
tProbe™ Serial Data Communication Analyzer (Datacom Analyzer)



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tProbe™ with Datacom Analyzer

Portable tProbe™ Datacom T1 E1 Analyzer



Back Panel

Front Panel

mTOP™ 1U Rack tProbe™ Datacom T1 E1 Analyzer



Front Panel

Back Panel

mTOP™ Probe tProbe™ T1 E1 Analyzer (Front Panel)

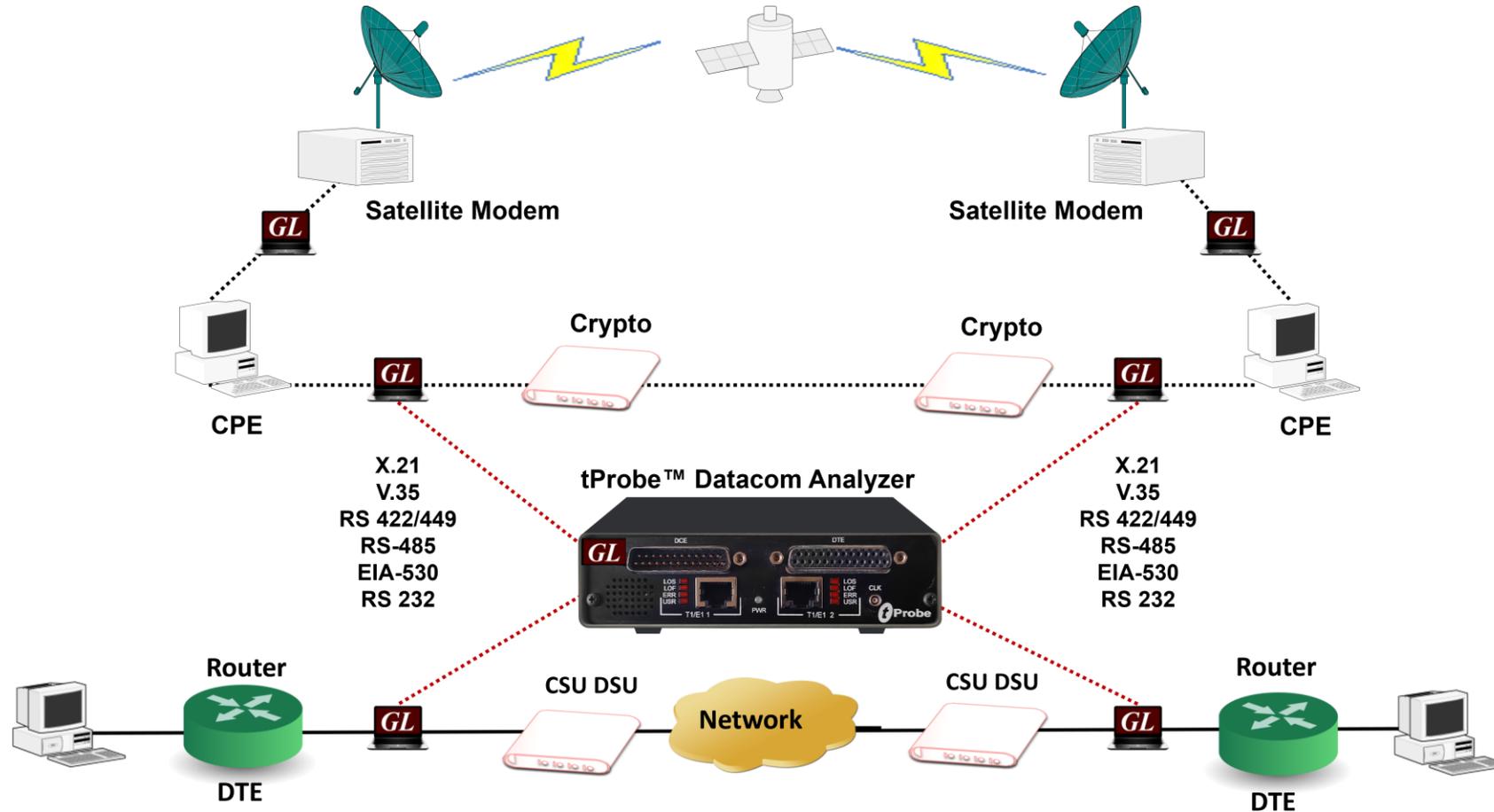


mTOP™ Probe tProbe™ T1 E1 Analyzer (Back Panel)



mTOP™ Probe

Introduction



- The tProbe™ T1 E1 and Datacom analyzer is designed for test and verification of data communications equipment and circuits
- Software selectable modes are provided to emulate DTE, DCE and non-intrusive monitoring for both synchronous (Sync), and asynchronous (Async) modes

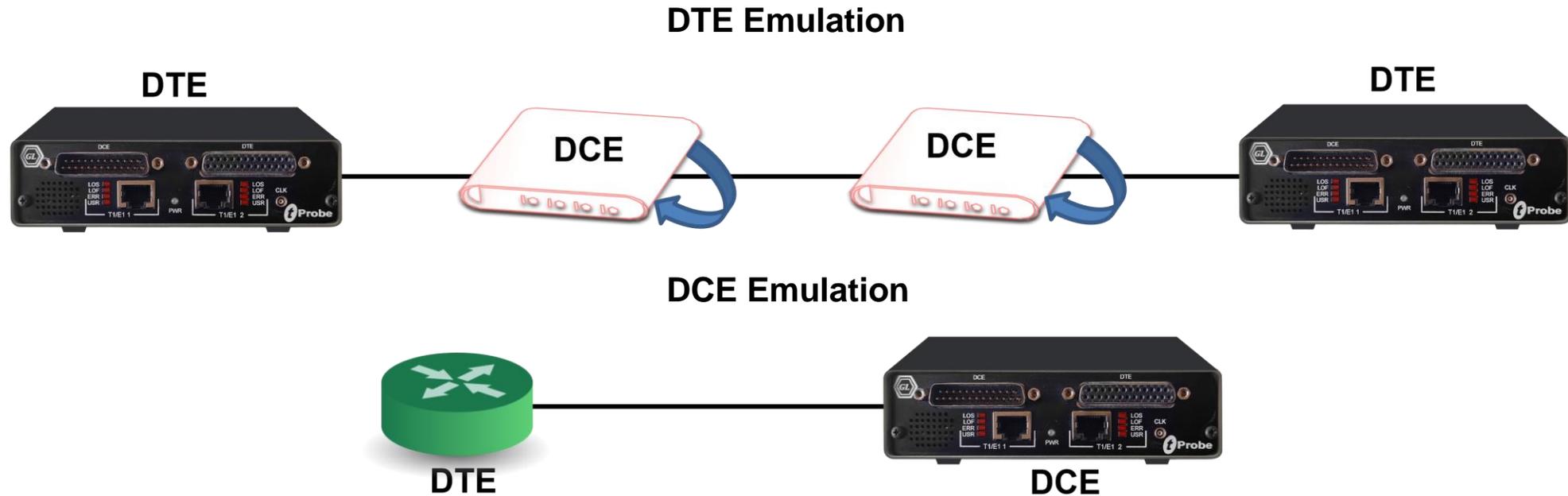
Main Features

- Supported Line interfaces – V.24, V.35, X.21, RS-232, RS-449, EIA-530 and EIA-530A
- Allows user to define custom frequency data rate for all encoding options
- Supports Frequency Measurement, [PPP Analysis](#), and [HDLC Analysis](#)
- Sync BER from 300 b/s to 16.384Mbps - very wide dynamic range
- Async BER from 75 b/s to 115.2Kbps
- DTE or DCE emulation mode
- SYNC clock source and sense selection
- Windows Client / Server provides the capability of remote operation, automation, and multi-site connectivity
- Client Server (WCS) module also supports Enhanced BER testing

Main Features (Contd.)

- Supports NRZ, FM0, FM1 and Differential Manchester encoding schemes
 - Manchester IEEE BER from 75 b/s to 115.2Kbps
 - Manchester GE Thomas BER from 75 b/s to 115.2Kbps
 - Differential Manchester BER from 75 b/s to 115.2Kbps
 - Manchester FM0 and FM1 BER from 75 b/s to 115.2Kbps
 - NRZI BER from 0.5Mbps to 10Mbps
- Real time View of Data
- Record Playback of Files
- Delay and Impairment of Data
- Protocol Analysis for HDLC and PPP

Typical Application



- Bidirectional monitoring with Y-adapter cable
- Monitor control leads, frequency
- DTE / DCE emulation for end-to-end testing of data networks, bidirectional monitoring for a greater level of troubleshooting for data networks
- Verifying end-to-end transmission through DCE or DTE

Frequencies

Interface	Mode	Frequency	
		Low	High
RS-232 V.35 EIA_530 EIA_530A RS-449 X.21	Async	75 bps	115.2 Kbps
	Sync	300 bps	16.384 Mbps
	Manch IEEE	75 bps	1.024 Mbps
	ManchGE T	75 bps	1.024 Mbps
	NRZI	0.5 Mbps	10 Mbps
	ManchDiff	75 bps	1.024 Mbps
	ManchFM0	75 bps	1.024 Mbps
	ManchFM1	75 bps	1.024 Mbps

