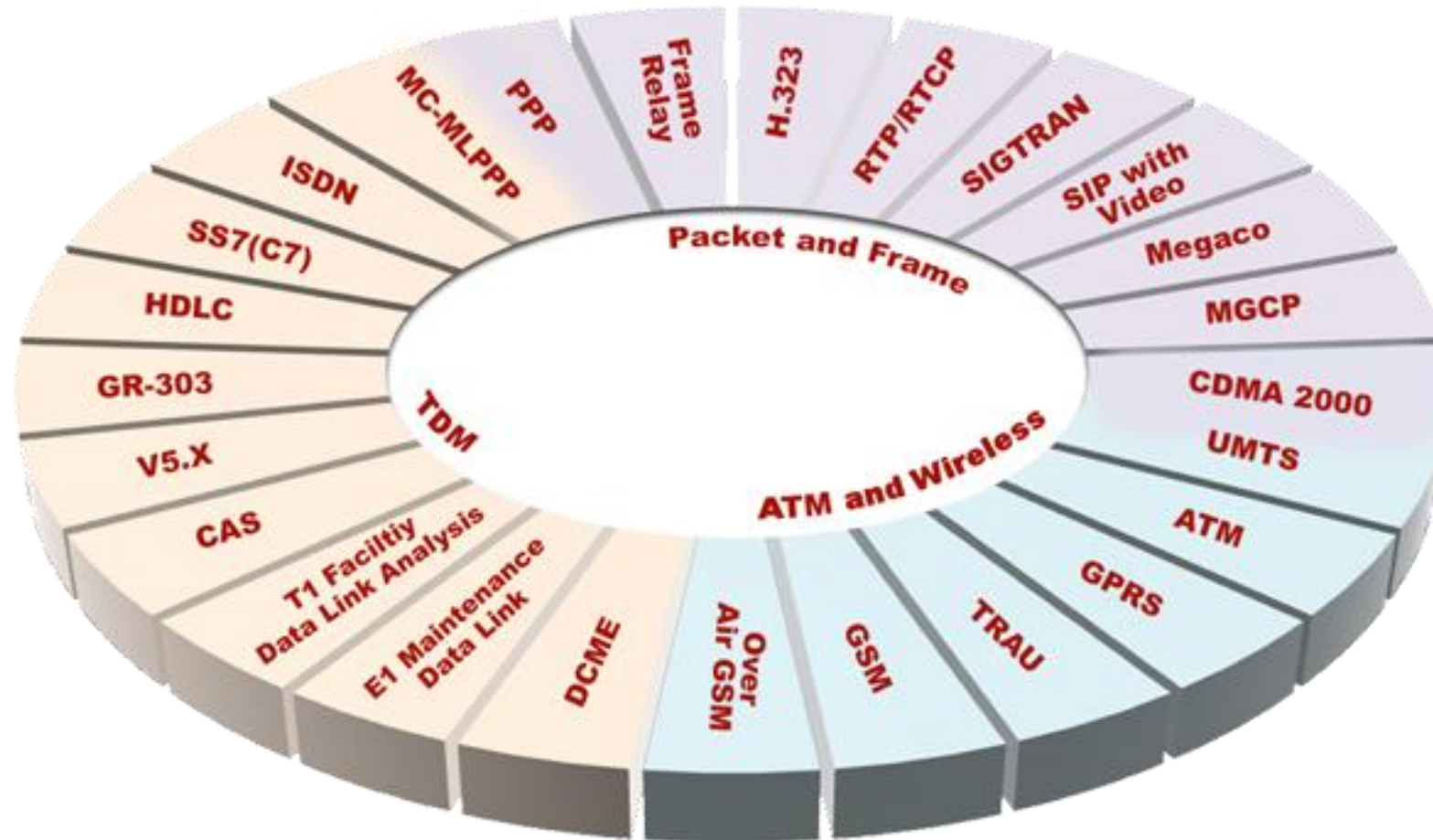

V5.x Protocol Analyzer



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Website: <https://www.gl.com>

TDM, Wireless, and VoIP Protocol Analysis

- GL Communications provides a host of protocol analyzers for testing a variety of protocols
- Analysis may be done both in real-time and off-line



