 56 kbps, n x 64 kbps, or n x 56 kbps data channels (hyper-channels)
- The following variations are accommodated in the software: inverted or non-inverted data, byte reversal or non-reversal
- Supports decoding of frames with FCS of 16 bits and 32 bits, or none
- Multiple streams of HDLC traffic on various T1/E1 channels can be simultaneously decoded with different GUI instances

Export Options

- Exports Summary View information to a comma delimited file for subsequent import into a database or spreadsheet
- Capability to export detailed decode information to an ASCII file

Record/Playback

- Captured frames can later be used for traffic simulation using HDLC Transmit/Receive/Playback application
- Recorded trace files can be played back using HDLC playback option

Remote Monitoring

- Remote monitoring capability using GL's Network Surveillance System

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Summary, Detail, Hex dump, and Statistics Views

The analyzer displays Summary, Detail, Hex dump and Statistics views in different panes. The Summary View displays Frame Number, Time, Length, C/R, SAPI, and so on. The user can select a frame in the Summary View to analyze and decode each frame in the Detail View. The Hex dump View displays the frame information in HEX and ASCII octet dump format. The contents of detail and hex dump view can also be copied to clipboard. The Statistics View helps to study the performance and trends in the HDLC network based on protocol fields and different parameters.
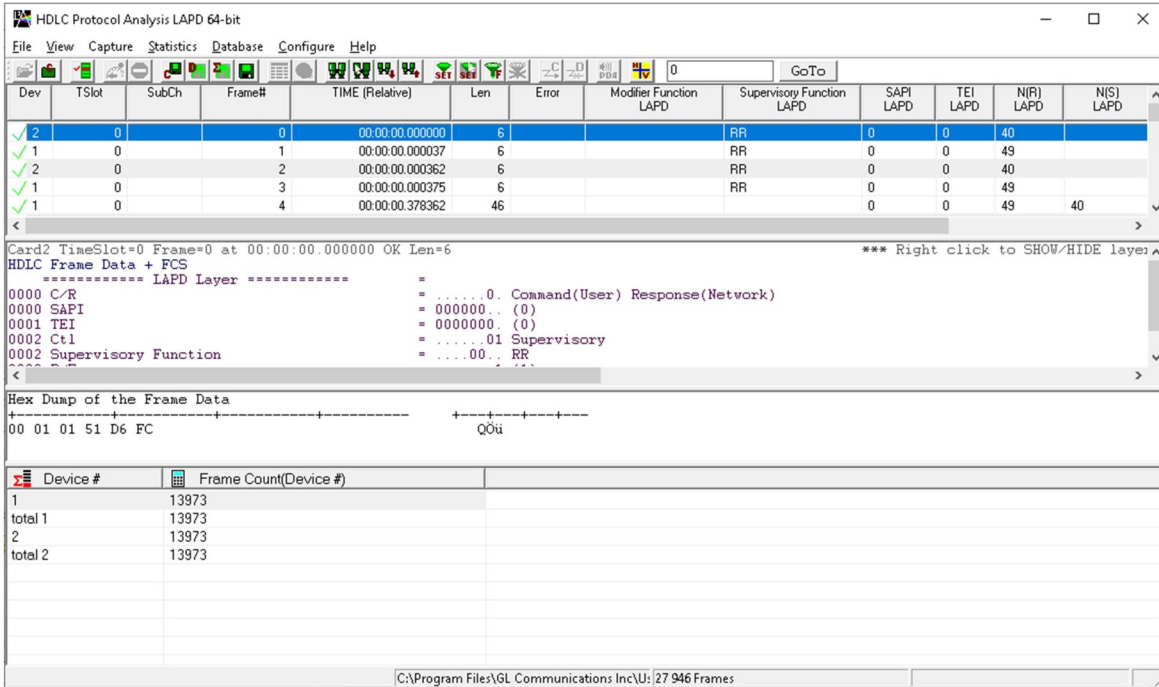

Figure: Summary, Detail, Hex dump, and Statistics Views

Real-time, Remote, and Offline Analysis

Users can capture and analyze HDLC frames using either real-time or remote analyzers, and record all or filtered traffic into a trace file.

