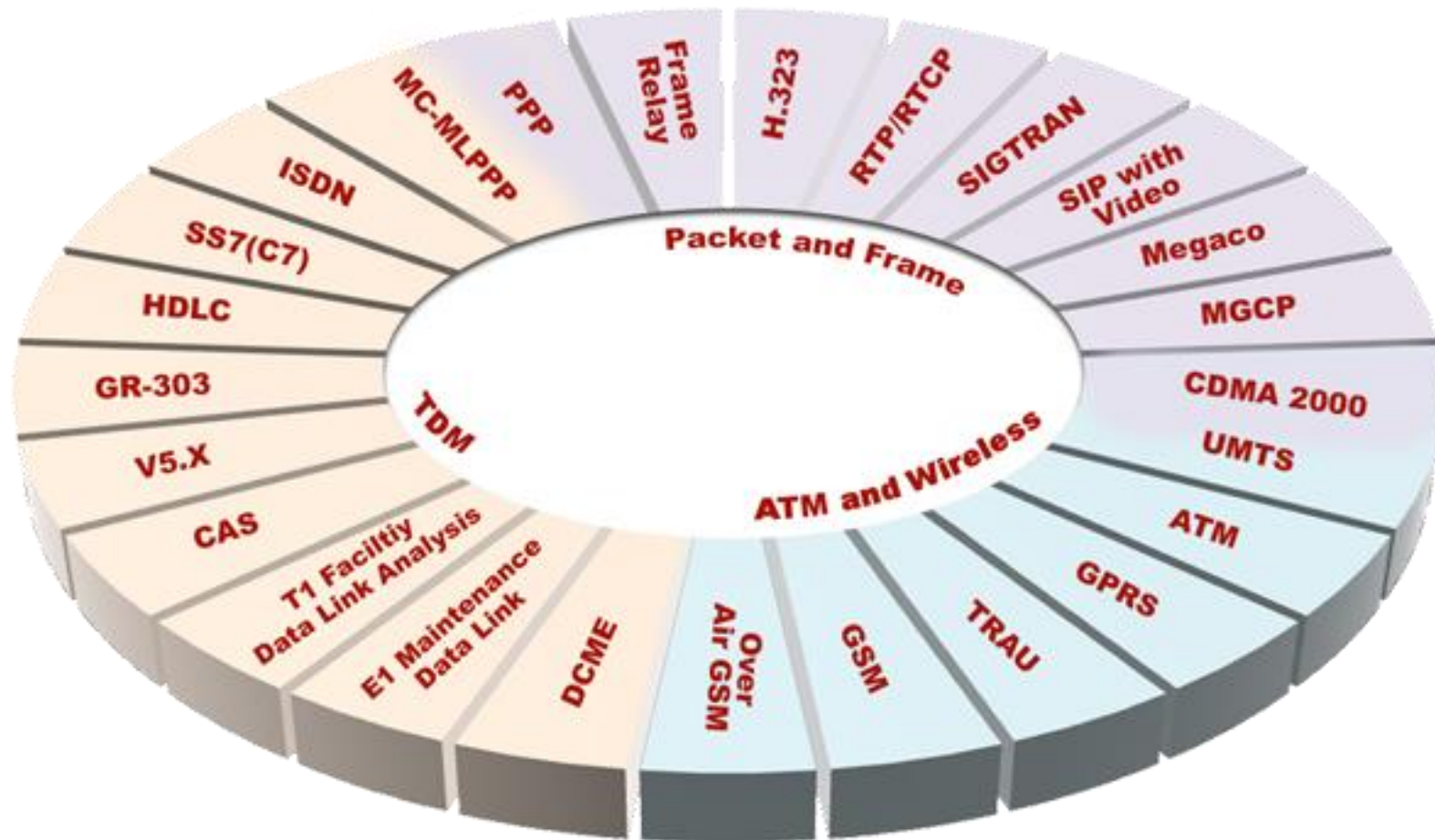

GPRS Protocol Analyzer



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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