Supported Platforms



tProbe™ - Portable USB based T1 E1 VF FXO FXS and Serial Datacom Analyzer

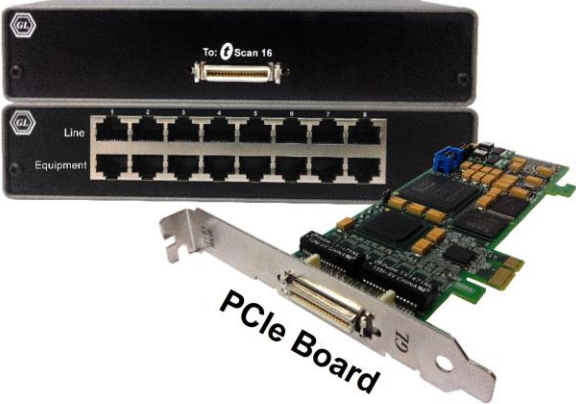


Quad / Octal T1 E1 PCIe Card



Dual T1 E1 Express (PCIe) Board

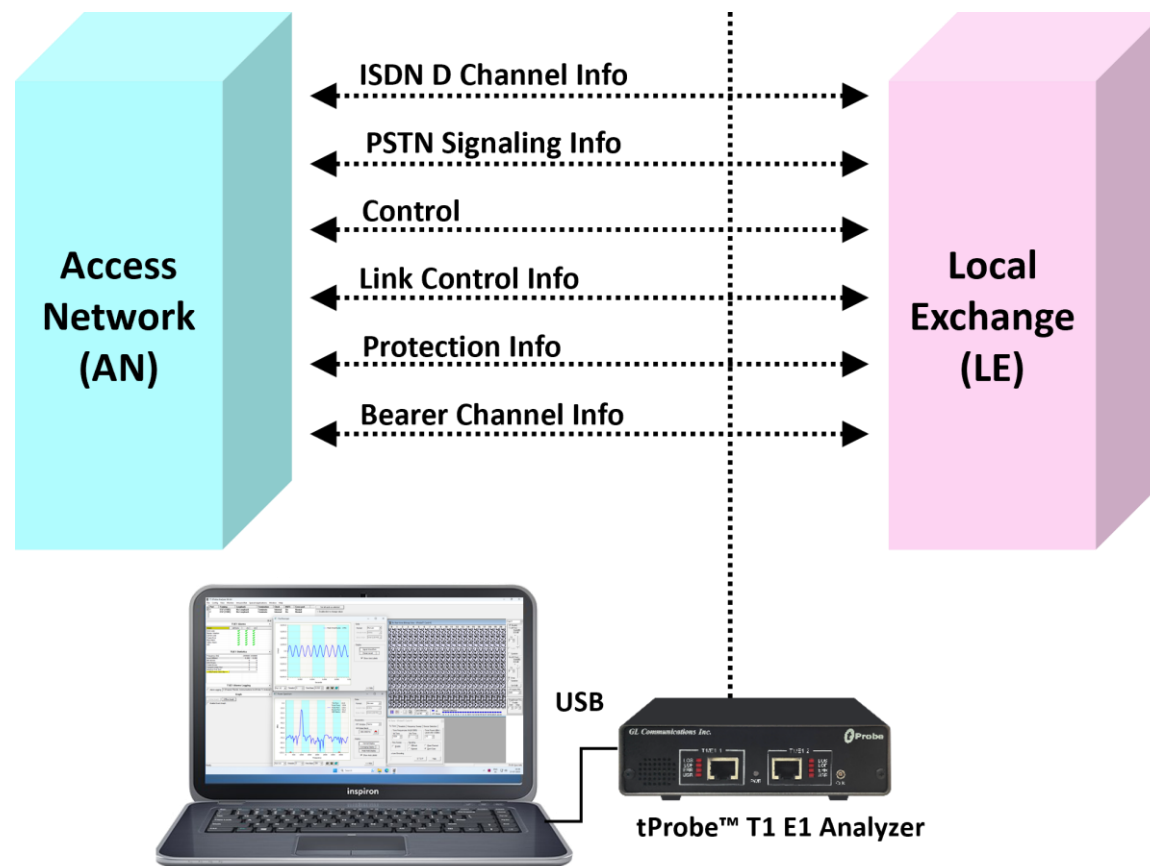
tScan16™ with 16-port T1 E1 Breakout Box



PCIe Board

Overview

- GL's V5.x analyzer can be used to capture and analyze a stream of frames from the link between LE and AN
- The analyzer provides V5.x based on ETSI / ITU standard in order to decode according to the corresponding standards
- Supports capturing and decoding of LAPV5, ISDN Call Signaling - Q.93 as layer 3, Link Control Protocol (LCP), Protection Protocol (PP), Bearer Channel Connection (BCC). and PSTN



Supported Protocol Standard

- V5 ITU Standard
- V5 ETSI Standard

Supported Protocols	Specification Used
LAPV5	
PSTN	
BCC	ITU-T Q921, G.964 & G.965
PP	
Link Control	
ISDN Q.931	ITU-T Q.931

Features

- Summary View displays Device Number, Time Slots: Sub channels, Frame number, Time, Frame length, etc. in a tabular format
- Summary view (Call Quality Matrix) displays complete summary of call information in graphical format, along with a summary of alerts
- Detail View displays packet by packet statistics for call information in 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
- Advanced filtering and search based on any user selected protocol fields
- Allows the user to create search/filter criteria automatically from the current screen selection
- Remote monitoring capability using GL's Network Surveillance System

Real-time Analysis

The screenshot displays the V5x Protocol Analysis V5 ITU Standard 64-bit software interface. The main window is divided into several sections:

- Summary View:** A table listing captured frames with columns for Dev, TSlot, SubCh, Frame#, TIME (Relative), Len, Error, BCC Message Type Information, and CTRL Message Type Information.
- Detail View:** A text-based representation of the selected frame's data, including HDLC Frame Data + FCS and LAPV5 Layer details.
- Hex Dump View:** A hex dump of the frame data with corresponding ASCII characters.
- Statistics View:** A table summarizing the frame counts for each device.

Dev	TSlot	SubCh	Frame#	TIME (Relative)	Len	Error	BCC Message Type Information	CTRL Message Type Information
✓ 1	0		4	00:00:00.000000	15		AN FAULT	
✓ 1	0		5	00:00:00.000000	16		PROTOCOL ERROR	
✓ 1	0		6	00:00:00.000000	15		ALLOCATION REJECT	
✓ 1	0		7	00:00:00.000000	15			PORT CONTROL


```
Card1 TimeSlot=0 Frame=4 at 00:00:00.000000 OK Len=15 *** Ri
HDLC Frame Data + FCS
----- LAPV5 Layer -----
0000 EA1 = .....0 (0)
0000 C/R = .....0. Command(User). Response(Network)
0000 EF Address = 8178 (111111... 1110010.)
0001 EA2 = .....1 (1)
0002 V5DIAddr = 8178 (111111... 1110010.)
```



```
Hex Dump of the Frame Data
+-----+-----+-----+-----+-----+-----+
FC E5 FC E5 13 48 E0 3F 28 40 04 C0 07 47 49      uiãuã Hà?(@ À GI
```