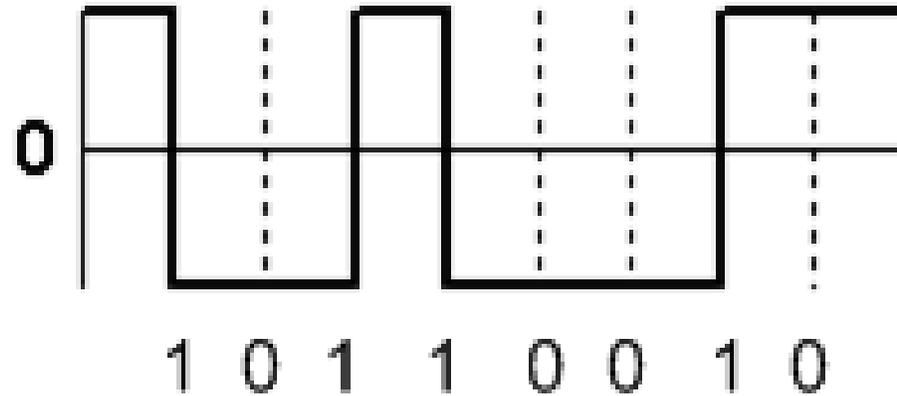
Async Mode of Operation

- Data is transmitted without the clock
- Adds the start, stop, and parity check bits to the data. The start bit is used to start the process
- Asynchronous transmission is easy to implement but less efficient as it requires an extra 2–3 control bits for every 8 data bits
- This method is usually used for low volume transmission
- Transmitters and receivers extract the data using their own clock, and they do not share the common clock as in serial communication mode

Sync Mode of Operation

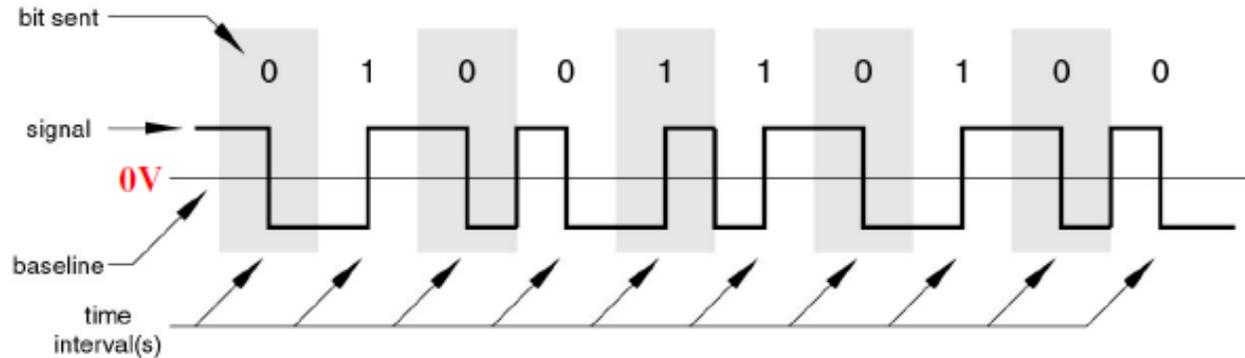
- Requires the clock signal to be transmitted from the source along with the data
- Data rate for the link is same for the transmitter and receiver
- Transmitter and receiver share a common clock

NRZ (Nonreturn to Zero-Level) Coding



- Uses two different voltage levels (one positive and one negative) as the signal elements for the two binary digits.
- A change in the signal level occurs every time a "one" occurs, but when a "zero" occurs, it remains the same, i.e., no transition occurs

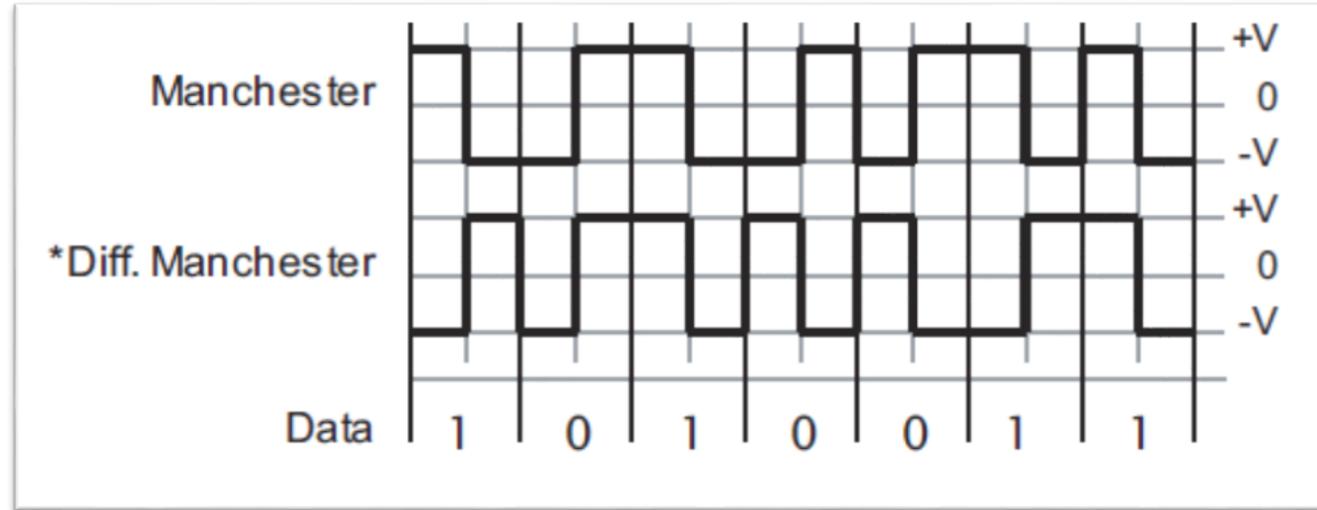
Manchester Coding



- Transition occurs at the **middle** of each bit period
- Transition serves as **clock and data**
- Low to high represents binary 1
- High to low represents binary 0
- Used by IEEE 802.3 (Ethernet)

- Encode data by their direction (positive-negative is one value, negative-positive is the other).
- Transition occurs at the middle of each bit period
- The advantage over normal NRZ is that it has more transition density which improves the timing recovery at the receiver

Differential Manchester



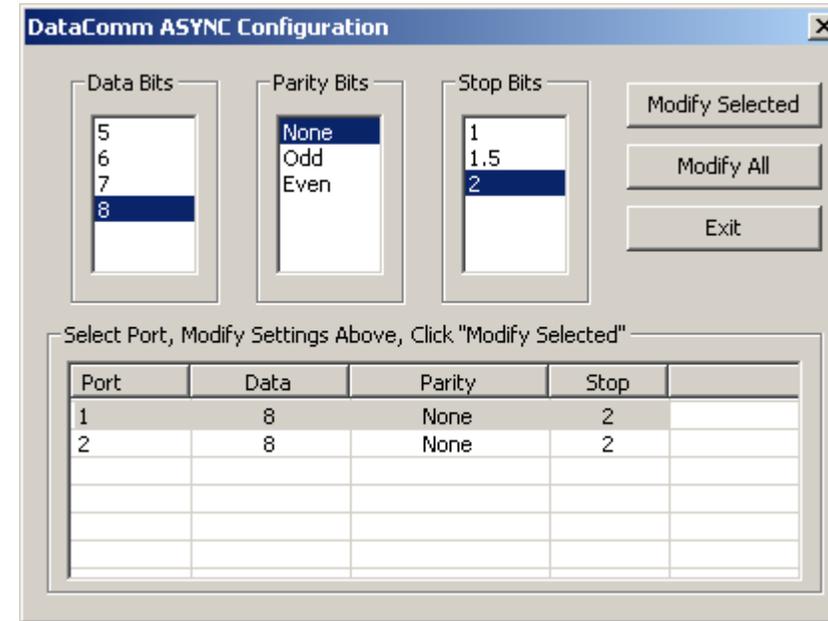
- Uses the presence or absence of transitions to indicate logical value
- In differential Manchester encoding, if a "1" is represented by one transition, then a "0" is represented by two transitions and vice versa. It is a differential encoding

Datacom Interfaces

- **RS232C:** It is a standard interface for serial data for connecting DTE to DCE computer serial ports
- **RS-423:** It is a higher speed unbalanced interface similar to RS-232C. The Datacom board supports this with RS-232C interface setting
- **RS-449:** It is a high speed serial data communication interface. This interface used unbalanced or pairs of signals to transmit and receive clock and data. This interface typically uses a 37 pin connector
- **RS-422/RS-485:** It is similar to the RS-449 standard with changes only to the logic levels. This is sometimes used with a multi drop configuration of up to 10 receivers with 1 transmitter. Difficult to setup but can fill low cost reliable data communications
- **V.35:** It is another high speed serial data communication interface. This interface also uses unbalanced or pair of signals to transmit and receive clock and data. This interface typically uses a 35 pin connector
- **RS-530:** It is another high speed serial data communication interface. It is a common interface used to replace a 25 pin connector instead of using the RS-449 DB-37 or V.35 connectors

ASync Configuration

Configuration functionality allows to configure various Tx/Rx parameters such as Data Bits, Parity Bits, and Stop Bits



Monitoring of Control Signals and Frequency

Data Comm Rx Status

Ports

	1	2	
RXD			
RXC			
TXC			
CTS			
RI			
DSR			
DCD			
TM			
Freq	16 383 928	16 383 928	

Monitoring of Control Signals and Frequency (Contd.)