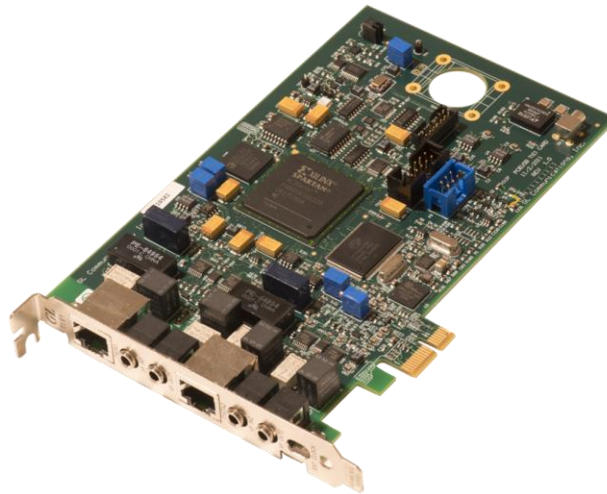
Front Panel

Back Panel

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

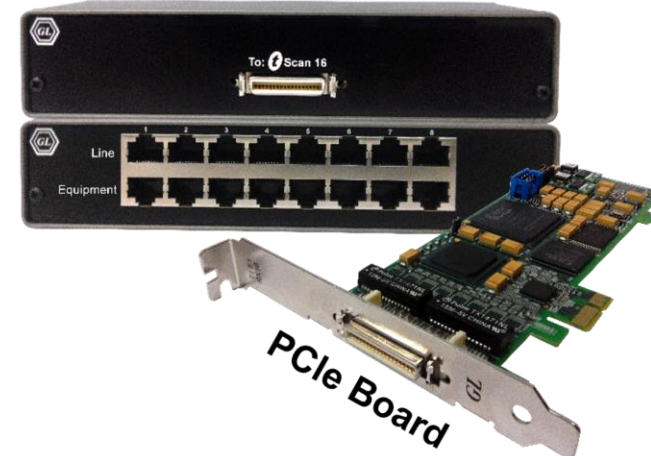


Quad / Octal T1 E1 PCIe Card



Dual T1 E1 Express (PCIe) Board

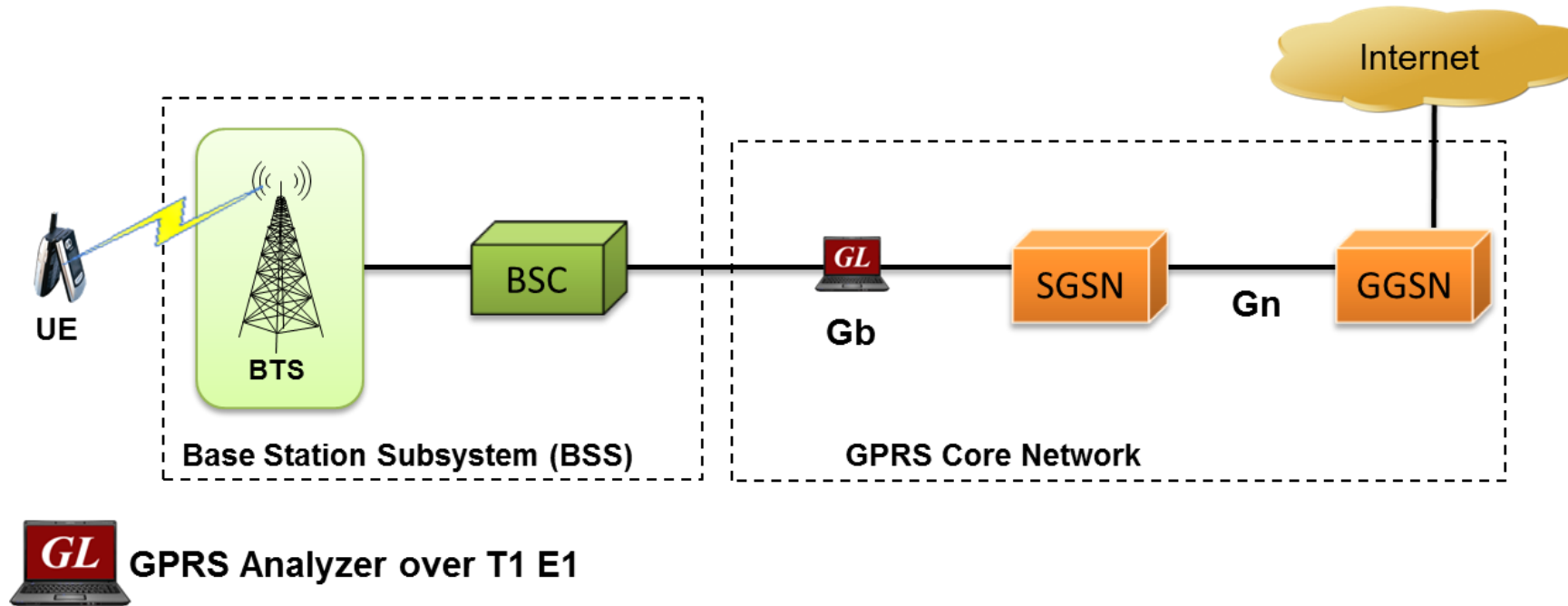
**tScan16™ with
16-port T1 E1 Breakout Box**