Device #	Frame Count(Device #)
1	20
total 1	20

C:\Program Files\GL Communicatic 22 Frames

Summary View

Detail View

Hex Dump View

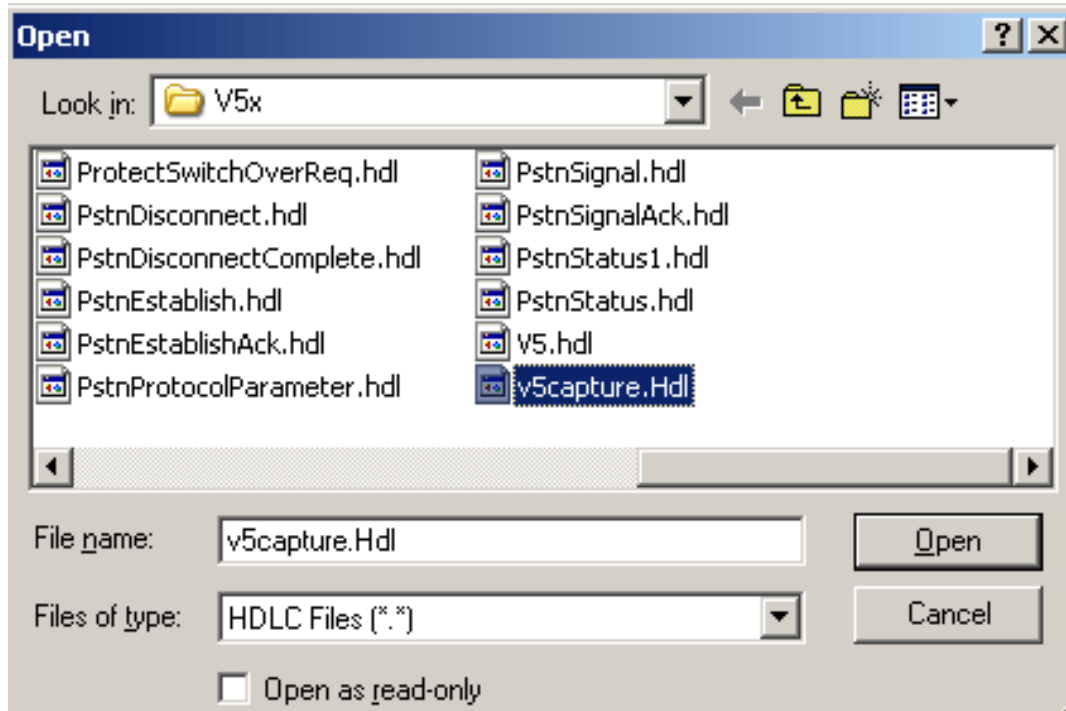
Statistics View

Different Views

- **Summary View:** This pane displays the columns that contain Card Number, Timeslots, Frame Number, BCC Message Type Information, CTRL Message Type Information, and more in a tabular format
- **Detail View:** This pane displays in detail about a frame in order to analyze and decode by selecting it in the summary view
- **Hex Dump View:** This pane displays the frame information in HEX and ASCII format
- **Statistics View:** This pane displays various statistics that are calculated based on the protocol fields

Offline Analysis

- Off-line analysis is equivalent to capturing a file in pre-defined timeslots
- Captured frames or only the filtered frames can be exported to *.HDL file for the further off-line analysis
- Trace file for offline analysis can be loaded either through analyzer GUI or through simple command-line arguments



V5x Protocol Analysis V5 ITU Standard 64-bit

File View Capture Statistics Database Call Detail Records Configure Help

Dev	TSlot	SubCh	Frame#	TIME (Relative)	Len	Error	BCC Message Type Information	CTRL Message Type Information	PP Message Type Information
✓ 1	0		0	00:00:00.000000	14		PROTOCOL ERROR		
✓ 1	0		1	00:00:00.000000	15		PROTOCOL ERROR		
✓ 1	0		2	00:00:00.000000	11		AN FAULT ACKNOWLED...		
✓ 1	0		3	00:00:00.000000	15		AN FAULT		
✓ 1	0		4	00:00:00.000000	15		AN FAULT		
✓ 1	0		5	00:00:00.000000	16		PROTOCOL ERROR		
✓ 1	0		6	00:00:00.000000	15		ALLOCATION REJECT		
✓ 1	0		7	00:00:00.000000	15			PORT CONTROL	
✓ 1	0		8	00:00:00.000000	14			PORT CONTROL ACK	
✓ 1	0		9	00:00:00.000000	23			COMMON CONTROL	
✓ 1	0		10	00:00:00.000000	14			COMMON CONTROL ACK	

Card1 TimeSlot=0 Frame=0 at 00:00:00.000000 OK Len=14 *** Right click to SHOW/HIDE

HDLC Frame Data + FCS

===== LAPV5 Layer =====

0000 EA1 =0 (0)
0000 C/R =0. Command(User), Response(Network)
0000 EF Address = 8178 (111111... 1110010.)
0001 EA2 =1 (1)
0002 VSDLaddr = 8178 (111111... 1110010.)
0003 Layer 3 Protocol = 1110010. BCC
0004 Ctl =11 Unnumbered
0004 Modifier Function = 000.00... UI
0004 P/F = ...1..... (1)