- **RXD:** (Received Data) -This is the serial encoded data received by a DTE from a DCE which has in turn received from another source
- **RXC:** (Receive Complete) -The RXC bit will be set to HIGH(1) when data is received and is available in the buffer
- **TXC:** (Transmit Complete) -The TXC bit is set to HIGH(1) when a transmission is completed and there is no other data to send
- **CTS: (Clear to Send)** - This is set to HIGH(1) by a DCE to allow/ prevent the DTE to transmit data
- **RI:** (Ring Indicator) -This signal is used for auto answer applications. DCE raises when incoming call detected
- **DSR:** (Data Set Ready) -This should be set to HIGH(1) by a DCE whenever it is powered on. It can be used by the DTE to determine that the DCE is on line
- **DCD:** (Data Carrier Detect) - This is set to HIGH(1) by a DCE when it detects the data carrier signal on the datacom line
- **Frequency:** Displays operating Frequency in Hertz
- **TM:** Test Mode

Datacom Cables

RS-530 Male to Female Cable



RS530 Male to RS530 Female

- The RS-530 is a standard high speed data communications serial interface which can be used with external cables to support different serial interface connectors

RS530 Female to Female



RS530 Female to RS530 Female

RS530 Male to Male



RS530 to RS530 Male

RS232C

- This is a standard interface for serial data for connecting DTE to DCE computer serial ports
- It is used for slower data communications due to the logic and interface used



RS449

- This is a high-speed serial data communication interface
- This interface uses unbalanced (RS-423) and balanced (RS-422) to transmit and receive clock and data
- This interface typically uses a 37 pin connector



RS449 DCE to RS530



RS530 to RS449 DTE

V.35

- This is a high-speed serial data communication interface
- Uses unbalanced or pair of signals to transmit and receive clock and data
- This interface typically uses a 35 pin connector



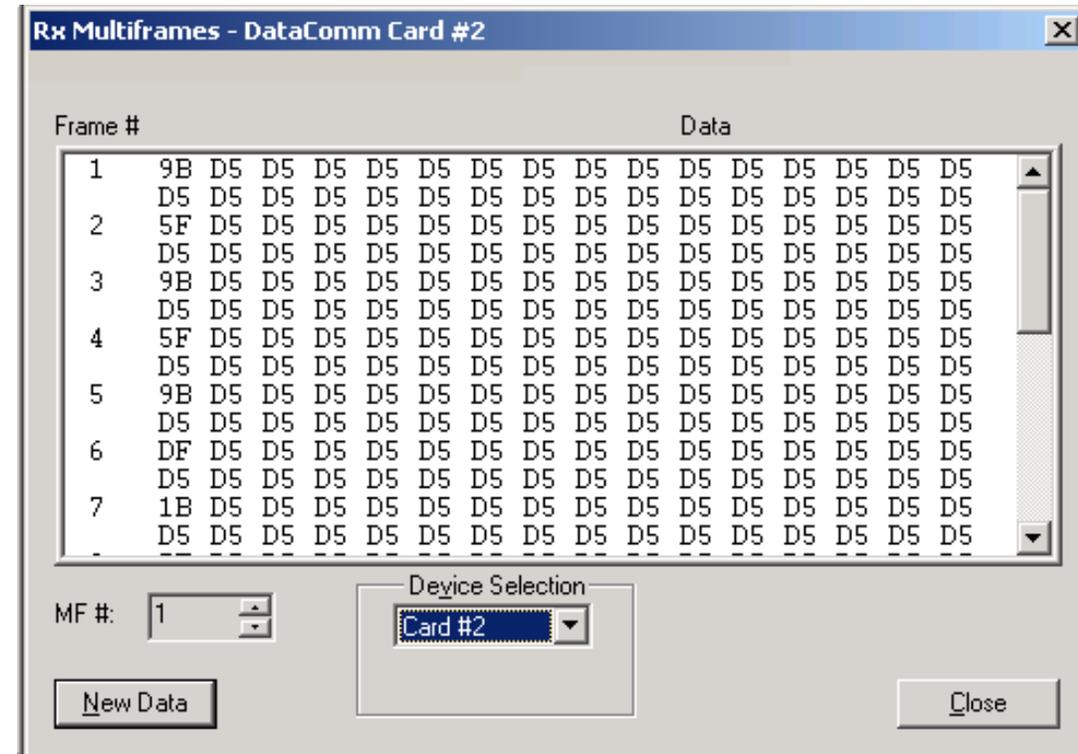
V.35 Male to RS530 Male



RS530 Female to V.35 DCE

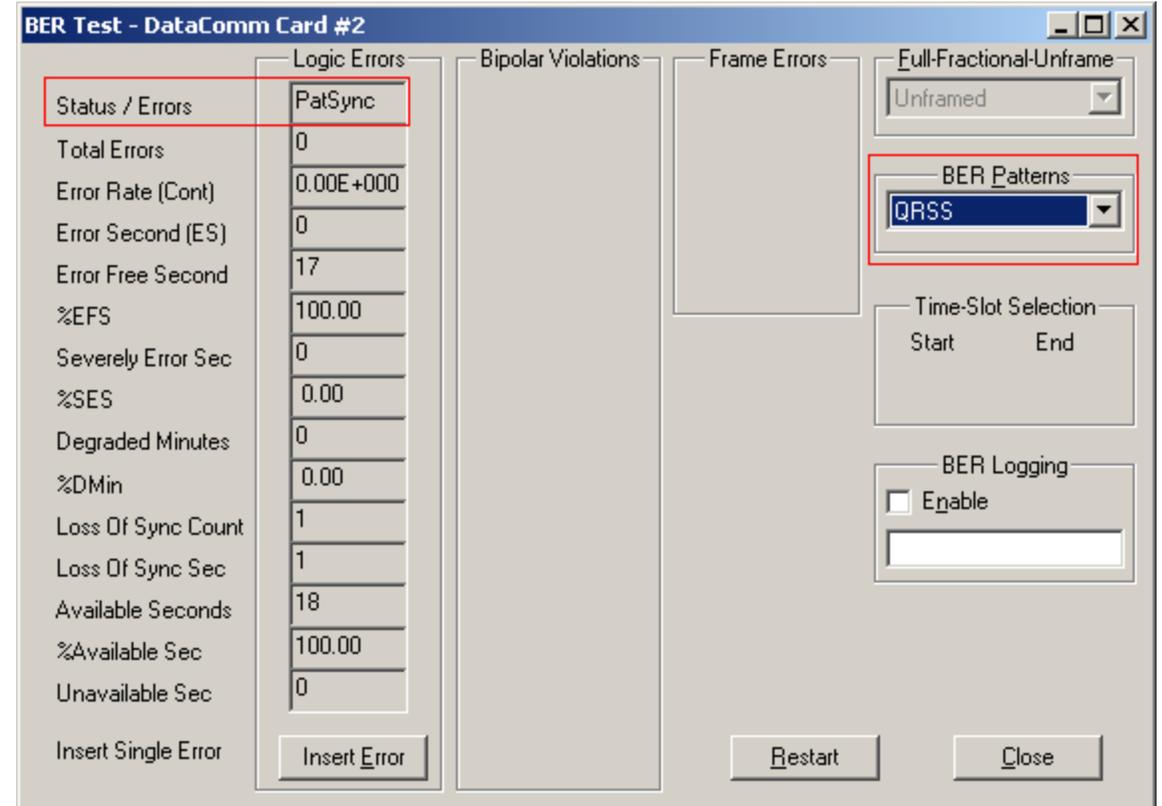
Monitoring Data in Realtime

- This application permits viewing data on a Datacom port – both directions simultaneously
- Approximately 2 seconds of data is captured for viewing



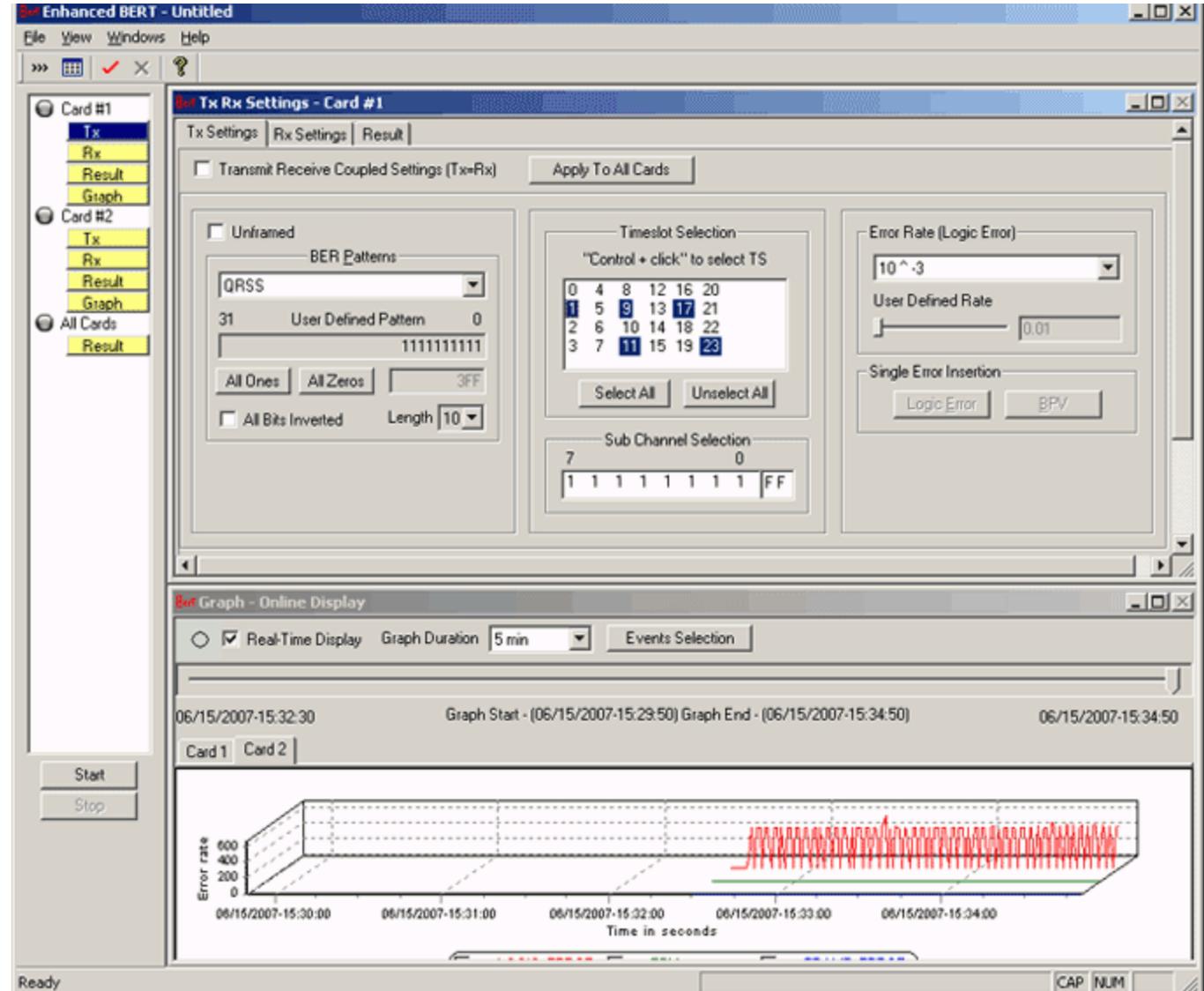
Bit Error Rate Test for Async and Sync

- The Bit Error Rate Test (BERT) application for Datacom Analyzer generates/detects data that are defined in Pseudo Random Bit Sequence (PRBS)