The recorded trace file can be used for offline analysis or exported to a comma-delimited file, or ASCII file. Real-time capturing requires user to specify timeslots, bit inversion, octet bit reversion, user/network side, FCS, and data transmission rate. Recorded trace file can be played back on T1/E1 using the HDLC file Playback application.
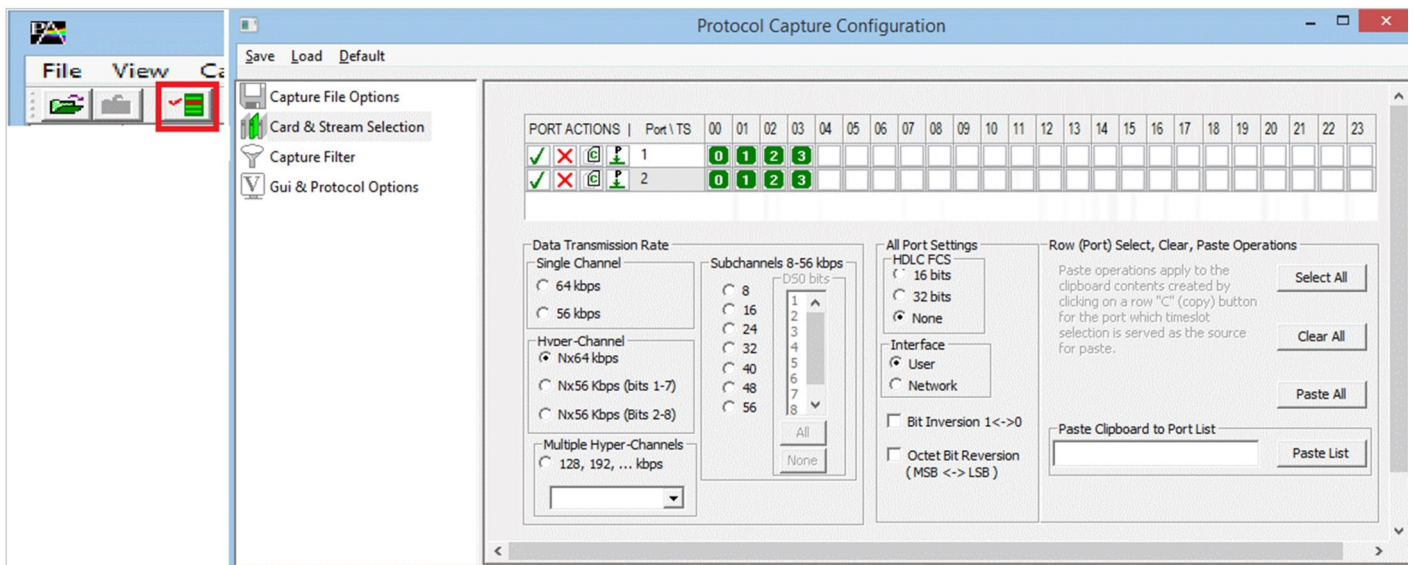

Figure: Stream / Interface Selection

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Filtering and Search

Users can record all or filtered traffic into a trace file and also can create search/filter criteria automatically from the current screen selection. The filter and search options add a powerful dimension to the HDLC Analyzer that isolates required frames from the captured frames in real-time/remote/offline. Users can specify custom values for frame length to filter frames during real-time capture. The frames can also be filtered after completion of capture based on LAPD, and other application layers. Similarly, search capability helps user to search for a particular frame based on specific search criteria.
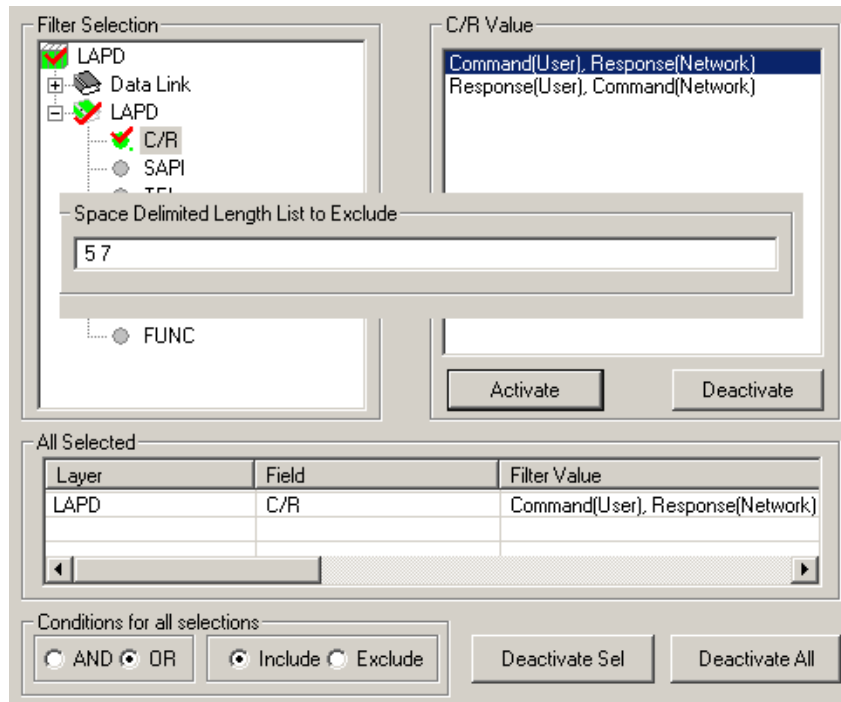