===== Information Layer =====

0000 Spare = 11111100 (252)
0001 Spare = 11100101 (229)
BCC Protocol =
0002 Spare = 11111100 (252)
0003 Spare = 11100101 (229)
0004 Spare = 00010011 (19)
0005 Protocol Discriminator = 72 (x48)
0006 BCC Reference Number = 6207 (.11000000 ..111111)
0006 Source ID = 1..... (1)
0008 BCC Message Type = .0101010 PROTOCOL ERROR
User Port Identification =
0009 IE Identifier(PEC) = 01000101 Protocol Error Cause Information
000A Length of Protocol Error Cause = 1 (x01)
000B Protocol Error Cause = .00000001 Protocol discriminator error

Off-line Viewing. C:\Program Files\GL Communications\Inc\Probe E1 Anz\22 Frames

Filtering and Search

- Isolates required frames from all frames in real-time, as well as offline
- The frames can also be filtered after completion of capture based on C/R, SAPI, TEI, CTL, different ISDN message types and more. Similarly, search capability helps user to search for a particular frame based on specific search criteria

Space Delimited Length List to Exclude

5 7

Exclude FISU Exclude LSSU Clear ALL

Filter Selection

- Q.93x
 - Data Link
 - LAPD
 - C/R
 - SAPI
 - TEI
 - CTL
 - P/F
 - N(S)
 - N(R)
 - FUNC
 - Q.93x Layer 3

CTL Value

- Information
- Supervisory
- Unnumbered

Activate Deactivate

All Selected

Layer	Field	Filter Value
LAPD	C/R	Command(User), Response(Network)
LAPD	CTL	Information, Supervisory, Unnumbered

Conditions for all selections

AND OR Include Exclude Deactivate Sel Deactivate All

Filtering Criteria From Screen Selection

- Allows the user to create filter criteria automatically from the current screen selection

Use Ctrl, Shift for Extended Selection

Information::BCC Message Type

OK Select All Cancel

Analyzer GUI and Protocol Configuration

Save Load Default

Select summary columns to di...
Menu checked options
Protocol standard selection
Network/User side selection
Time Format
View Filter
View Search
TCP Connection Options
Periodic Trace Saving Options
Startup Options
Data Link Groups
View Font Size
INI Decode Options
Define Summary Columns
Aggregate Summary Columns
Capture Options

Filter Selection

- V5 ITU Standard
 - Data Link
 - LAPV5
 - Information
 - Q.93x

Value Selection

Activate Deactivate

All Selected

Layer	Field	Filter Value
Information	BCC Message Type	PROTOCOL ERROR

Conditions for all selections

AND OR Include Exclude Deactivate Sel Deactivate All

Search Options

- Search features helps users to search for a particular frame based on specific search criteria

The screenshot displays the 'Analyzer GUI and Protocol Configuration' window. On the left is a sidebar with various configuration options, including 'View Filter' which is currently selected. The main area is divided into several sections:

- Filter Selection:** A tree view showing protocol layers. 'V5 ITU Standard' is expanded to show 'Data Link' and 'Information'. Under 'Information', 'BCC Message Type' is selected with a red checkmark. Other options include 'CTRL Message Type', 'Cause Type', 'PP Message Type', 'PSTN Message Type', and 'Q.93x'.
- CTRL Message Type Value:** A list box containing 'COMMON CONTROL', 'COMMON CONTROL ACK', 'PORT CONTROL', and 'PORT CONTROL ACK'. Below it are 'Activate' and 'Deactivate' buttons.
- All Selected:** A table showing the current filter configuration.

Layer	Field	Filter Value
Information	BCC Message Type	ALLOCATION REJECT

At the bottom, there are radio buttons for 'Conditions for all selections' (AND/OR) and 'Include/Exclude', along with 'Deactivate Sel' and 'Deactivate All' buttons.

Search Criteria From Screen Selection

- Allows the user to create search criteria automatically from the current screen selection

The image illustrates the process of creating search criteria from a screen selection in a network analyzer. It shows a table of network events, a context menu, a dialog box for selection, and the main configuration window.

✓	1	0	6	00:00:00.000000	15	ALLOCATION REJECT		
✓	1	0	7	00:00:00.000000	15	PORT CONTROL	Search Selected Value	
✓	1	0	8	00:00:00.000000	14	PORT CONTROL ACK	Set Search Criteria as Sel Values	
✓	1	0	9	00:00:00.000000	23	COMMON CONTROL	Set Filter Criteria as Sel Values	
✓	1	0	10	00:00:00.000000	14	COMMON CONTROL A		

The context menu for the selected row includes:

- Search Selected Value
- Set Search Criteria as Sel Values
- Set Filter Criteria as Sel Values

The dialog box "Use Ctrl, Shift for Extended Selection" shows the selected value "Information::CTRL Message Type".

