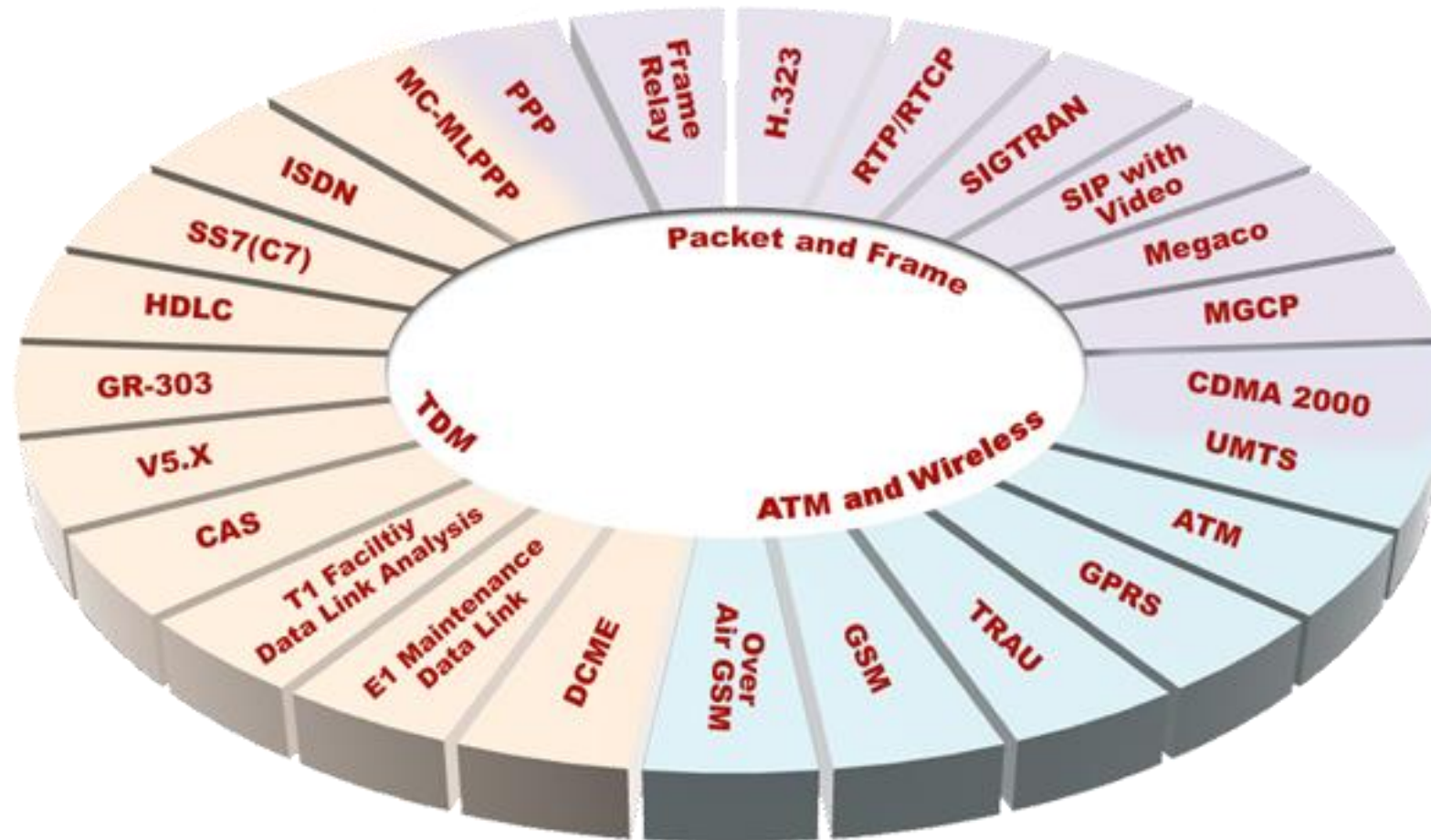

GR303 Protocol Analyzer



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Phone: (301) 670-4784 Fax: (301) 670-9187 Email: info@gl.com
Website: <https://www.gl.com>

TDM, Wireless, and VoIP Protocol Analysis

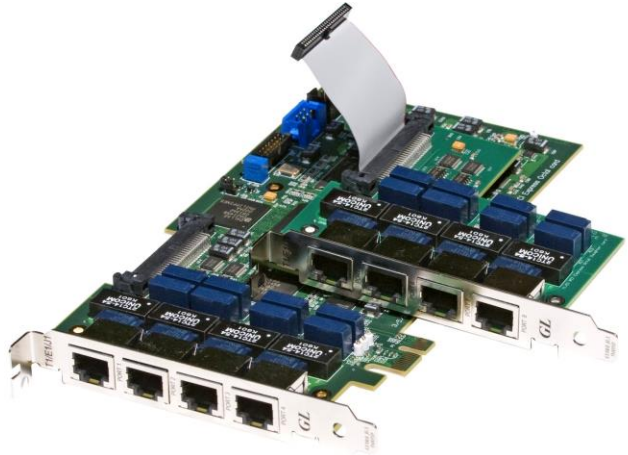
- GL Communications provides a host of protocol analyzers for testing a variety of protocols
- Analysis may be done both in real-time and off-line