PCIe Board

Overview

- GL's GPRS Analyzer performs real time (and offline) analysis across the Gb (T1 E1) interface. The GPRS Analyzer when connected between SGSN and BSS elements of a GPRS network permits the monitoring of Gb interface



Supported Protocol Standards

Supported Protocols	Specification Used
LAPF	Q.922
BSSGP	3GPP TS 08.18 V8.10.0
LLC	3GPP TS 04.64 V8.7.0
GMM	3GPP TS 04.08 V7.19.0
SMS	3GPP TS 03.40 V7.5.0 / GSM 03.38 version 7.2.0
TOM	3GPP TS 04.64 V8.7.0 (2001-12)-Annex B
SNDCP	3GPP TS 04.64 V8.7.0
SMG	3GPP TS 04.08 V7.19.0
NS	GSM 8.16 ETSI TS 101 299 V8.0.0
IP	RFC 791
TCP	RFC 793
UDP	RFC 768
LLC	3GPP TS 04.64 V8.7.0
MAC	IEEE 802.3
ICMP	RFC 792
GTP / GTPv2 / GTP'	3GPP TS 09.60 V7.9.0 / 3GPP TS 29.060 V6.5.0 / 3GPP TS 32.005 V3.7.0 and 3GPP TS 32.015 V3.12.0

Features

- Summary View displays GB Interface information such as DLCI, FECN, BECN, SAPI, CTL, Session Mgmt Message 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
- Supports filtering and search based on Gb Interface parameters such as Data Link, Network Service, BssGp, LLC, Gprs Mobility/Session Mgmt, SMS, TOM and SNDCCP
- 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
- 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

GPRS PR GB Protocol Analysis GB Interface 64-bit

File View Capture Statistics Database Call Detail Records Configure Help

0 GoTo

Dev	TSlot	SubCh	Frame#	TIME (Relative)	Len	Error	TLLI value BssGp	TMSI BssGp	IMSI Identity BssGp	Mobile Gt
✓ 2	0-23		3	00:00:00.548666	71		3780573050		466921201213076	xE15CD4
✓ 2	0-23		4	00:00:00.586213	19		2699313018			
✓ 2	0-23		5	00:00:00.764218	19		3779520890			
✓ 2	0-23		6	00:00:00.878963	26		3780452986			
✓ 2	0-23		7	00:00:01.091817	71		3780475770		466921304859061	xE15CE0