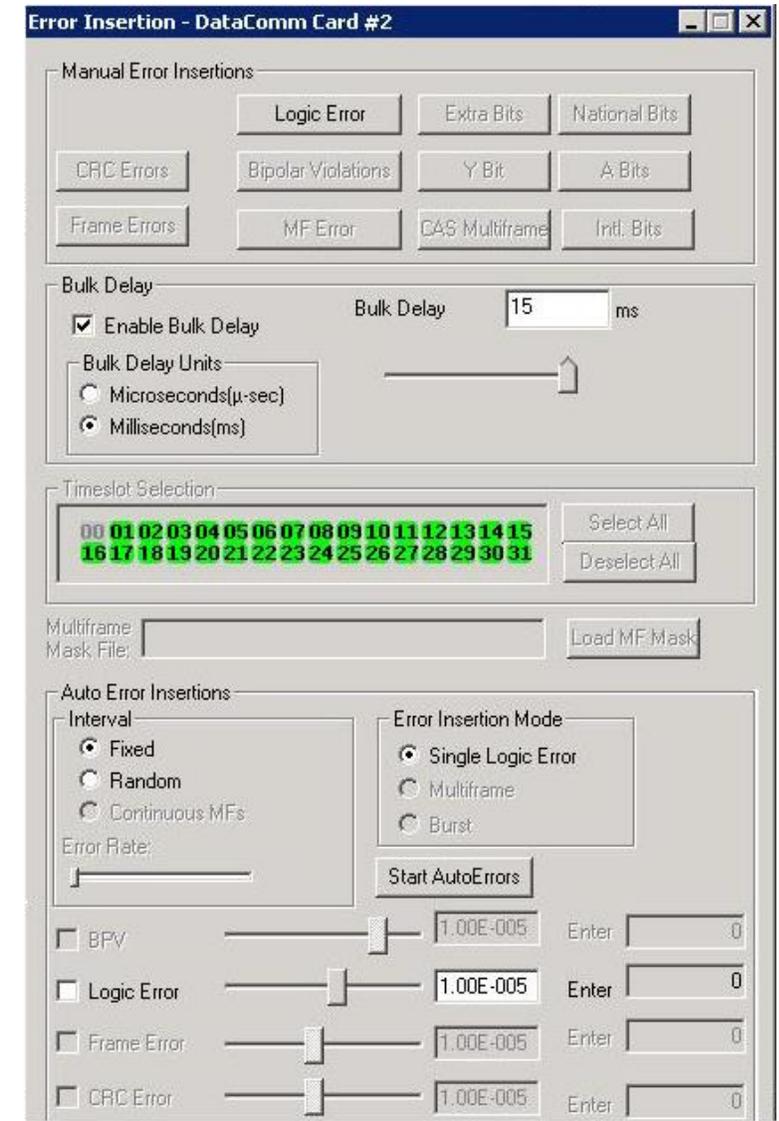
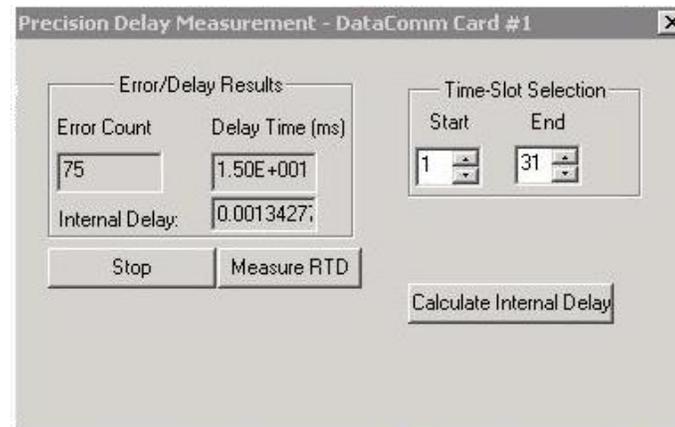
Enhanced Bit Error Rate Test

- The enhanced features include support for multiple ports, with a consolidated result view for all ports
- The Tx and Rx settings for all the cards can be independently controlled or coupled as per the convenience of the user
- The Enhanced BERT measures the correctness of data received on datacom according to the repetitive pattern file for a given transmission



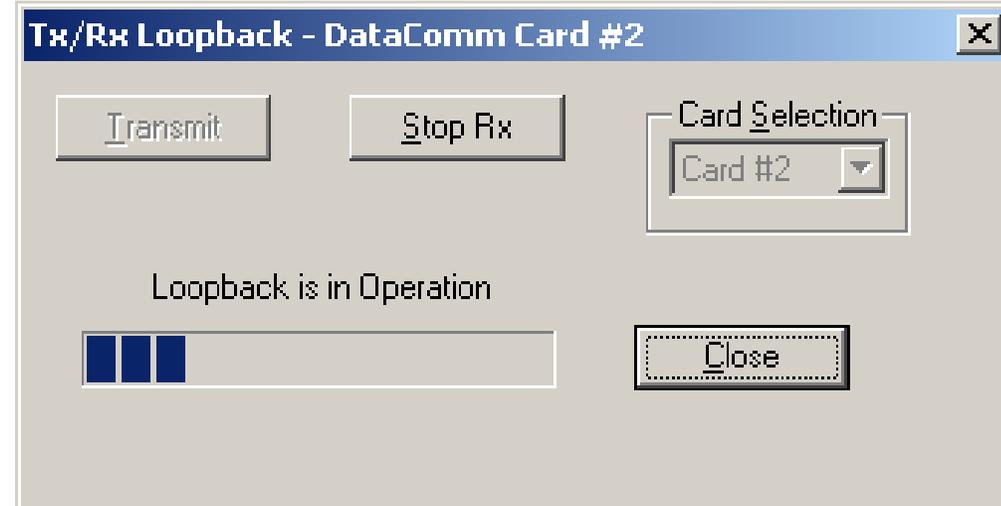
Precision Delay Measurement

- Precision Delay Measurement measures the Round-Trip Delay of a system

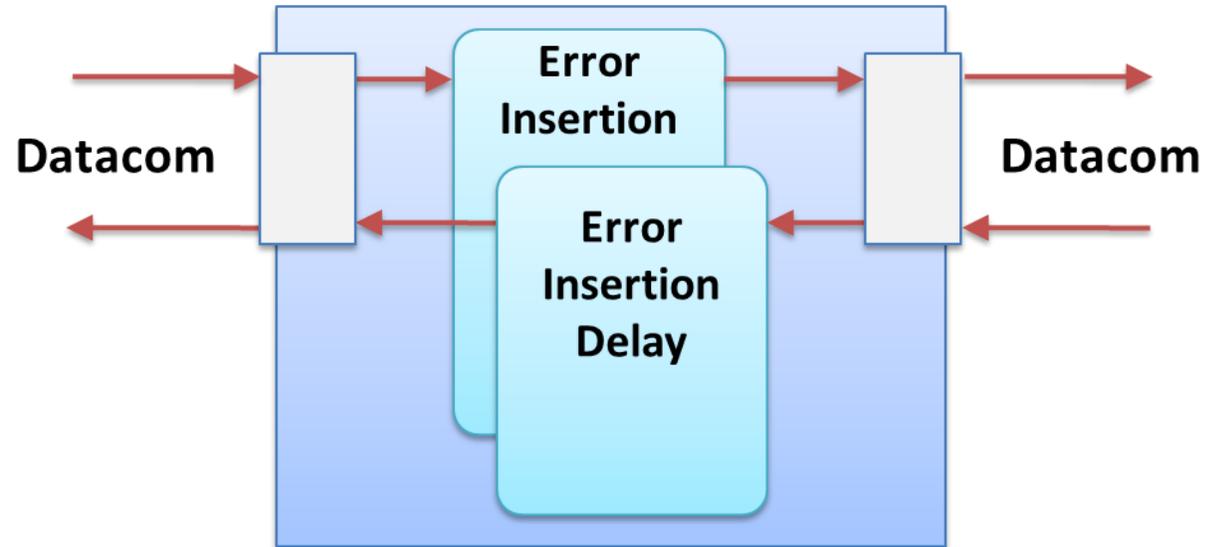


Rx to Tx Loop back

- Loop backs the received data from back to the transmitting port
- Used in conjunction with a Bit Error Rate Tester to verify the operation of analyzer



Error Insertion



- Permits inserting single, fixed, automatic, random, and burst error into the incoming bit stream

Manual Error Insertion

Error Insertion - DataComm Card #1

Manual Error Insertions

Logic Error Extra Bits National Bits

CRC Errors Bipolar Violations Y Bit A Bits

Frame Errors MF Error CAS Multiframe Intl. Bits

Bulk Delay

Enable Bulk Delay Bulk Delay: 0 ms

Bulk Delay Units

Microseconds(μ -sec)

Milliseconds(ms)

Timeslot Selection

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Select All
Deselect All

Multiframe Mask File: Load MF Mask

Auto Error Insertions

Interval

Fixed

Random

Continuous MFs

Error Rate:

Error Insertion Mode

Single Logic Error

Multiframe

Burst

Start AutoErrors

BPV 1.00E-005 Enter 0

Logic Error 1.00E-005 Enter 0

Frame Error 1.00E-005 Enter 0

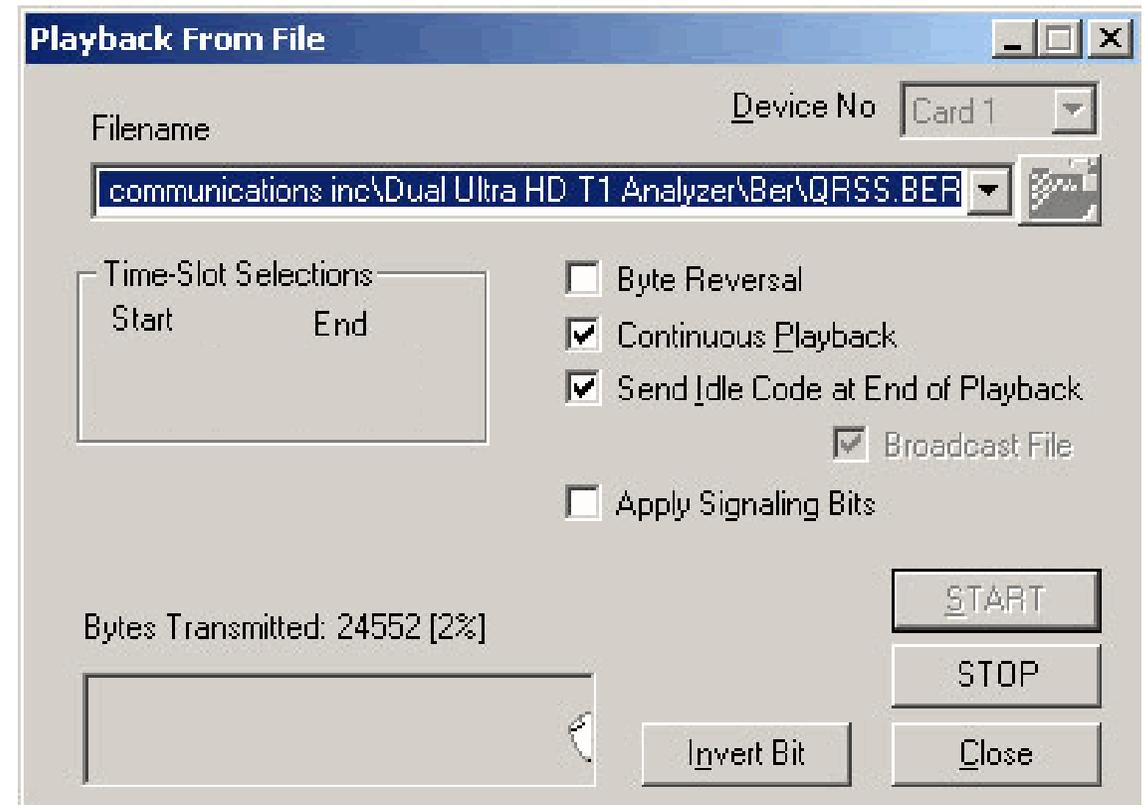
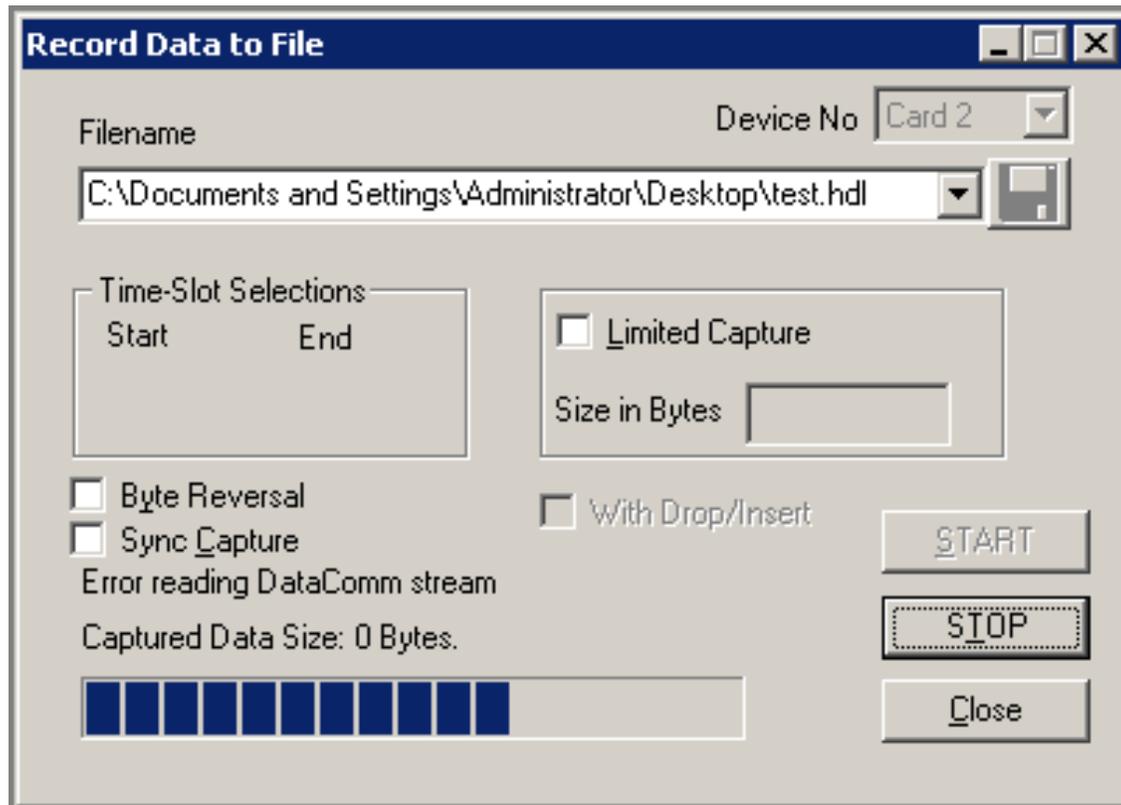
CRC Error 1.00E-005 Enter 0

Loopback Testing

- No Loopback – This option disables any existing loopback conditions
- Outward Loopback – In this configuration the data sent from the CSU are received by the Datacom interface and are immediately retransmitted to the CSU
- Diagnostic (Input + Output) Loopback – Loops the internal transmit clock and data to the internal receive clock and data along with looping the external clock and data back to the incoming device
- Cross-port Loopback – It takes the Rx data from the DTE and places it on the Rx of the DCE. It also takes Rx data from the DCE and places it on the Tx of the DTE

Optional Applications

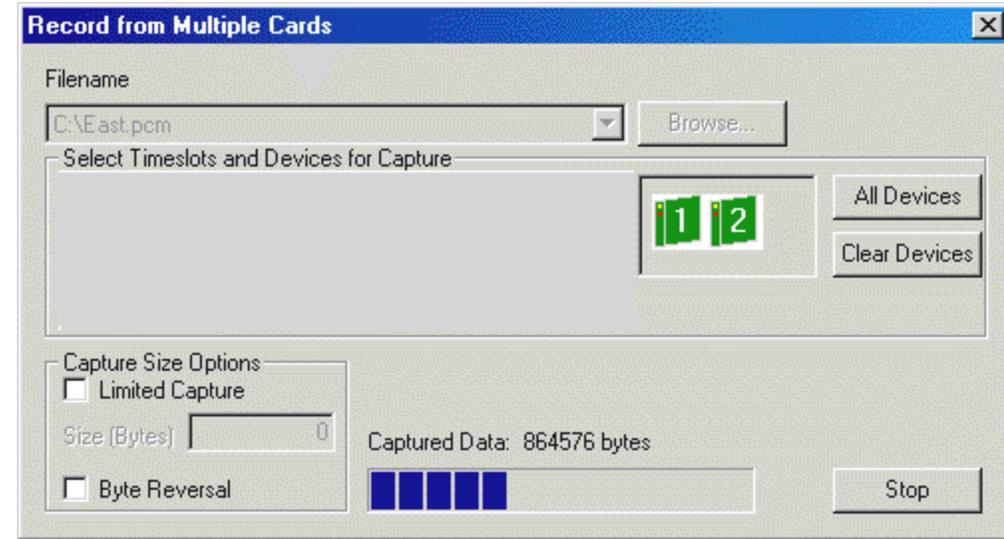
Record / Playback Applications



- Record / Playback Disk Files: This application permits capture of data being transmitted on the Datacom ports to / from a file

Record from Multiple Cards

- This application permits capture of data being transmitted on (any one or all) Datacom ports to a file
- Bytes may be captured in reverse order or normal order
- Limit captured (specific number of bytes) data to files



Automated Record/Playback (ARP)

Task #	Filename	Tx/Rx	Card #	Timeslots	Capture/Transmit Size	Invert Bits	Reverse Bits	Continuous	Safe Margin
0	C:\Program Files\GL Communications Inc\Dataco...	Tx	1	N/A	713	Yes	No	Yes	Default
1	C:\Program Files\GL Communications Inc\Dataco...	Tx	2	N/A	44	Yes	No	Yes	Default
2	C:\Program Files\GL Communications Inc\Dataco...	Rx	1	N/A	No Limit	No	No	No	Default
3	C:\Program Files\GL Communications Inc\Dataco...	Rx	2	N/A	No Limit	No	No	No	Default

Task #	Status	Bytes Tx/Rx	Bytes Underru...
0	IN PROGRESS	0	0
1	IN PROGRESS	0	0
2	IN PROGRESS	6300160	0
3	IN PROGRESS	6300160	0

- Provide various menus to transmit/receive data simultaneously
- Comprises of various columns to display the status of parameters for any given data file
- Comprises of various columns to display the status of all tasks queued in the Task Status Viewer

List of Available Protocol Analyzer

- HDLC Analysis
- Frame Relay Analysis
- PPP Analyzer

HDLC Analysis

HDLC Protocol Analysis LAPP

File View Capture Statistics Database Configure Help

0 GoTo

Dev	TSlot	Frame#	TIME (Relative)	Len	Error	DLCI	DE	BECN	FECN	CTL	Sequence Number
✓ 2	0-23	0	00:00:00.000000	6		0	0	0	0	Sup...	
✓ 2	0-23	1	00:00:00.005239	6		0	0	0	0	Sup...	
✓ 2	0-23	2	00:00:00.010479	38		0	0	0	0	Infor...	
✓ 2	0-23	3	00:00:00.015890	6		0	0	0	0	Sup...	
✓ 2	0-23	4	00:00:00.021135	6		0	0	0	0	Sup...	
✓ 2	0-23	5	00:00:00.026380	6		0	0	0	0	Sup...	