Supported Platforms



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

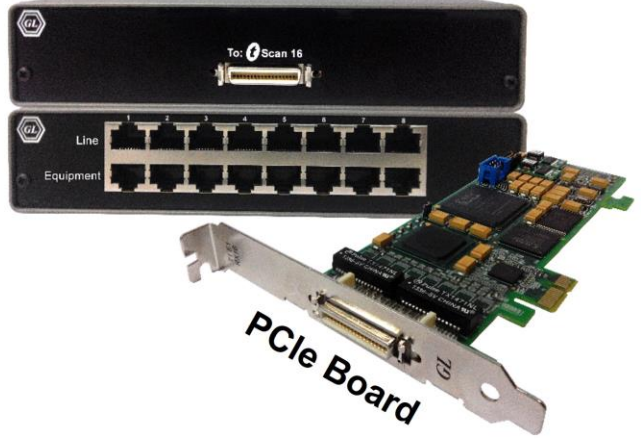


Quad / Octal T1 E1 PCIe Card



Dual T1 E1 Express (PCIe) Board

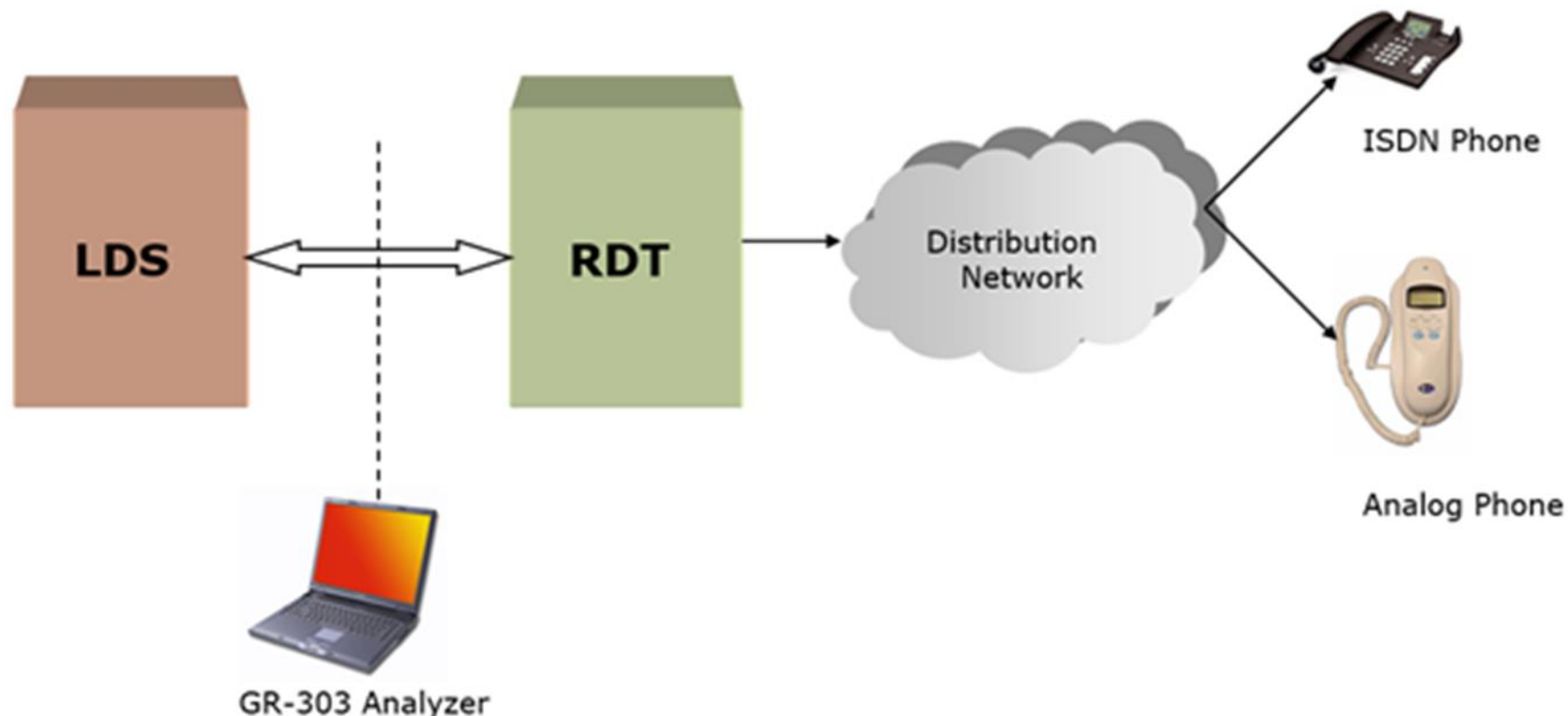
tScan16™ with 16-port T1 E1 Breakout Box