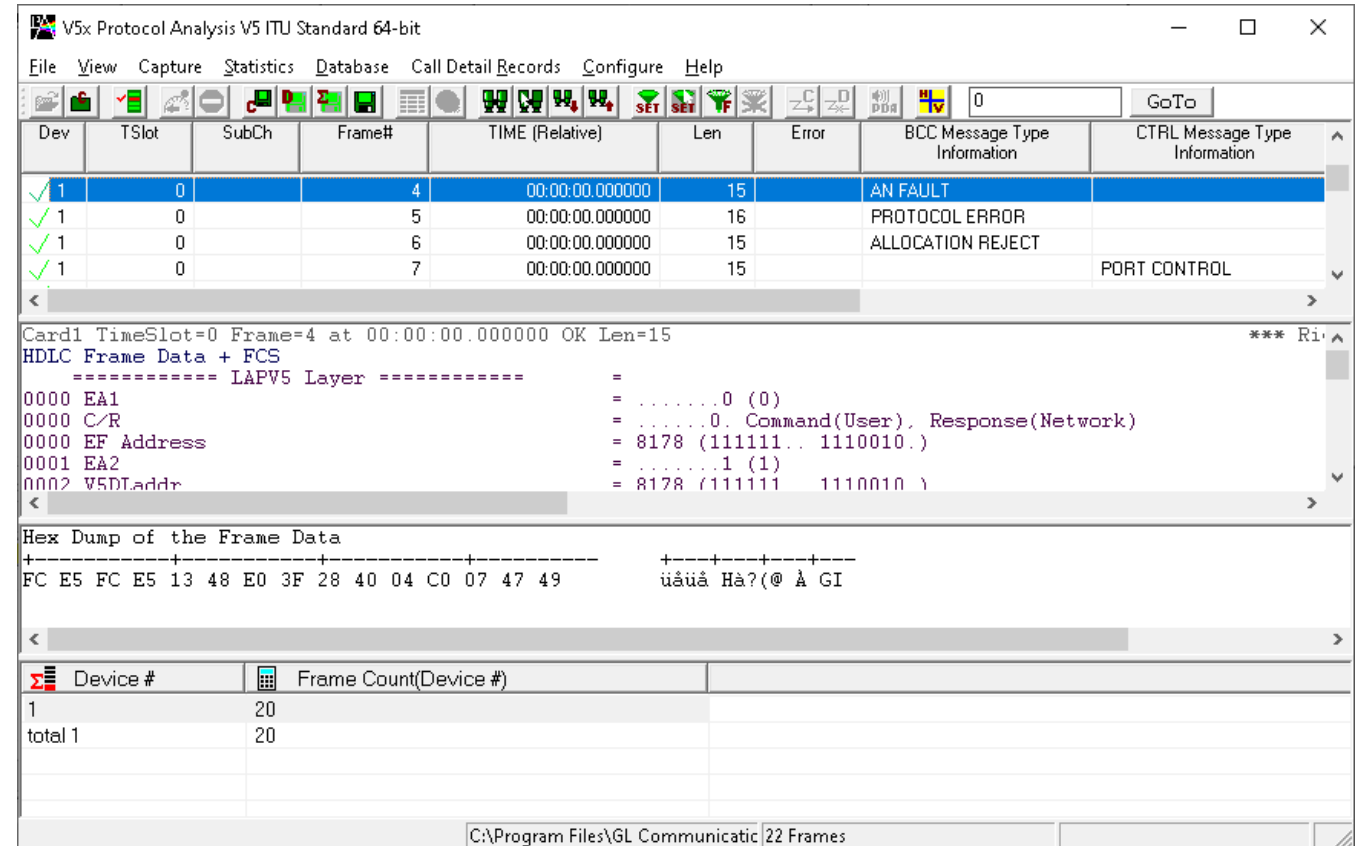
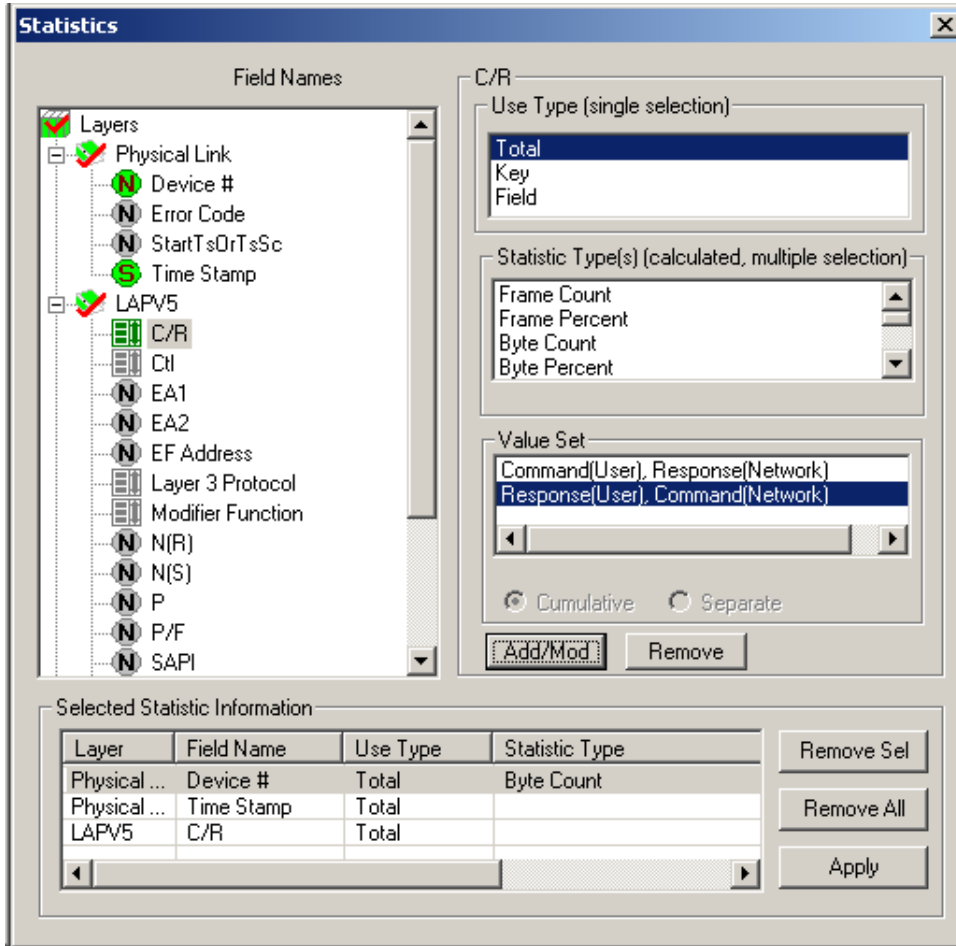
The main window "Analyzer GUI and Protocol Configuration" shows the "Filter Selection" pane with "Information" selected. The "Value Selection" pane is empty. The "All Selected" table is highlighted with a red box:

Layer	Field	Search Value
Information	CTRL Message Type	PORT CONTROL

At the bottom, the "Conditions for all selections" section shows "AND" selected and "Include" selected.