Card2 TimeSlots=0-23 Frame=3 at 00:00:00.548666 OK Len=71 *** Right click to SHOW/HIDE layer

HDLC Frame Data + FCS

===== LAPF Layer =====

0000 EA0 = 0 (0)

0000 C/R = 0. Command(User). Response(Network)

0000 DLCI = 172 (001010... 1100....)

0001 EA1 = 1 (1)

Hex Dump of the Frame Data

Hex	ASCII
28 C1 00 00 00 74 00 E1 56 F7 7A 00 00 21 16 82	(A t áV+z ! I
03 E8 13 88 13 33 82 2A 09 89 28 00 0D 88 49 66	è I 3I* I(IIf
29 21 10 12 03 67 0E 9D 41 C0 15 08 09 00 49 64)! g AA Id
2C 28 02 FF 02 10 00 00 00 10 0E F4 F1 5C 04 2A	2\ 2 Á Á Á Á

Device #	Frame Count(Device #)
2	192
total 2	192

Call ID	Call Status	DevNo	TS	Call Start Date & Time	Call Duration	BVCI	TLLI	IMSI	Call Type
A 0	active	2	0	2004-03-03 20:08:19.885645	00:00:27.521911	116	3780...		PTMSI Re...
A 1	active	2	0	2004-03-03 20:08:20.428796	00:00:26.978760	384	3780...		PTMSI Re...
A 2	active	2	0	2004-03-03 20:08:22.184479	00:00:25.223078	72	3779...		PTMSI Re...
A 3	active	2	0	2004-03-03 20:08:23.064062	00:00:24.343494	402	2706		PTMSI Re...

C:\Program Files\GL Communications Inc\Us 192 Frames

Summary View

Detail View

Hex Dump View

Statistics View

Call Trace View

Different Views

- Summary View displays GB Interface information such as DLCI, FECN, BECN, SAPI, CTL, Session Mgmt Message etc. in a tabular form
- 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

The screenshot displays the GPRS PR GB Protocol Analysis GUI. On the left, an 'Open' dialog box is open, showing a file explorer view of the 'GPRS' directory. It lists three HDL files: 'Gprs_Gb_Capt1.hdl', 'Gprs_Gb_Capt2.HDL', and 'GPRS_Gb_Test1.hdl'. Below the file list, there are fields for 'File name:' and 'Files of type:' (set to 'HDL Files (*.*)').

The main window of the GPRS PR GB Protocol Analysis GB Interface 64-bit is visible. It features a menu bar (File, View, Capture, Statistics, Database, Call Detail Records, Configure, Help) and a toolbar. The main display area shows a table of captured frames with columns: Dev, TSlot, SubCh, Frame#, TIME (Relative), Len, Error, TLLI value BssGp, TMSI BssGp, IMSI Identity BssGp, and Mobile GH. The table contains several rows of data, with the first row highlighted in blue.

Below the table, there is a section for 'Card2 TimeSlots=0-23 Frame=3 at 00:00:00.548666 OK Len=71'. This section displays the HDLC Frame Data + PCS, including the LAPD Layer and the Hex Dump of the Frame Data. The Hex Dump shows the raw data in hexadecimal and ASCII format.

At the bottom of the main window, there is a table showing the 'Device #' and 'Frame Count(Device #)' for each device. The table has two columns: 'Device #' and 'Frame Count(Device #)'. The data shows two devices, each with a frame count of 192.

Below the device table, there is a table showing the 'Call ID', 'Call Status', 'DevNo', 'TS', 'Call Start Date & Time', 'Call Duration', 'BVCi', 'TLLI', 'IMSI', and 'Call Type'. The table contains several rows of data, with the first row highlighted in green.