Card2 TimeSlots=0-23 Frame=0 at 00:00:00.000000 OK Len=6

HDLC Frame Data + FCS

```

===== LAPP Layer =====
0000 EA = .....0 (0)
0000 C/R = .....0. Command(User). Response(Network)
0000 DLCI = 0 (000000.. 0000....)
0001 EA = .....1 (1)
0001 DE = .....0. (0)
0001 BECN = .....0.. (0)
0001 FECN = ....0... (0)
0002 Ctl = .....01 Supervisory
0002 Supervisory Function = ....00.. RR
0003 P/F = .....1 (1)
  
```

Hex Dump of the Frame Data

```

+-----+-----+-----+-----+-----+-----+-----+-----+
00 01 01 45 73 AA                                     Es²
  
```

Supervisory Function	Frame Count(Supervisory Function)
RR (0)	49%
total RR (0)	49%

C:\Program Files\Gl Communication 526 Frames

Supported Protocols

- LAPD
- LAPF
- IP
- TCP
- UDP
- ICMP
- STUN
- DNS
- HTTP
- FTP
- SNMP
- Cisco HDLC
- ARP
- LAPB
- DHCP

HDLC Playback

Transmit HDLC

port 1
port 2

Playback File
C:\Program Files\GL Communications Inc\Datacomm Analyzer\hdlc_isdn\dcoss.hdl Browse...

Continuous Play Limit
 Limited

Invert Bits (Complement)
Flags Between Frames

OverRuns: 24 (464736)

Transmission On All Selected Cards
Start Abort Card1 transmitted 17 247 out of 27 946 Frames ...

HDLC Protocol Analysis LAPD

File View Capture Statistics Database Configure Help

Dev	TSlot	SubCh	Frame#	TIME (Relative)	Len	Error	CTL	FUNC
✓ 2	0-31		472203	00:00:15.343818	45		Information	
✓ 2	0-31		472204	00:00:15.343912	6		Information	
✓ 2	0-31		472205	00:00:15.343915	11		Unnumbered	Reserved
✓ 2	0-31		472206	00:00:15.343921	11		Unnumbered	Reserved
✓ 2	0-31		472207	00:00:15.343927	6		Information	
✓ 2	0-31		472208	00:00:15.343930	6		Information	
✓ 2	0-31		472209	00:00:15.343948	11		Information	
✓ 2	0-31		472210	00:00:15.343967	11		Information	
✓ 2	0-31		472211	00:00:15.343973	6		Information	

Card2 TimeSlots=0-31 Frame=472203 at 00:00:15.343818 OK Len=45
HDLC Frame Data + FCS
----- LAPD Layer -----
0000 C/R =0. Command(User), Response(Netw
0000 SAPI = 010000.. (16)
0001 TEI = 1000000. (64)
0002 Ctl =0 Information
0002 N(S) = 0100001. (33)
0003 P =0 (0)
0003 N(R) = 0000101. (5)

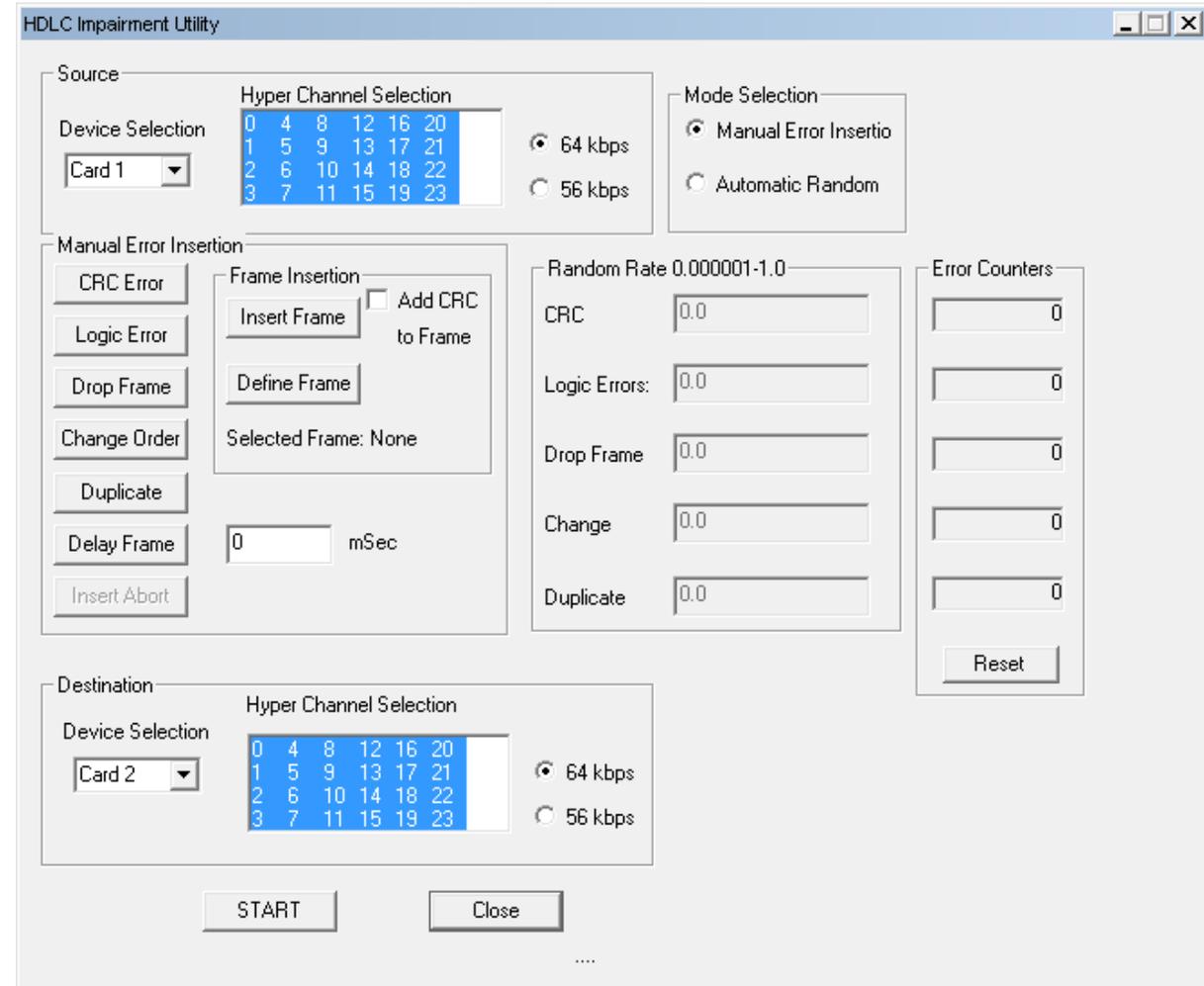
Hex Dump of the Frame Data
+-----+-----+-----+-----+-----+-----+-----+-----+
40 80 42 0A 10 41 DC 30 A0 20 C0 00 08 C5 19 C1 @|B AÜ0 À Á Á
94 C0 69 37 11 00 AC AD AC 4C 8C 4C 8C 0E 10 00 |Ài7 --L||
2C 0D EC AC 2C 8C 2C 00 82 80 68 84 33 , i-, |, ||h|3

Output File Limit has been reached C:\Temp.Hdl Captured 1 170 209 frames Errors 0 CRC, 510515 Fram

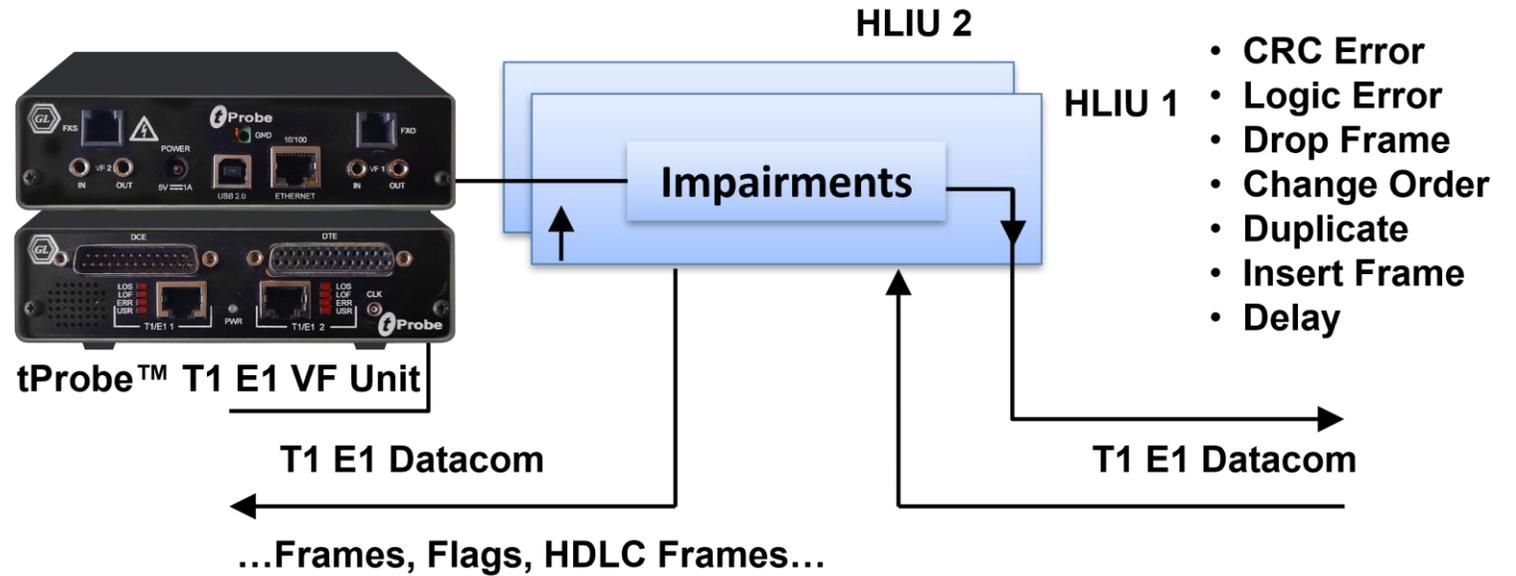
HDLC Link Impairment Utility (HLIU)