PCIe Board

Overview

- GL's GR303 Analyzer offers testing for all aspects of GR-303 systems: monitoring T1 Line, monitoring the TMC/CSC control channel, monitoring EOC channel, viewing robbed ABCD signaling and dialed digits, listening to voice channels, and thorough tests for the physical layer
- The GR-303 option troubleshoots signaling problems between the switch and remote terminal to determine call status, monitor for any dropped calls, detect any abnormal conditions, and identify when service was unavailable



Supported Protocol Standards

Supported Protocols	Specification Used
LAPD	CCITT (Q.920/Q.921) Telcordia GR-303-IMD (formerly TR-TSY-000303)
TMC and CSC	GR-303-CORE Issue 3 December 1999 / GR-303-IMD Issue 1, December 1998
EOC	GR-303-CORE Issue 3 December 1999
Series X (Data networks and open system communication)	X.208, X.209, X.219, X.229, X.710, and X.711.

Features

- Summary View displays the SAPI, TEI, C/R, Message type (for TMC/CSC) and ROSE APDU (for EOC) 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 particular 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
- Monitor both TMC/CSC and EOC simultaneously to correlate call-setup and OAM&P
- 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

GR-303 Protocol Analysis GR-303 64-bit

File View Capture Statistics Database Call Detail Records Configure Help

0 GoTo

Dev	TSlot	SubCh	Frame#	TIME (Relative)	Len	Error	Message Type GR303 TMC/CSC	Call Reference Value GR303 TMC/CSC
✓ 2	23		1110	00:00:45.933750	17		CONNECT	179
✓ 1	23		1111	00:00:45.938000	6			
✓ 1	23		1112	00:00:46.057875	17		CONNECT ACKNOWLEDGE	179
✓ 1	23		1113	00:00:46.066875	6			
✓ 1	23		1114	00:00:46.074875	6			

Card2 TimeSlot=23 Frame=1110 at 00:00:45.933750 OK Len=17 *** Right click t

HDLC Frame Data + FCS

```

----- LAPD Layer -----
0000 C/R          = .....1. Response(User), Command(Network)
0000 SAPI        = 000000.. (0)
0001 TEI         = 0000000. (0)
0002 Ctl         = .....0 Information
0002 N(S)        = 0010100 (20)
    
```

Hex Dump of the Frame Data

```

+-----+-----+-----+-----+-----+-----+-----+-----+
02 01 28 50 4F 02 05 98 07 18 04 69 8A 83 8E 59      (PO | iIIIY
13
    
```

Device #	Frame Count(Device #)
1	996
total 1	996
2	240
total 2	240

Call ID	Call Status	Call Start Date & Time	Call Duration	Release Complete Cause	DevNo	TS	CRV
0	completed	2001-04-03 18:30:47.947500	00:00:10.415500	Normal Clearing	1	23	179
1	completed	2001-04-03 18:31:27.988750	00:00:04.705500	Temporary Failure	1	23	179
2	completed	2001-04-03 18:31:29.231875	00:00:02.922250	Invalid Call Reference	1	23	179