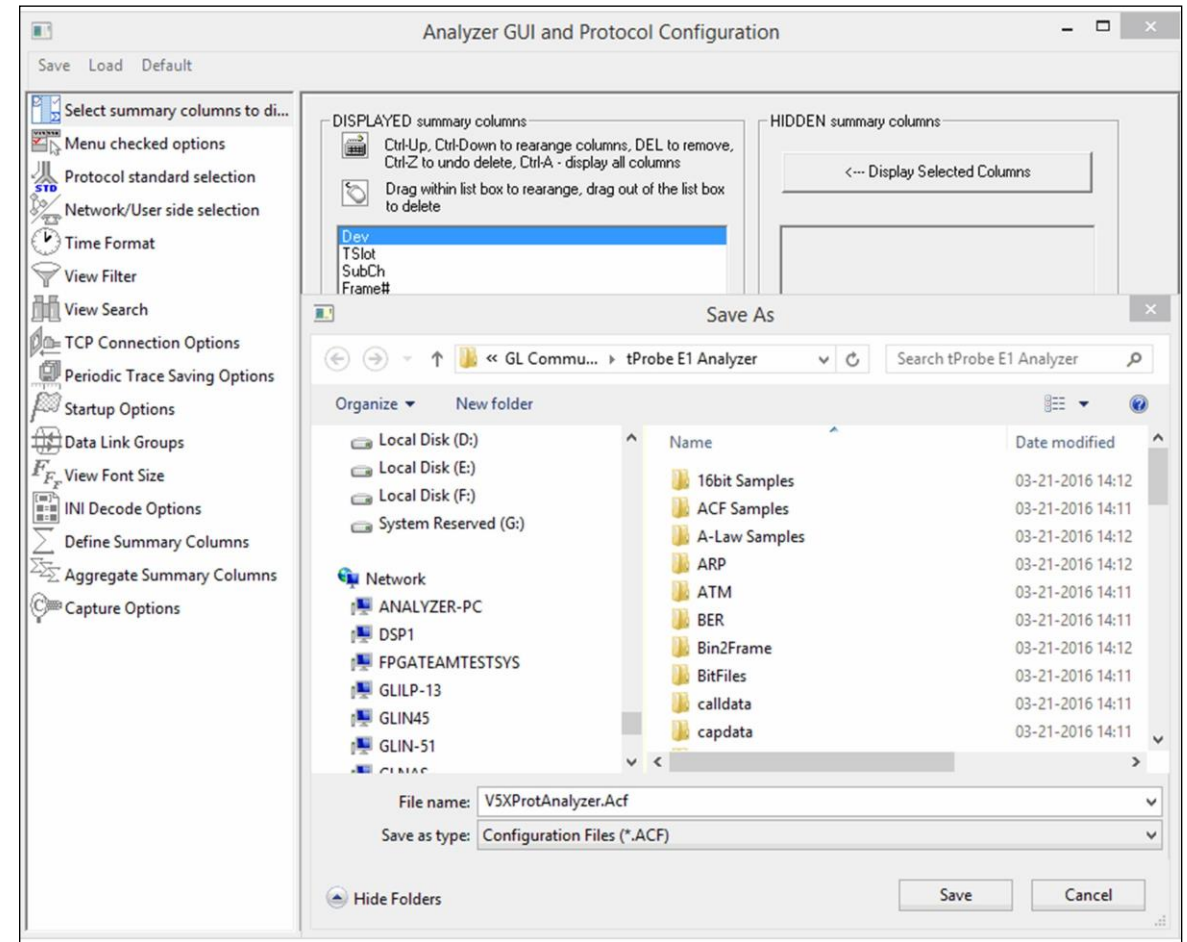
Statistics

- Statistics is an important feature available in V5.x analyzer and can be obtained for all frames both in real-time as well as offline mode