Figure: Real-time and Offline Filter

Save/Load All Configuration Settings

Protocol Configuration window provides a consolidated interface for all the important settings required in the analyzer. This includes various options such as protocol selection, startup options, stream/interface selection, filter/search criteria and so on. Any protocol field can be added to the summary view, filtering, and search features from this GUI providing the users more flexibility to monitor required protocol fields. All the configuration settings can be saved to a file and then loaded for future operations, or user may just revert to the default values using the default option.
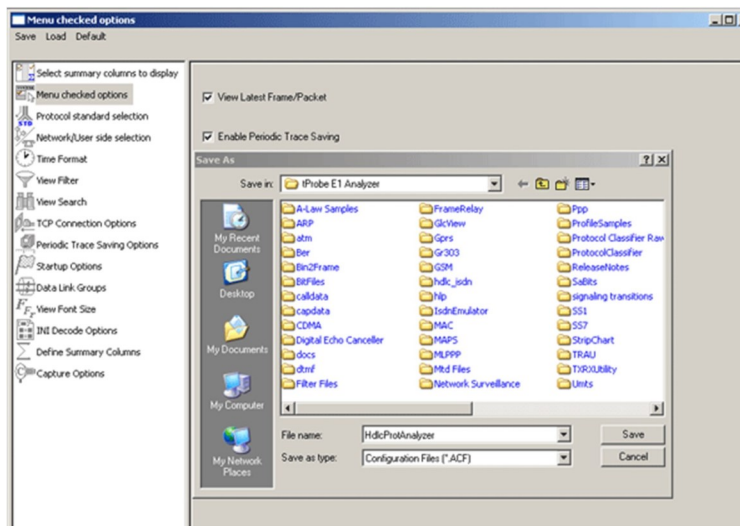

Figure: Save / Load Configuration

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Aggregate Column Group

The enhanced feature of the protocol analyzer is aggregate column groups. The user can also create multiple aggregate column groups and prioritize the groups as per the requirement to display the summary results in an efficient way.

If the user has five different aggregate columns and wants to prioritize some columns, the user can create a group of aggregate columns with the highest priority and will display only the columns of chosen priority. If the values are null, then the next group values are displayed. The aggregate columns comprising a group will have the same prefix and suffix index as ~0, ~1 … ~N. The **group~0** is the root aggregate group that has the highest priority.
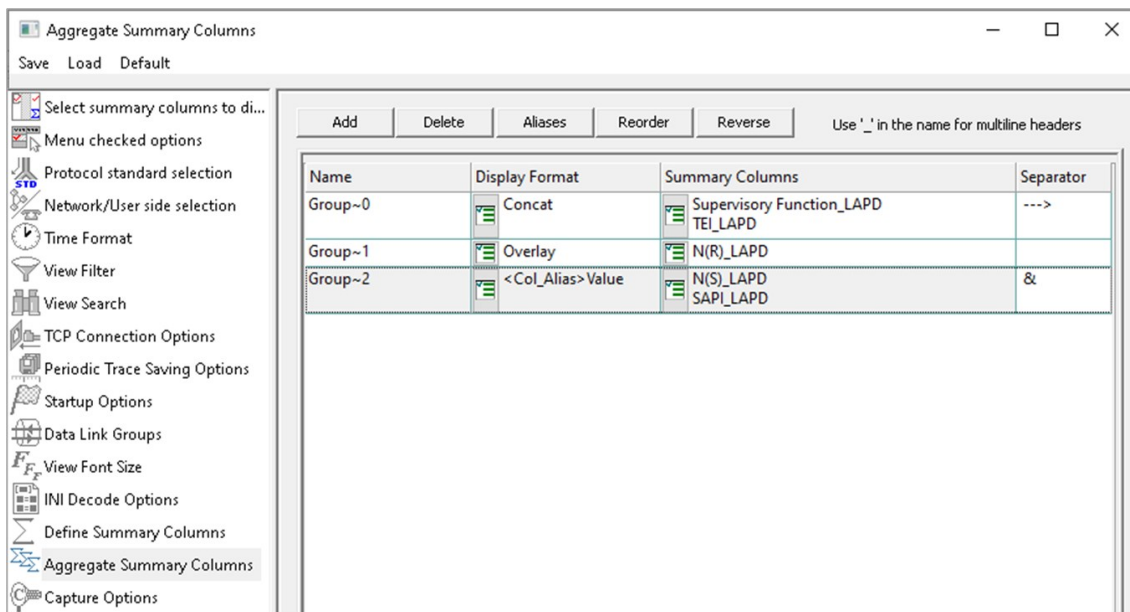