C:\Program Files\GL Communications | 1 236 Frames

Summary View

Detail View

Hex Dump View

Statistics View

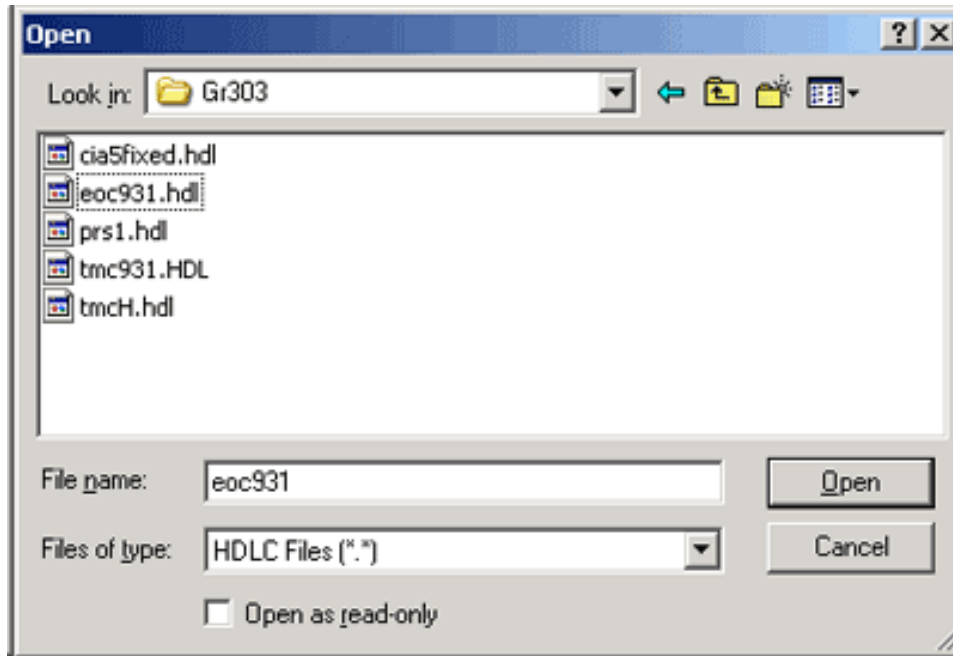
Call Trace View

Different Views

- The analyzer displays Summary, Detail, and Hex dump View in different panes. The Summary View displays Frame Number, C/R, SAPI, CTL, P/F, FUNC, CRV message type (for TMC/CSC) and ROSE APDU (for EOC) and more
- 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



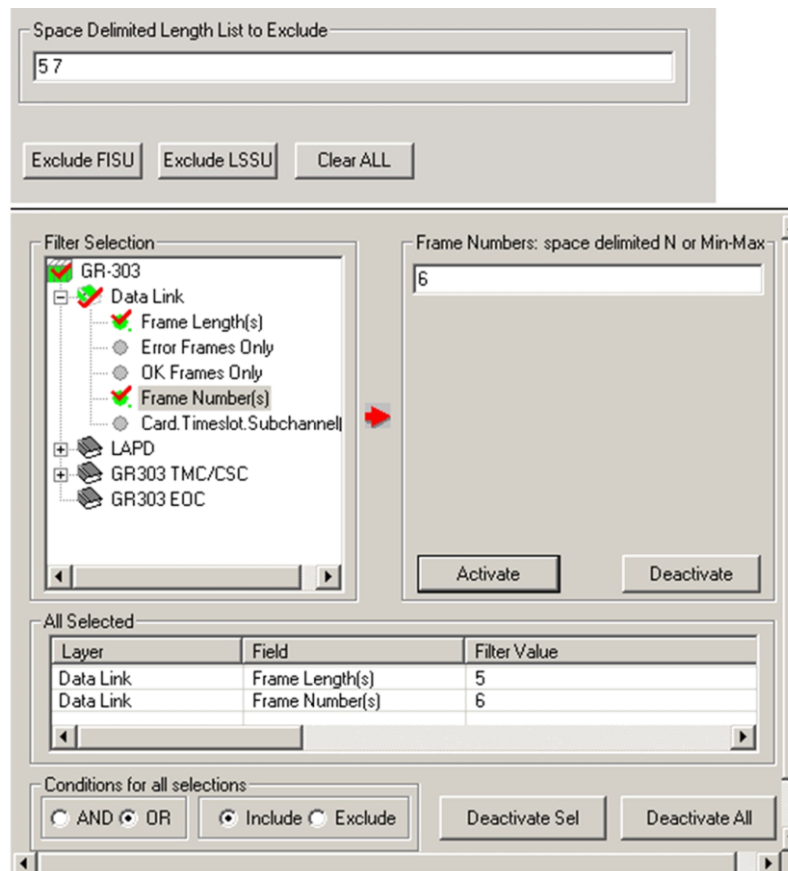
Dev	TSlot	SubCh	Frame#	TIME (Relative)	Len	Error	Message Type GR303 TMC/CSC	Call Reference Value GR303 TMC/CSC
2	23		1110	00:00:45.933750	17		CONNECT	179
1	23		1111	00:00:45.938000	6			
1	23		1112	00:00:46.057875	17		CONNECT ACKNOWLEDGE	179
1	23		1113	00:00:46.066875	6			
1	23		1114	00:00:46.074875	6			

Device #	Frame Count(Device #)
1	996
total 1	996
2	240
total 2	240

Call ID	Call Status	Call Start Date & Time	Call Duration	Release Complete Cause	DevNo	TS	CRV
0	completed	2001-04-03 18:30:47.947500	00:00:10.415500	Normal Clearing	1	23	179
1	completed	2001-04-03 18:31:27.988750	00:00:04.705500	Temporary Failure	1	23	179
2	completed	2001-04-03 18:31:22.221875	00:00:02.822500	Invalid Call Reference	1	23	179

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 Frame Number, Time, Length, Error, C/R, SAPI, and more Similarly, search capability helps user to search for a particular frame based on specific search criteria