Features

- Provides flexible option to select Manual Error Insertion or Automatic Random Error Insertion Mode to inject errors as per requirement
- The HLIU application has the following features: Logic Errors, CRC Errors, Drop a Frame, Change Order of Frames, Duplicate a Frame, Insert a Frame, and Delay Frames
- Impairments can be introduced manually or automatically with a specified random rate, e.g. 1×10^{-4} , or one in 10,000
- This application helps us:
 - Understand the Delay a network can handle
 - Simulate Inline Error Insertion with ability to transmit / receive on different ports and allow hyper channel / timeslot selection
 - Control the error rate to correct the network
 - Error counters display the total number of CRC, Logic, Drop Frame, Change, and Duplicate errors impaired to an HDLC frame



HLIU with T1 E1



- Input stream of HDLC frames is contained in a “single” stream
- The output stream of HDLC frames is contained in a similar structure
- The output stream of HDLC frames may be on a different card or the same card as the input

Logic Error

- The first byte of the frame #1 changed from “00” to “FF”

The image displays two screenshots of the HDLC Protocol Analysis LAPD software interface. The top screenshot shows a table of captured frames with the first byte of frame #1 highlighted as '00'. Below the table is a hex dump of the frame data: 00 00 00 00 DE FC. The bottom screenshot shows the same table, but the first byte of frame #1 is now 'FF'. Its hex dump is: FF 00 00 00 0C 39.

Dev	SubCh	Frame#	TIME (...)	Len	Error	C/R	SAPI	TEI	CTL	P/F	N(S)	N(R)
✓ 1		0	00:00:...	6		Com...	0	0	Infor...	0	0	0
✓ 1		1	00:00:...	6		Com...	0	0	Infor...	1	0	0
✓ 1		2	00:00:...	6		Com...	0	0	Infor...	0	0	1

Hex Dump of the Frame Data

```
00 00 00 00 DE FC
```

Dev	SubCh	Frame#	TIME (...)	Len	Error	C/R	SAPI	TEI	CTL	P/F	N(S)	N(R)
✓ 1		0	00:00:...	6		Res...	63	0	Infor...	0	0	0
✓ 1		1	00:00:...	6		Res...	63	0	Infor...	1	0	0
✓ 1		2	00:00:...	6		Res...	63	0	Infor...	0	0	1

Hex Dump of the Frame Data

```
FF 00 00 00 0C 39
```

CRC Error

- The CRC error inserted on frame #15 and the CRC value is decremented from "E899" to "E898"
- HLIU application can insert a Single Shot or Random Rate CRC Error into an HDLC frame

The image displays two screenshots of the HDLC Protocol Analysis LAPD software interface. The top screenshot shows a capture of three frames. Frame 15 is selected, and its hex dump shows the CRC field as E8 99. The bottom screenshot shows the same capture, but frame 15 now has a CRC error (fcs error) and the CRC field in the hex dump is E8 98. The status bar at the bottom of the second screenshot indicates "Errors 1 CRC, 0 Frame".

Dev	SubCh	Frame#	TIME (Relative)	Len	Error	C/R	SAPI	TEI	CTL	P/F	N(S)	N(R)
1		14	00:00:03.813000	6		Com...	0	0	Infor...	1	0	2
1		15	00:00:03.933875	6		Com...	0	0	Infor...	0	0	3
1		16	00:00:04.078750	6		Com...	0	0	Infor...	1	0	3

Hex Dump of the Frame Data

```
00 00 00 06 E8 99
```

Running Utilization 0.02% C:\Temp.Hdl Captured 50 frames

Dev	SubCh	Frame#	TIME (Relative)	Len	Error	C/R	SAPI	TEI	CTL	P/F	N(S)	N(R)	FI
1		14	00:00:21.033000	6		Com...	0	0	Infor...	1	0	2	
1		15	00:00:21.177875	6	fcs error								
1		16	00:00:21.298750	6		Com...	0	0	Infor...	1	0	3	

Hex Dump of the Frame Data

```
00 00 00 06 E8 98
```

Running Utilization 0.03% C:\Temp.Hdl Captured 50 frames Errors 1 CRC, 0 Frame

Drop a Frame

- The frame # 1 order number changed from '01' to '02' due to a dropped frame

The image displays two screenshots of the HDLC Protocol Analysis LAPD software interface, illustrating the effect of dropping a frame on the sequence numbering.

Top Screenshot: Shows a capture of three frames. The first frame (Frame# 0) has a sequence number of 01. The second frame (Frame# 1) has a sequence number of 01, indicating it is the next frame in the sequence. The third frame (Frame# 2) has a sequence number of 02. The hex dump of the frame data shows the sequence number field containing '01'.

Dev	SubCh	Frame#	TIME (...)	Len	Error	C/R	SAPI	TEI	CTL	P/F	N(S)	N(R)
✓ 1		0	00:00:...	6		Com...	0	0	Infor...	0	0	0
✓ 1		1	00:00:...	6		Com...	0	0	Infor...	1	0	0
✓ 1		2	00:00:...	6		Com...	0	0	Infor...	0	0	1

Hex Dump of the Frame Data
00 00 00 01 57 ED Wi

Bottom Screenshot: Shows the same capture after a frame has been dropped. The first frame (Frame# 0) has a sequence number of 01. The second frame (Frame# 1) has a sequence number of 02, indicating that the frame with sequence number 01 was dropped. The hex dump of the frame data shows the sequence number field containing '02'.

Dev	SubCh	Frame#	TIME (...)	Len	Error	C/R	SAPI	TEI	CTL	P/F	N(S)	N(R)
✓ 1		0	00:00:...	6		Com...	0	0	Infor...	0	0	0
✓ 1		1	00:00:...	6		Com...	0	0	Infor...	0	0	1
✓ 1		2	00:00:...	6		Com...	0	0	Infor...	0	0	3

Hex Dump of the Frame Data
00 00 00 02 CC DF iB

Change Order

The image displays two screenshots of the HDLC Protocol Analysis LAPD software interface, illustrating a change in frame order. Both screenshots show a table of captured frames and a hex dump of the frame data.

Top Screenshot:

Dev	TSlot	SubCh	Frame#	TIME [...]	Len	Error	C/R	SAPI	TEI	CTL	P/F	N(S)	N(R)	FUNC
✓ 1	1		0	00:00:...	6		Com...	0	0	Infor...	1	0	0	
✓ 1	1		1	00:00:...	6		Com...	0	0	Infor...	0	0	0	
✓ 1	1		2	00:00:...	6		Com...	0	0	Infor...	1	0	1	

Hex Dump of the Frame Data

```
00 00 00 01 57 ED          Vi
```

Bottom Screenshot:

Dev	TSlot	SubCh	Frame#	TIME [...]	Len	Error	C/R	SAPI	TEI	CTL	P/F	N(S)	N(R)	FUNC
✓ 1	1		0	00:00:...	6		Com...	0	0	Infor...	1	0	0	
✓ 1	1		1	00:00:...	6		Com...	0	0	Infor...	0	0	0	
✓ 1	1		2	00:00:...	6		Com...	0	0	Infor...	1	0	1	

Hex Dump of the Frame Data

```
00 00 00 00 DE FC          bi
```

- The frame # 0 order number is changes from '00' to 01', the frame # 1 order number is changes from '01' to 00'

Duplicate a Frame

The image displays two screenshots of the HDLC Protocol Analysis LAPD software interface. The top screenshot shows a capture of three frames. Frame #0 is highlighted with a red box, and its hex dump is shown as '00 00 00 00 DE FC'. The bottom screenshot shows the same capture, but frame #0 has been duplicated as frame #1, also highlighted with a red box. The hex dump for frame #1 is also '00 00 00 00 DE FC'.

Dev	TSlot	SubCh	Frame#	TIME	Len	Error	C/R	SAPI	TEI	CTL	P/F	N(S)	N(R)	FUNC
✓ 1	1		0	00:00...	6		Com...	0	0	Infor...	0	0	0	
✓ 1	1		1	00:00...	6		Com...	0	0	Infor...	0	0	0	
✓ 1	1		2	00:00...	6		Com...	0	0	Infor...	1	0	0	

Hex Dump of the Frame Data

```
00 00 00 00 DE FC
```

Dev	TSlot	SubCh	Frame#	TIME	Len	Error	C/R	SAPI	TEI	CTL	P/F	N(S)	N(R)	FUNC
✓ 1	1		0	00:00...	6		Com...	0	0	Infor...	0	0	0	
✓ 1	1		1	00:00...	6		Com...	0	0	Infor...	0	0	0	
✓ 1	1		2	00:00...	6		Com...	0	0	Infor...	1	0	0	

Hex Dump of the Frame Data

```
00 00 00 00 DE FC
```

- The frame # 0 duplicated as frame # 1

Delay Frame

The screenshot shows the HDLC Protocol Analysis LAPD interface. The table below displays the captured frames. Frame 39 has a relative time of 00:00:04.900375, and frame 40 has a relative time of 00:00:10.019250. The 5-second interval between these two frames is highlighted with a red box, indicating an inserted delay.