Figure: Aggregate Column Group

The updated results are as shown in the figure below. Here the root aggregate group~0 summary columns are displayed first and then Group~1 and Group~2 as per the assigned priority if the higher group values are null.
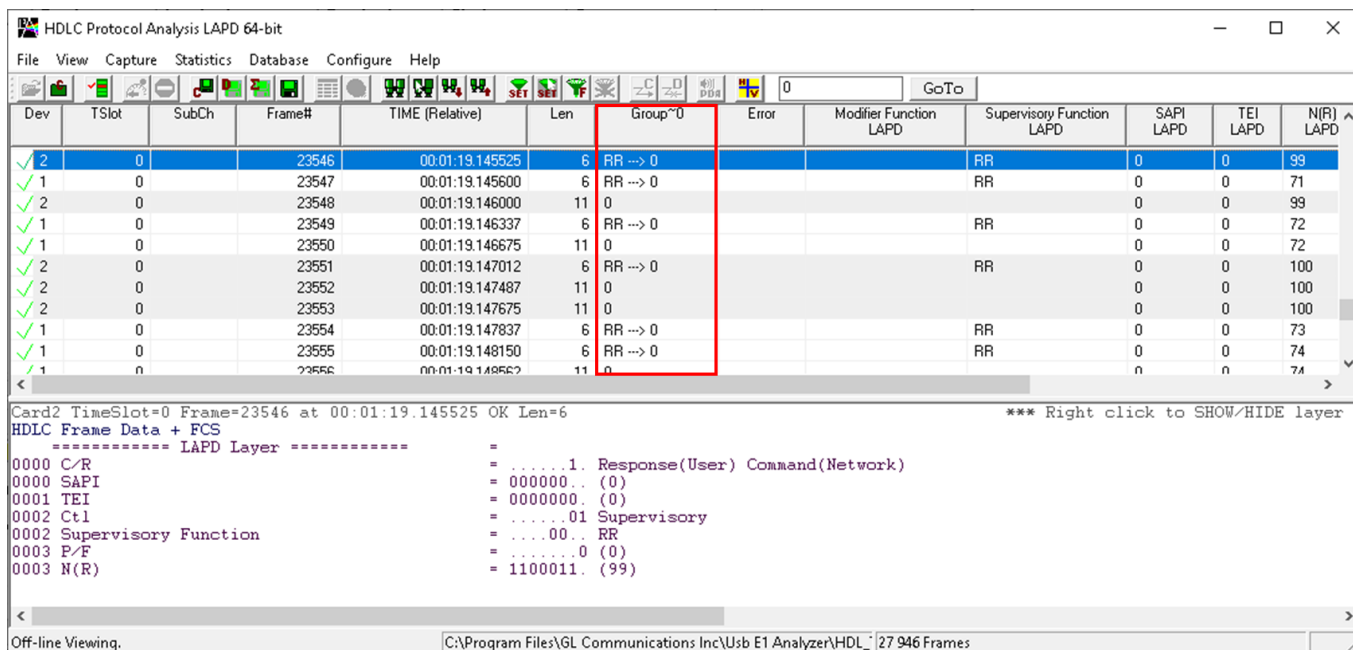