Filtering Criteria From Screen Selection

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

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

Use Ctrl, Shift for Extended Selection

GR303 TMC/CSC::Call Reference Value
GR303 TMC/CSC::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

- GR-303
 - Data Link
 - LAPD
 - GR303 TMC/CSC
 - GR303 EOC

Value Selection

Activate Deactivate

Layer	Field	Filter Value
GR303 TMC/CSC	Call Reference Value	179
GR303 TMC/CSC	Message Type	CONNECT

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 shows the 'Analyzer GUI and Protocol Configuration' window. The left sidebar contains various configuration options, with 'View Search' highlighted. The main area is divided into 'Filter Selection' and 'Value Selection' panels. The 'Filter Selection' panel shows a tree view with 'GR-303' selected, and its sub-items 'Data Link', 'LAPD', 'GR303 TMC/CSC', and 'GR303 EOC'. A red arrow points from the 'GR303 TMC/CSC' item to the 'Value Selection' panel. The 'Value Selection' panel is currently empty and has 'Activate' and 'Deactivate' buttons. Below these panels is an 'All Selected' table with the following data:

Layer	Field	Search Value
GR303 TMC/CSC	Message Type	SETUP

At the bottom, there are radio buttons for 'Conditions for all selections': 'AND' (selected) and 'OR', and 'Include' (selected) and 'Exclude'. There are also 'Deactivate Sel' and 'Deactivate All' buttons.

Search Criteria From Screen Selection

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

Dev	TSlot	SubCh	Frame#	TIME (Relative)	Len	Error	Message Type GR303 TMC/CSC	Call Reference Value GR303 TMC/CSC
✓ 1	23		101	00:00:03.771750	6			
✓ 1	23		102	00:00:03.783000	6			
✓ 2	23		103	00:00:03.783375	17		CONNECT	179
✓ 1	23		104	00:00:03.791250	6			
✓ 1	23		105	00:00:03.796500	15		SETUP	179
✓ 1	23		106	00:00:03.831750	17		CONNECT ACKNOWLEDG	
✓ 2	23		107	00:00:03.890125	6			
✓ 2	23		108	00:00:03.918875	6			
✓ 2	23		109	00:00:03.919875	6			

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

Use Ctrl, Shift for Extended Selection

GR303 TMC/CSC::Call Reference Value
GR303 TMC/CSC::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

- GR-303
 - Data Link
 - LAPD
 - GR303 TMC/CSC
 - GR303 EOC

Value Selection

Activate Deactivate

All Selected

Layer	Field	Search Value
GR303 TMC/CSC	Message Type	SETUP

Conditions for all selections

AND OR Include Exclude Deactivate Sel Deactivate All

Statistics

- Important call specific parameters such as Call ID, Call Status, Call duration, CRV, Release Cause etc. are calculated and displayed in the Call Detail View. Additionally, users are provided with the option to search a particular call detail record from the captured traces

The screenshot shows the 'Statistics' dialog box in the 'LAK-SIJ Protocol Analysis LAK-SIJ' application. The dialog box is configured with the following settings:

- Field Names:** IE Identifier(NI), IE Identifier(R), IE Identifier(S), IE Identifier(Sw), IE Keypad Facility Length, IE Notification Ind Length, IE Reserved Length, IE Signal Length, IE Switchhook Length, Info Channel selection, Information transfer capability, Information transfer rate, Interface Type, Interface identifier present, Keypad Information, Location, Message Type, Notification Description.
- Message Type:** Use Type (single selection): Total, Key, Field.
- Statistic Type(s) (calculated, multiple selection):** Frame Count, Frame Percent, Byte Count, Byte Percent.
- Value Set:** RELEASE COMPLETE, SETUP, SETUP ACKNOWLEDGE, STATUS.
- Options:** Cumulative (checked), Separate (unchecked).

The application interface shows a table of captured frames with the following columns: Dev, TS, S, Frame#, TIME (Relative), Len, C/R, SAPI, TEI, CTL, P/F, N(S), N(R), Message Type.

Dev	TS	S	Frame#	TIME (Relative)	Len	C/R	SAPI	TEI	CTL	P/F	N(S)	N(R)	Message Type
1	0	0	0	00:00:00.000000	15	Comma...	0	0	Information	0	40	42	SETUP
2	0	1	1	00:00:00.007500	6	Comma...	0	0	Supervis...	0		41	
2	0	2	2	00:00:00.096875	17	Respon...	0	0	Information	0	42	41	CONNECT
1	0	3	3	00:00:00.101125	6	Respon...	0	0	Supervis...	0		43	
1	0	4	4	00:00:00.134000	17	Comma...	0	0	Information	0	41	43	CONNECT ACKNOWLE

Below the frame table is a summary table:

Device #	Message Ty...	Frame Count(Message Ty...
1	SETUP (5)	2
1	CONNECT (7)	1
1	CONNECT ACKN...	2
1	RELEASE (7)	3
total 1	Total	8
2	SETUP (5)	1
2	CONNECT (7)	2
2	DISCONNECT (6)	3
2	RELEASE COMP...	3
total 2	Total	9

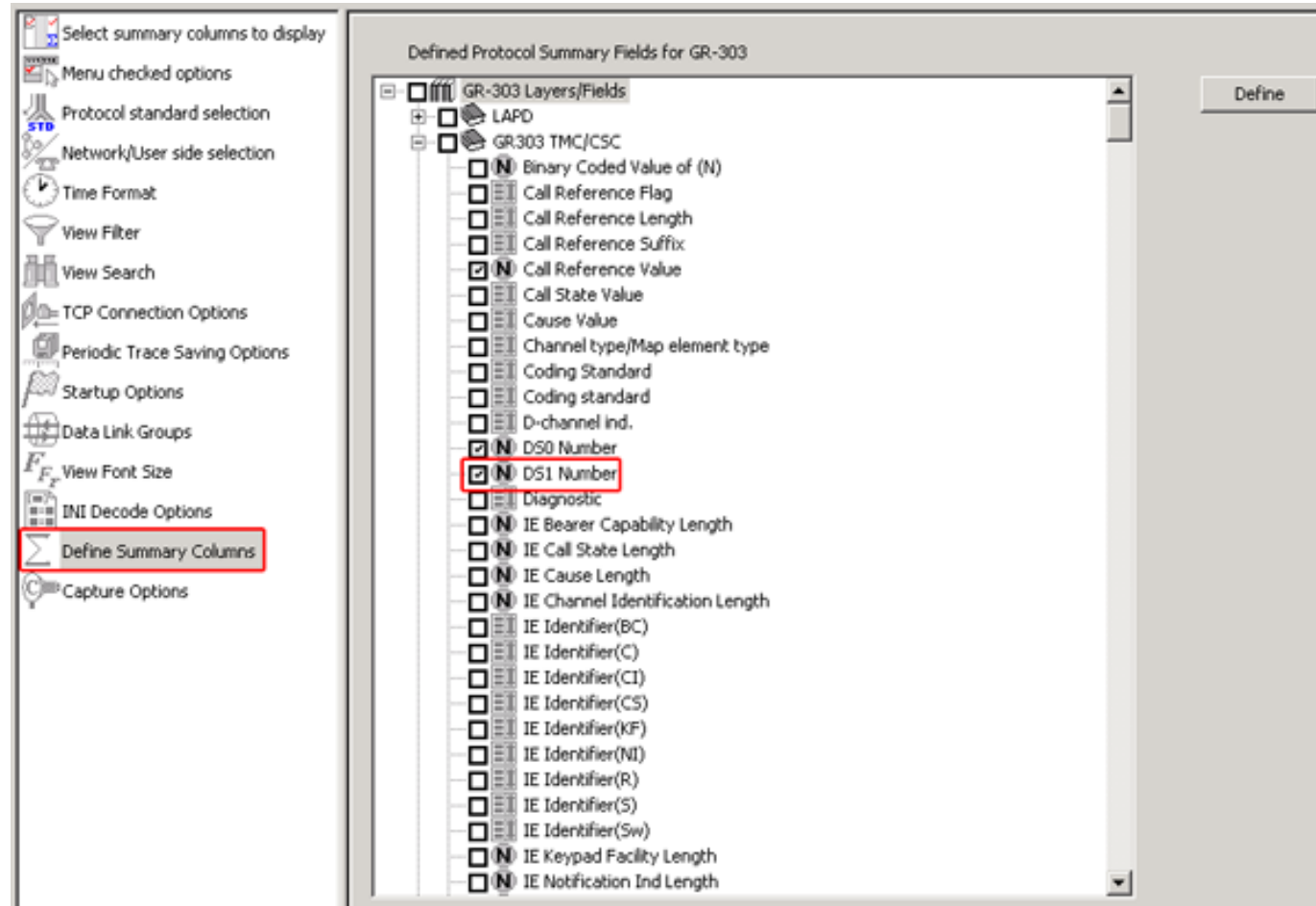
At the bottom, there is a table with columns: Call ID, Call Status, Call Start Date & Time, Call Duration, Release Complete Cause, DevNo, TS, CRV.