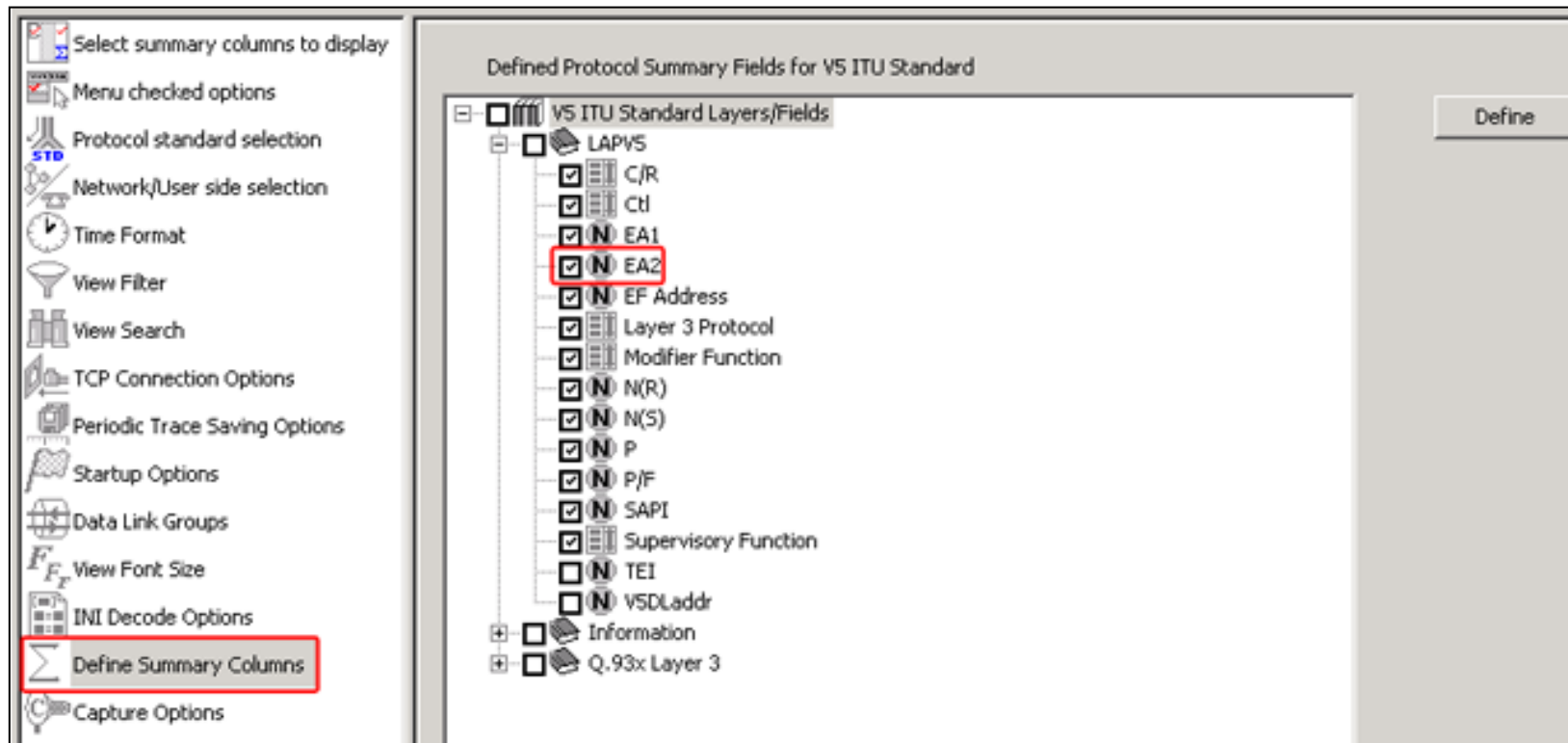
Saving a File

- Captured trace files can be controlled by saving the trace using different conventions such as –
 - Trace files with user-defined prefixes
 - Trace file with date-time prefixes
 - Slider control to indicate the total number of files, file size, frame count, or time limit



Define Summary Columns

- Required protocol fields can be added through Define summary column option
- User can remove the protocol field which is not required



Aggregate Summary Column

- The user can use this option to combine the two or more summary columns and remove unnecessary empty columns into a single Aggregate Summary Column

Selection of Summary Column

Name	Display Format	Summary Columns	Separator
Message Type	Concat	BCC Message Type_Information CTRL Message Type_Information	&

Output display in analyzer

Dev	TSlot	SubCh	Frame#	TIME (Relative)	Len	Message Type	Error	BCC Message Type Information	CTRL Message Type Information
✓ 1	0		0	00:00:00.000000	14	PROTOCOL ERROR		PROTOCOL ERROR	
✓ 1	0		1	00:00:00.000000	15	PROTOCOL ERROR		PROTOCOL ERROR	
✓ 1	0		2	00:00:00.000000	11	AN FAULT ACKNOWLEDGE		AN FAULT ACKNOWLEDGE	
✓ 1	0		3	00:00:00.000000	15	AN FAULT		AN FAULT	
✓ 1	0		4	00:00:00.000000	15	AN FAULT		AN FAULT	
✓ 1	0		5	00:00:00.000000	16	PROTOCOL ERROR		PROTOCOL ERROR	
✓ 1	0		6	00:00:00.000000	15	ALLOCATION REJECT		ALLOCATION REJECT	
✓ 1	0		7	00:00:00.000000	15	PORT CONTROL			PORT CONTROL
✓ 1	0		8	00:00:00.000000	14	PORT CONTROL ACK			PORT CONTROL ACK
✓ 1	0		9	00:00:00.000000	23	COMMON CONTROL			COMMON CONTROL

```
Card1 TimeSlot=0 Frame=0 at 00:00:00.000000 OK Len=14
HDLC Frame Data + FCS
===== LAPV5 Layer =====
0000 EA1 = .....0 (0)
0000 C/R = .....0. Command(User), Response(Network)
0000 EF Address = 8178 (111111.. 1110010.)
0001 EA2 = .....1 (1)
0002 VSDLaddr = 8178 (111111.. 1110010.)
0003 Layer 3 Protocol = 1110010. BCC
0004 Ctl = .....11 Unnumbered
0004 Modifier Function = 000.00.. UI
0004 P/F = ...1.... (1)
===== Information Layer =====
0000 Spare = 11111100 (252)
0001 Spare = 11100101 (229)
0002 BCC Protocol =
0002 Spare = 11111100 (252)
```

Aggregate Summary Column Group

- The user can create multiple aggregate column groups and prioritize the groups as per the requirement to display the summary results efficiently

The screenshot shows the 'Aggregate Summary Columns' dialog box with the following configuration:

Name	Display Format	Summary Columns	Separator
Group~0	<Col_Alias> Value	BCC Message Type_Information CTRL Message Type_Information	&
Group~1	Overlay	Cause Type_Information	
Group~2	Concat		

The 'V5x Protocol Analysis V5 ITU Standard 64-bit' application window displays the following table:

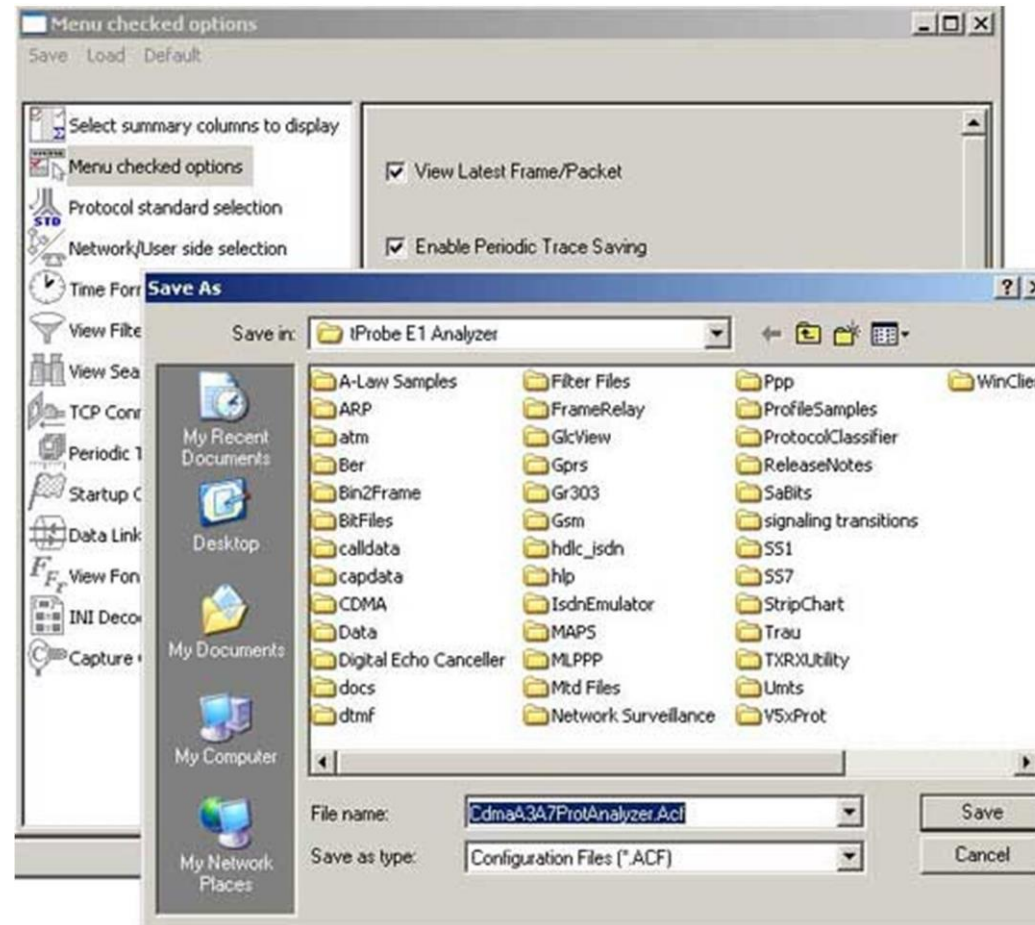
Dev	TSlot	SubCh	Frame#	TIME (Relative)	Len	Group~0	Error	BCC Message Type Information	CTRL Message Information
✓ 1	0		0	00:00:00.000000	14	<BCC Message>PROTOCOL ERROR		PROTOCOL ERROR	
✓ 1	0		1	00:00:00.000000	15	<BCC Message>PROTOCOL ERROR		PROTOCOL ERROR	
✓ 1	0		2	00:00:00.000000	11	<BCC Message>AN FAULT ACKNOWLEDGE		AN FAULT ACKNOWLEDGE	
✓ 1	0		3	00:00:00.000000	15	<BCC Message>AN FAULT		AN FAULT	
✓ 1	0		4	00:00:00.000000	15	<BCC Message>AN FAULT		AN FAULT	
✓ 1	0		5	00:00:00.000000	16	<BCC Message>PROTOCOL ERROR		PROTOCOL ERROR	
✓ 1	0		6	00:00:00.000000	15	<BCC Message>ALLOCATION REJECT		ALLOCATION REJECT	
✓ 1	0		7	00:00:00.000000	15	<CTRL Message>PORT CONTROL			PORT CONTROL
✓ 1	0		8	00:00:00.000000	14	<CTRL Message>PORT CONTROL ACK			PORT CONTROL ACK
✓ 1	0		9	00:00:00.000000	23	<CTRL Message>COMMON CONTROL			COMMON CONTROL
✓ 1	0		10	00:00:00.000000	14	<CTRL Message>COMMON CONTROL ACK			COMMON CONTROL ACK
✓ 1	0		11	00:00:00.000000	14				

Below the table, the HDLC frame data is displayed:

```
Card1 TimeSlot=0 Frame=0 at 00:00:00.000000 OK Len=14
HDLC Frame Data + FCS
===== LAPV5 Layer =====
0000 EA1 = .....0 (0)
0000 C/R = .....0 Command(User), Response(Network)
0000 EF Address = 8178 (111111.. 1110010.)
0001 EA2 = .....1 (1)
0002 V5DLaddr = 8178 (111111.. 1110010.)
0003 Layer 3 Protocol = 1110010. BCC
0004 Ctl = .....11 Unnumbered
0004 Modifier Function = 000.00.. UI
0004 P/F = ...1.... (1)
===== Information Layer =====
0000 Spare = 11111100 (252)
0001 Spare = 11100101 (229)
```

Save/Load All Configuration Settings

- Protocol Configuration window provides a consolidated interface for all the settings required in the analyzer such as protocol selection, filter criteria, search criteria, and so on
- Configuration settings can be saved to a file, loaded from a configuration file, or user may just revert to the default values using the default option



Thank you