Figure: Display of Aggregate Column Group in Summary View

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HDLC Playback Application

The HDLC Playback application is used to transmit HDLC frames in the pre-recorded files over T1/E1 channels. The frames can be transmitted on selected time slots (contiguous or non-contiguous), sub-channels or full bandwidth. The HDLC frames may also be transmitted on just one, or n x 64 kbps, or n x 56 kbps hyper channels.
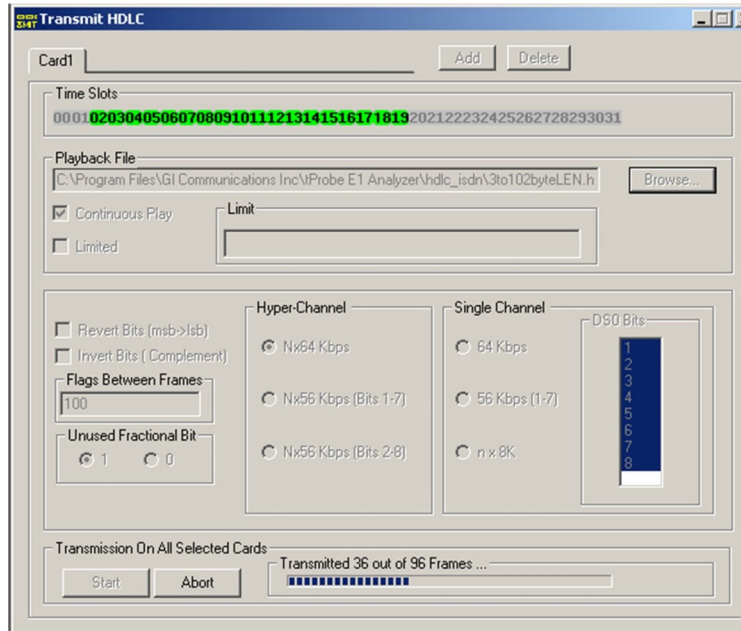

Figure: HDLC Playback

HDLC Link Impairment Utility

The HDLC Link Impairment Utility offers various options to 'impair (inject errors) specific HDLC frames, thus simulating various scenarios taking place in a real-time network.

Provides options to select Manual Error Insertion or Automatic Random Error Insertion Mode to inject errors as per requirement. Automatic Random option will allow user to introduce impairments at specified random rate from 1x10E-06 to 1.0. Error Counters displays the total number of CRC, Logic, Drop Frame, Change, and Duplicate errors impaired to an HDLC frame.
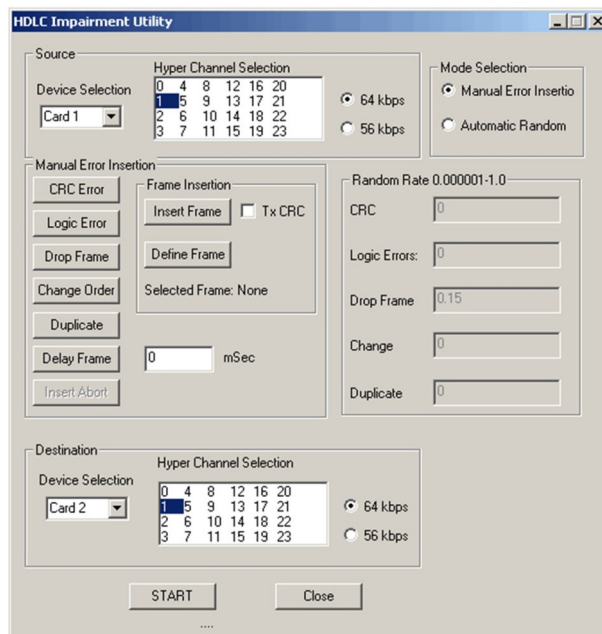

Figure: HDLC Link Impairment Utility

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HDLC Tx / Rx Test

The HDLC Automated Test System consists of two applications: Transmitter application and Receiver application. Each application has real-time and off-line features. The Transmitter application generates HDLC test frames using special algorithms, transmits them over T1/E1 or records them to an HDL file for subsequent use with other applications.