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, C/R, SAPI, CTL 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

- ☒ GB Interface
- ☒ Data Link
 - ☒ Frame Length(s)
 - ☐ Error Frames Only
 - ☐ OK Frames Only
 - ☐ Frame Number(s)
 - ☐ Card Timeslot Subchan
- ☐ Network Service(Frame Re
- ☐ Network Service
- ☒ BssGp
- ☐ LLC
- ☐ Gprs Mobility Mgmt

Value

Activate Deactivate

All Selected

Layer	Field	Filter Value
Data Link	Frame Length(s)	6
BssGp	BSSGP Pdu	CREATE-BSS-PFC

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

The screenshot illustrates the workflow for creating filter criteria from a screen selection in the Analyzer GUI. It shows a data table, a context menu, a selection dialog, and the main configuration window.

Data Table:

✓ 2	0-23		0	00:00:00.000000	19	3780682106	
✓ 2	0-23		1	00:00:00.155843	121	3747714426	
✓ 2	0-23		2	00:00:00.350083	18	3779291258	
✓ 2	0-23		3	00:00:00.548666	71	3780573050	
✓ 2	0-23		4	00:00:00.586213	19	2699313018	
✓ 2	0-23		5	00:00:00.764218	19	3779520890	

Context Menu:

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

Selection Dialog:

Use Ctrl, Shift for Extended Selection

BssGp::IMSI Identity
BssGp::TLLI value

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:

- GB Interface
 - Data Link
 - LAPF
 - NS
 - BssGp
 - LLC
 - GMM
 - SM
 - SMS
 - TOM
 - SNDCP

Value Selection:

Activate Deactivate

All Selected:

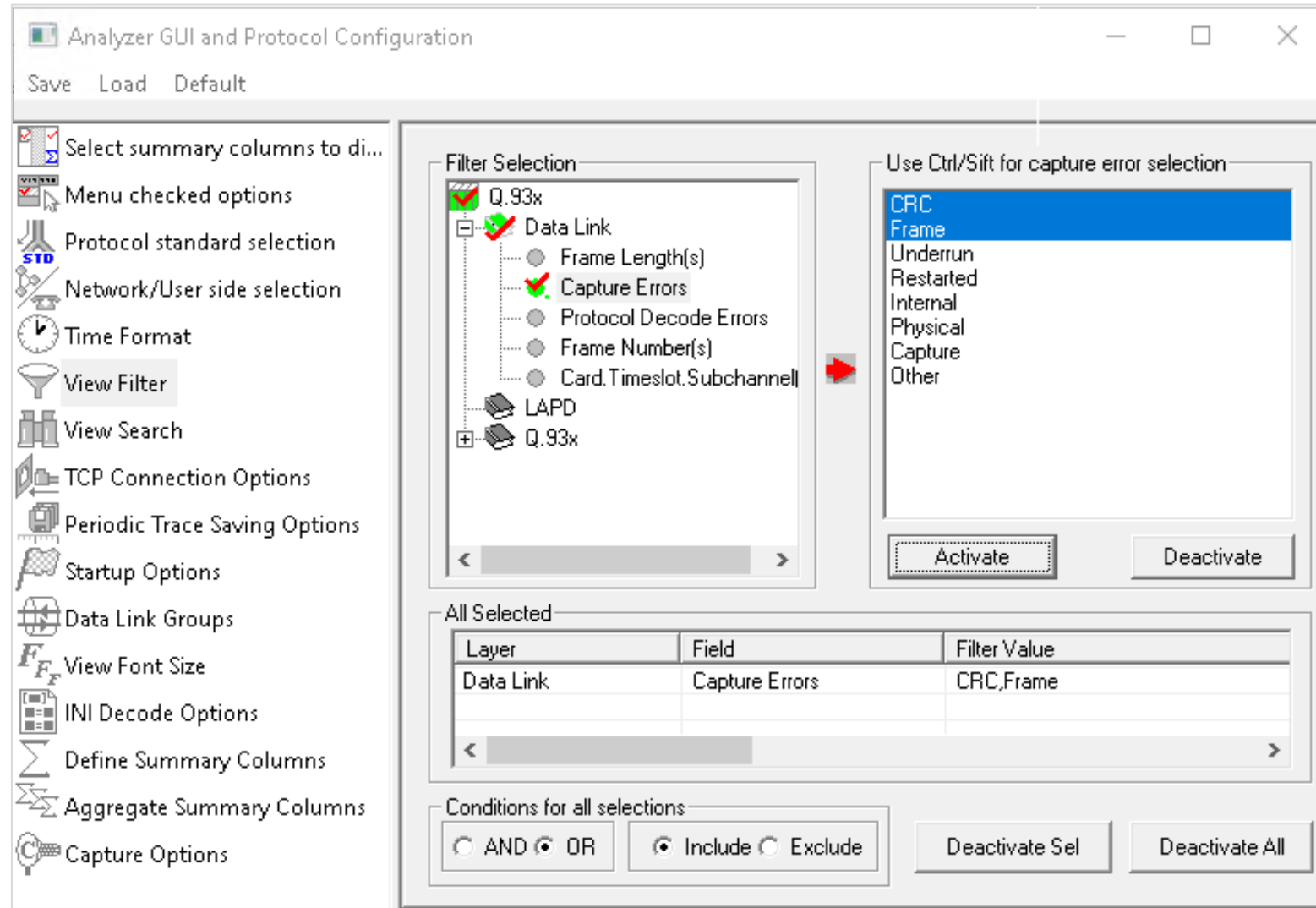
Layer	Field	Search Value
BssGp	IMSI Identity	466921304023437