Dev	SubCh	Frame#	TIME (Relative)	Len	Error	C/R	SAPI	TEI	CTL	P/F	N(S)	N(R)	FUNC
✓ 1		36	00:00:04.540625	6		Com...	0	0	Unn...	0			UI
✓ 1		37	00:00:04.658500	6		Com...	0	0	Unn...	0			UI
✓ 1		38	00:00:04.779375	6		Com...	0	0	Unn...	0			UI
✓ 1		39	00:00:04.900375	6		Com...	0	0	Unn...	0			UI
✓ 1		40	00:00:10.019250	6		Com...	0	0	Unn...	0			UI
✓ 1		41	00:00:10.020125	6		Com...	0	0	Unn...	0			UI
✓ 1		42	00:00:10.021000	6		Com...	0	0	Unn...	0			UI
✓ 1		43	00:00:10.021875	6		Com...	0	0	Unn...	0			UI

C:\Documents and Settings\Mahesh\Desktop\ 92 Frames

- The delay of 5 secs inserted between frame # 39 and frame # 40

Supported Protocols for Frame Relay Analysis

- LAPF
- Multi-Protocol Encapsulation
- IP
- TCP
- UDP
- SMTP
- POP3
- STUN
- FTP
- SNMP
- DNS
- DHCP
- HTTP
- RIP
- NBNS (NetBIOS Name Service)
- IPM Reg (IPv4 Registration Message)
- Q933FRel
- SNAP
- PPP over Frame Relay
- FRF.12, FRF12.1, FRF.15
- LCP
- SVC Signaling
- LMI Signaling

PPP Analysis

- Encapsulates other network layer protocols like IP for transmission on synchronous (like T1 or E1) and asynchronous communications lines

The screenshot displays the 'PPP Protocol Analysis' window. At the top, there is a menu bar (File, View, Capture, Statistics, Database, Configure, Help) and a toolbar with various icons. Below the toolbar is a table of captured frames:

Dev	TSlot	Frame#	TIME (Relative)	Len	Error	PPP Layer3Protocol	Mlppp Seq No	Source IP Address	Destination IP Address
✓ 2	1-31	0	00:00:00.000000	182		ML PPP	3132	202.174.156.34	72.37.201.145
✓ 2	1-31	1	-00:00:00.6825...	410		ML PPP	3130	72.37.201.145	202.174.156.34
✓ 2	1-31	2	00:00:00.001145	244		ML PPP	3133	202.174.156.34	72.37.201.145
✓ 2	1-31	3	00:00:00.883967	76		ML PPP	3134	202.174.156.37	72.37.201.145
✓ 2	1-31	4	00:00:00.884681	76		ML PPP	3135	202.174.156.37	72.37.201.145
✓ 2	1-31	5	00:00:00.885395	76		ML PPP	3136	202.174.156.37	72.37.201.145
✓ 2	1-31	6	00:00:00.886108	76		ML PPP	3137	202.174.156.37	72.37.201.145

Below the table, the details for the selected frame (Frame 0) are shown:

```
Card2 TimeSlots=1-31 Frame=0 at 00:00:00.000000 OK Len=182
HDLCL Frame Data + FCS
----- PPP Link Layer -----
0000 Address          = 11111111 (255)
0001 Ctl              = 00000011 (3)
0002 Protocol         = 00000000 00111101 ML PPP
----- ML PPP Layer -----
0004 Beginning Fragment = 1..... Yes
0004 Ending Fragment   = .1..... Yes
0004 Mlppp Class       = ..0000.. (0)
```

The bottom section shows a hex dump of the frame data:

```
Hex Dump of the Frame Data
+-----+-----+-----+-----+-----+-----+
FF 03 00 3D C0 00 0C 3C 00 21 45 00 00 AA F9 89   y =A < !E 3u|
40 00 3F 06 C9 3C CA AE 9C 22 48 25 C9 91 06 B8   @ ? E<E@| "H%E' ,
E8 9F 00 44 EE F3 4C 96 B9 52 80 18 00 D7 08 84   e| Di6L|'R| x |
00 00 01 01 08 0A 02 73 1B B2 02 53 6A 22 03 00   s ' Sj"
00 76 08 02 F6 D1 03 1E 02 80 81 7E 00 66 05 38   v cN ||~ f 8
00 54 84 06 00 08 91 4A 00 03 08 00 00 40 81 26   T| 'J @|_
5C 6C FE 11 9C 26 53 41 4E 53 41 59 02 1A 00 00   \lp |SANSAY
00 0E 00 01 01 80 11 14 00 01 00 CA AE 9C 25 29   | E@|%)
72 00 CA AE 9C 25 29 73 17 40 42 1D 06 04 01 00   r E@|%)s @B
4E 00 01 01 80 0A 04 00 01 00 CA AE 9C 25 29 73   N | E@|%)s
05 80 01 00 01 00 40 B5 00 07 27 04 18 02 3C 0E   | @µ ' <
08 80 01 80 33 B7   | |3.
```

The status bar at the bottom indicates 'Off-line Viewing' and 'C:\Program Files (x86)\GL Communic 11 938 Frames'.

Supported Protocols for PPP Analysis

- Link Control Protocol (LCP)
- Bridging PDU (BPDU)
- PPP, Multiplexed PPP
- Multi-class extension to MLPPP
- Multi-link PPP
- Network Control Protocol (NCP)
 - Internet Protocol Control Protocol (IPCP)
 - Bridging Control Protocol (BCP)
 - PPP Mux CP
- Cisco HDLC decodes
- STUN, SNMP, RIP
- Link Quality Report (LQR)
- DHCP, DNS, ICMP
- Van Jacobson TCP/IP compression decodes
- IPHC
- IP, TCP, UDP
- IEC
- PAP, CHAP
- SIP, MGCP, MEGACO
- RTP, CRTP, RTCP
- H.263, H.264, H.450
- ISDN H.225, MPEG2
- T.38
- RAS, SCTP
- M2UA, M2PA, M3UA
- ISUP, SCCP
- SUA, IUA, TUP
- Test & Network Management Messages

WCS Modules

- Windows Client / Server applications allow the user to operate analyzers remotely, write scripts for automation, or provide multi-client connectivity to a single Datacom analyzer
- WCS supports Enhanced BERT functionality

The screenshot displays the Datacom Analyzer 64-bit software interface. The main window shows a configuration table for two ports:

Port	Interface	Loopback	Termination	Clock	Mode	Data Rate
1	V35	No Loop Back	Terminate	Internal	Sync	16.384 Mbps
2	V35	No Loop Back	Terminate	Internal	Sync	16.384 Mbps

Below the table is the 'Data Comm Rx Status' window, which shows a list of parameters for Port 1 DCE and Port 2 DTE:

	Port 1 DCE	Port 2 DTE
RXD		
RXC		
TXC		
CTS		
RI		
DSR		
DCD		
TM		
Freq	16 384 020	

Overlaid on the main window are two other windows:

- 'Untitled - WCS Server - DataComm': A log window showing connection and configuration messages for client #1160 at 192.168.10.96, including setting the DC interface to V35 and the data rate to 16.384 mbps.
- 'Datacomm_Interface.gls - GLClient': A script window showing commands for connecting to a GL Server on 'MATLAB2011B', setting the DC interface to V35, and configuring data rates and clock sources.

Pin Configurations on Datacom Units

RS-530 Connections (DCE) Male Connector

Pin	Signal	Direction	Description
1	CHGND	Chassis Ground	Chassis Ground
2	RD -	Input to tProbe	Receive Data -
3	TD -	Output from tProbe	Transmit Data -
4	CTS -	Input to tProbe	CTS Receive -
5	RTS -	Output from tProbe	RTS Transmit -
6	DTR -	Output from tProbe	DTR Transmit -
7	GND	Signal Ground	Ground
8	DCD -	Output from tProbe	DCD Transmit -
9	TT +	Output from tProbe	Transmit Clock +
10	DCD +	Output from tProbe	DCD Transmit +
11	RT +	Input to tProbe	Receive Clock +
12	ST +	Output from tProbe	Secondary Timing +
13	RTS +	Output from tProbe	RTS Transmit +
14	RD +	Input to tProbe	Receive Data +
15	ST -	Output from tProbe	Secondary Timing -

RS-530 Connections (DCE) Male Connector (Contd.)

Pin	Signal	Direction	Description
16	TD +	Output from tProbe	Transmit Data +
17	TT -	Output from tProbe	Transmit Clock -
18	TM	Input to tProbe	Test Mode
19	CTS +	Input to tProbe	CTS Receive +
20	DSR -	Input to tProbe	Data Set Ready -
21	RI	Input to tProbe	Ring Indicator
22	DTR +	Output from tProbe	DTR Transmit +
23	DSR +	Input to tProbe	Data Set Ready +
24	RT -	Input to tProbe	Receive Clock-
25	LL	Output from tProbe	Local Loop

RS-530 Connections (DTE) Female Connector

Pin	Signal	Direction	Description
1	CHGND	Chassis Ground	Chassis Ground
2	TD -	Output from tProbe	Transmit Data -
3	RD -	Input to tProbe	Receive Data -
4	RTS -	Output from tProbe	RTS Transmit -
5	CTS -	Input to tProbe	CTS Receive -
6	DSR -	Input to tProbe	Data Set Ready -
7	GND	Signal Ground	Ground
8	DCD -	Input to tProbe	DCD Receive -
9	RT +	Input to tProbe	Receive Clock +
10	DCD +	Input to tProbe	DCD Receive +
11	TT +	Output from tProbe	Transmit Clock +
12	RTC +	Input to tProbe	Secondary Receive Clock+
13	CTS +	Input to tProbe	CTS Receive +
14	TD +	Output from tProbe	Transmit Data +
15	RTC -	Input to tProbe	Secondary Receive Clock-

RS-530 Connections (DTE) Female Connector (Contd.)

Pin	Signal	Direction	Description
16	RD +	Input to tProbe	Receive Data +
17	RT -	Input to tProbe	Receive Clock -
18	LL	Output from tProbe	Local Loop
19	RTS +	Output from tProbe	RTS Transmit +
20	DTR -	Output from tProbe	DTR Transmit -
21	RL	Output from tProbe	Remote Loop
22	DSR +	Input to tProbe	Data Set Ready+ or Remote Indication
23	DTR +	Output from tProbe	DTR Transmit +
24	TT -	Output from tProbe	Transmit Clock -
25	TM	Input to tProbe	Test Mode

Thank you