The Receiver application can receive frames in real-time over T1/E1 or can verify an off-line HDL file for correct frame order and data integrity.
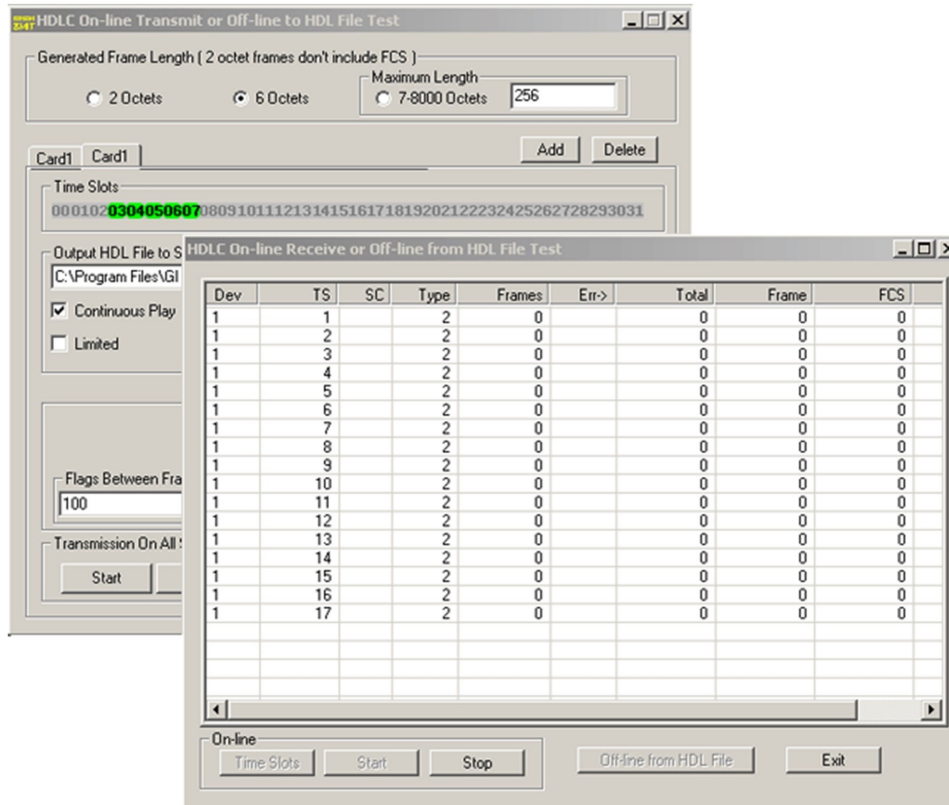

Figure: HDLC TX and RX

Automated HDLC Testing using Client-Server

The File based HDLC Record/Playback (Hdlcfunc) module is an optional application that allows HDLC Traffic Capture/Playback. It also allows transmission/reception of *.HDL frames files located on the server and on client. For details, visit File based HDLC Record/Playback webpage.

The HDLCTerr module performs multi-channel HDLC emulation and analysis. It permits frame error testing and transmission of memory generated sequences of fixed or variable length HDLC frames, GL *.HDL Trace file frames, and various bandwidth streams.

The HDLCHpio module performs file–based HDLC record and playback actions. It permits receive / transmit of HDLC streams of various bandwidth (hyper channel, timeslot, and multiple sub-channel streams per timeslot). For details, visit HDLC Frames Encode/Decode and Error Testing webpage.

Supported Protocol Standards

The supported protocol standards in HDLC analyzer are LAPF, LAPD, LAPD+IP, LAPX+IP, X.25, Cisco HDLC Protocols

Supported Protocols	Specification Used
LAPD	CCITT Q.920/921
LAPF	ITU-T Q.922
IP	RFC 791
TCP	RFC 793
UDP	RFC 768
ICMP	RFC 792
STUN	RFC 3489
DNS	RFC 1035
DHCP	RFC 1533, 2131
HTTP	RFC 2616
FTP	RFC 959
SNMP	RFC 1157,1155,1902,3416,2863,2578,3418,2011,2012 etc
Cisco HDLC	http://www.protocols.com/pbook/bridge.htm#CISCOROUTER
ARP	RFC 826
LAPB	ITU-T Recommendation X.25

Buyer's Guide

Item No	Product Description
XX090	T1/E1 Real-Time HDLC Decode/Store/Impairment/Rx-Tx Test Applications
OLV090	Offline HDLC Protocol Analyzer

Item No	Related Software
XX100	ISDN Analysis Software (T1 or E1)
XX600	Basic Client/Server Scripted Control Software (Included with Basic Software)
XX640	File based HDLC Record/Playback
XX641	File based HDLC Remote Record/Playback
XX634	Multi-Channel HDLC Emulation and Analysis & File based High Throughput HDLC Record/Playback

Item No	Related Hardware
PTE001	tProbe™ Dual T1 E1 Laptop Analyzer with Basic Analyzer Software
FTE001	QuadXpress T1E1 Main Board (Quad Port– requires additional licenses)
ETE001	OctalXpress T1E1 Main Board plus Daughter Board (Octal Port– requires additional licenses)
XTE001	Dual T1 E1 Express (PCIe) Boards (requires additional licenses)

For more details, refer to HDLC Protocol Analyzer webpage.

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