Call ID	Call Status	Call Start Date & Time	Call Duration	Release Complete Cause	DevNo	TS	CRV
0	completed	1601-01-01 00:00:00.475250	00:00:24.118500	Normal Clearing	1	0	4
1	completed	1601-01-01 00:00:04.094750	00:00:21.794250	Normal Clearing	2	0	8
2	completed	1601-01-01 00:00:25.334250	00:00:01.130875	Normal Clearing	1	0	4

The status bar at the bottom indicates: D:\Program Files\GL Communications\36 Frames

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

The image shows two overlapping windows from a network analysis tool. The top window is the 'Aggregate Summary Columns' dialog, which allows users to define how data is summarized. It has a menu on the left with options like 'Select summary columns to di...', 'Menu checked options', 'Protocol standard selection', etc. The main area of the dialog contains a table with columns: Name, Display Format, Summary Columns, and Separator. One entry is visible: Name: 'Message Type', Display Format: 'Concat', Summary Columns: 'Call Reference Value_GR303 TMC/CSC' and 'Message Type_GR303 TMC/CSC', Separator: '&'. Below the dialog is the main application window titled 'GR-303 Protocol Analysis GR-303 64-bit'. It features a menu bar (File, View, Capture, Statistics, Database, Call Detail Records, Configure, Help) and a toolbar. The main display area is a table with columns: Dev, TSlot, SubCh, Frame#, TIME (Relative), Len, Message Type, Error, Message Type GR303 TMC/CSC, and Call Reference Value GR303 TMC/CSC. A red box highlights the 'Message Type' column. Below the table, there is a detailed view of a frame: 'Card1 TimeSlot=23 Frame=101 at 00:00:03.771750 OK Len=6'. The data is shown in a hex dump format with corresponding ASCII values and protocol layer information (HDLC Frame Data + FCS, LAPD Layer, C/R, SAPI, TEI, Ctl, Supervisory Function, P/F, N(R)).

Name	Display Format	Summary Columns	Separator
Message Type	Concat	Call Reference Value_GR303 TMC/CSC Message Type_GR303 TMC/CSC	&

Dev	TSlot	SubCh	Frame#	TIME (Relative)	Len	Message Type	Error	Message Type GR303 TMC/CSC	Call Reference Value GR303 TMC/CSC
✓ 1	23		101	00:00:03.771750	6				
✓ 1	23		102	00:00:03.783000	6				
✓ 2	23		103	00:00:03.783375	17	179 & CONNECT		CONNECT	179
✓ 1	23		104	00:00:03.791250	6				
✓ 1	23		105	00:00:03.796500	15	179 & SETUP		SETUP	179
✓ 1	23		106	00:00:03.831750	17	179 & CONNECT ACKNOWLEDGE		CONNECT ACKNOWLEDGE	179
✓ 2	23		107	00:00:03.890125	6				
✓ 2	23		108	00:00:03.918875	6				
✓ 2	23		109	00:00:03.919875	6				
✓ 2	23		110	00:00:03.920875	6				
✓ 1	23		111	00:00:03.936500	6				
✓ 1	23		112	00:00:04.135000	6				
✓ 1	23		113	00:00:04.180125	6				
✓ 1	23		114	00:00:04.241250	6				

```
Card1 TimeSlot=23 Frame=101 at 00:00:03.771750 OK Len=6
HDLC Frame Data + FCS
===== LAPD Layer =====
0000 C/R = .....1. Response(User), Command(Network)
0000 SAPI = 000000.. (0)
0001 TEI = 000000.. (0)
0002 Ctl = .....01 Supervisory
0002 Supervisory Function = .....00.. RR
0003 P/F = .....0 (0)
0003 N(R) = 011111.. (63)
```


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 image shows two windows from a network analysis tool. The top window is titled 'Aggregate Summary Columns' and contains a table with the following data:

Name	Display Format	Summary Columns	Separator
Group~0	<Col_Alias>Value	Message_Type_GR303 TMC/CSC Call Reference Value_GR303 TMC/CSC	--->
Group~1	Concat	Cause Value_GR303 TMC/CSC	&
Group~2	Overlay	Message_Type_GR303 TMC/CSC	

The bottom window is titled 'GR-303 Protocol Analysis GR-303 64-bit' and displays a table of network data. A red box highlights the 'Group~0' column in the table below:

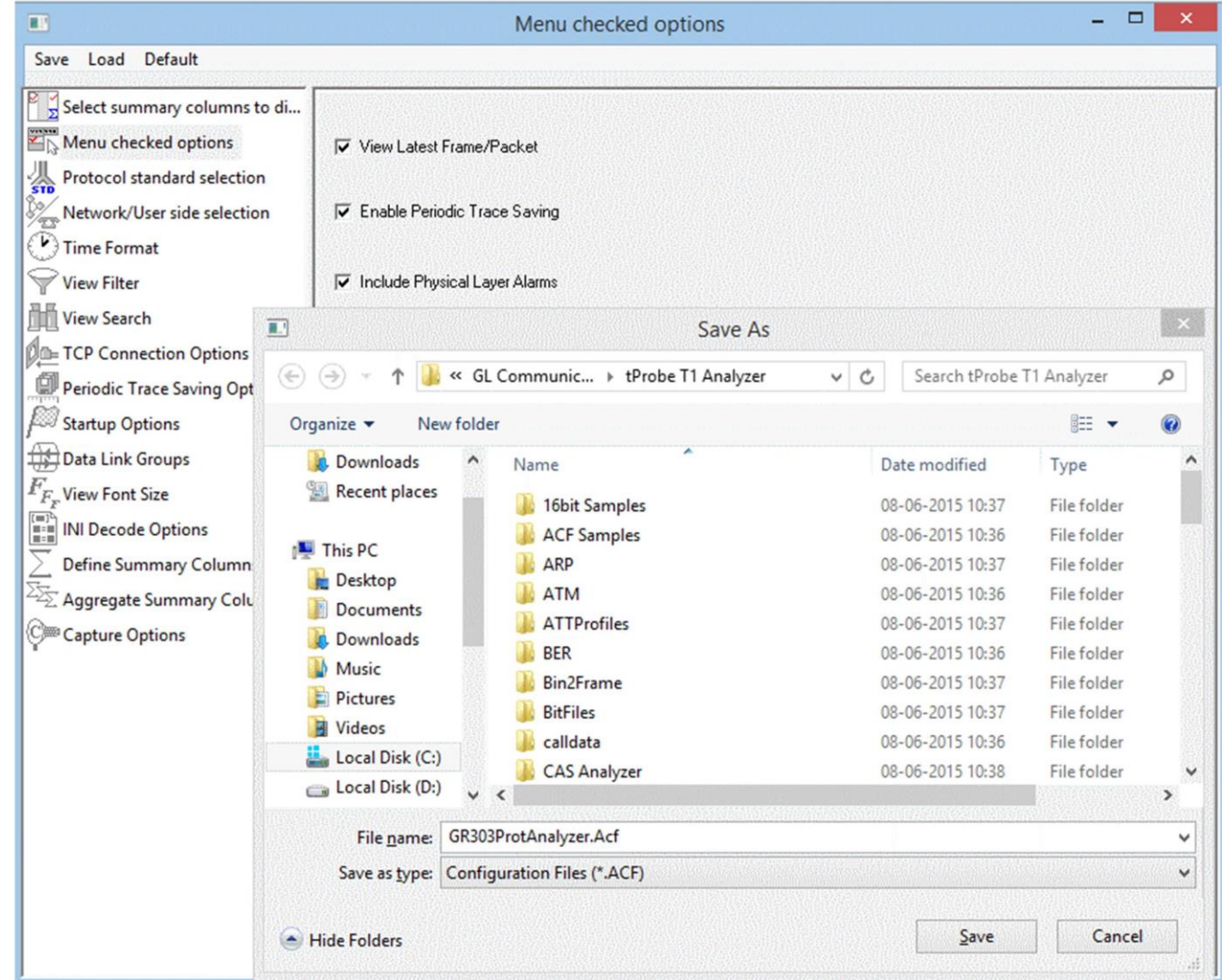
Dev	TSlot	SubCh	Frame#	TIME (Relative)	Len	Group~0	Error	Message Type GR303 TMC/CSC
✓ 2	23		103	00:00:03.783375	17	<Message Type>CONNECT--><CRV>179		CONNECT
✓ 1	23		104	00:00:03.791250	6			
✓ 1	23		105	00:00:03.796500	15	<Message Type>SETUP--><CRV>179		SETUP
✓ 1	23		106	00:00:03.831750	17	<Message Type>CONNECT ACKNOWLEDGE--><CRV>179		CONNECT ACKNOWLEDGE
✓ 2	23		107	00:00:03.891250	6			

Below the table, the 'HDLC Frame Data + FCS' section shows the following details:

```
Card2 TimeSlot=23 Frame=103 at 00:00:03.783375 OK Len=17
HDLC Frame Data + FCS
===== LAPD Layer =====
0000 C/R = .....1. Response(User), Command(Network)
0000 SAPI = 000000.. (0)
0001 TEI = 000000.. (0)
0002 Ctl = .....0 Information
0002 N(S) = 100000.. (64)
0003 P = .....0 (0)
0003 N(R) = 010101.. (45)
===== GR303 TMC/CSC Layer =====
0004 Protocol Discriminator = 01001111 National Use
0005 Call Reference Length = ....0010 in octets
0006 Call Reference Value = 179 (.0000101 10011...)
0007 Call Reference Suffix = .....000 line termination only supports one call at a time
0008 Message Type = 00000111 CONNECT
0009 IE Identifier(CI) = 00011000 Channel Identification
000A IE Channel Identification Length = 4 (x04)
000B Info Channel selection = .....01 As indicated in following octets
000B D-channel ind. = .....0.. Not D Channel
000B Pref/Excl = ...1... Exclusive
000B Interface Type = ..1.... Other interface
000B Interface identifier present = 1 Interface explicitly identified
```

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!