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



Search Criteria From Screen Selection

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

The screenshot illustrates the workflow for creating search criteria from a screen selection. It consists of three main parts:

1. Data Table: A table with 7 columns. The second row is highlighted in blue.

	2	0-23		0	00:00:00.000000	19	3780682106
✓	2	0-23		1	00:00:00.155843	121	3747714426
✓	2	0-23		2	00:00:00.350083	18	3779291258
✓	2	0-23		3	00:00:00.548666	71	3780573050
✓	2	0-23		4	00:00:00.586213	19	2699313018
✓	2	0-23		5	00:00:00.764218	19	3779520890

2. Context Menu: A menu is open over the selected row, with the option "Set Search Criteria as Sel Values" highlighted.

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

3. Selection Dialog: A dialog box titled "Use Ctrl, Shift for Extended Selection" is shown. It contains a list with "BssGp::IMSI Identity" and "BssGp::TLLI value". The "OK" button is highlighted.

4. Main Configuration Window: The "Analyzer GUI and Protocol Configuration" window is shown. The "View Search" option is selected in the left sidebar. The "Filter Selection" pane shows a tree view with "BssGp" selected. The "Value Selection" pane is empty. The "All Selected" table at the bottom is highlighted with a red box.

Layer	Field	Search Value
BssGp	IMSI Identity	466921304023437

Below the table, the "Conditions for all selections" section shows "AND" and "Include" selected.

Statistics

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

The screenshot displays the 'Statistics' dialog box and the main 'GPRS PR GB Protocol Analysis GB Interface' window.

Statistics Dialog Box:

- Field Names:** A tree view showing layers like Physical Link, Network Service, and BssGp.
- Device #:** A dropdown menu with 'Total' selected.
- Use Type (single selection):** A dropdown menu with 'Key' selected.
- Statistic Type(s) (calculated, multiple selection):** A list box with 'Frame Count', 'Frame Percent', 'Byte Count', and 'Byte Percent'.
- Range List:** A text input field.
- Buttons:** 'Add/Mod', 'Remove', 'Cumulative', and 'Separate'.
- Selected Statistic Information:** A table showing the selected statistics.

Layer	Field Name	Use Type	Statistic Type
Physical	Device #	Total	Frame Count
BssGp	PDU Type	Key	Frame Count

GPRS PR GB Protocol Analysis GB Interface:

- Menu Bar:** File, View, Capture, Statistics, Database, Call Detail Records, Configure, Help.
- Toolbar:** Various icons for file operations and analysis.
- Table 1: Frame List**

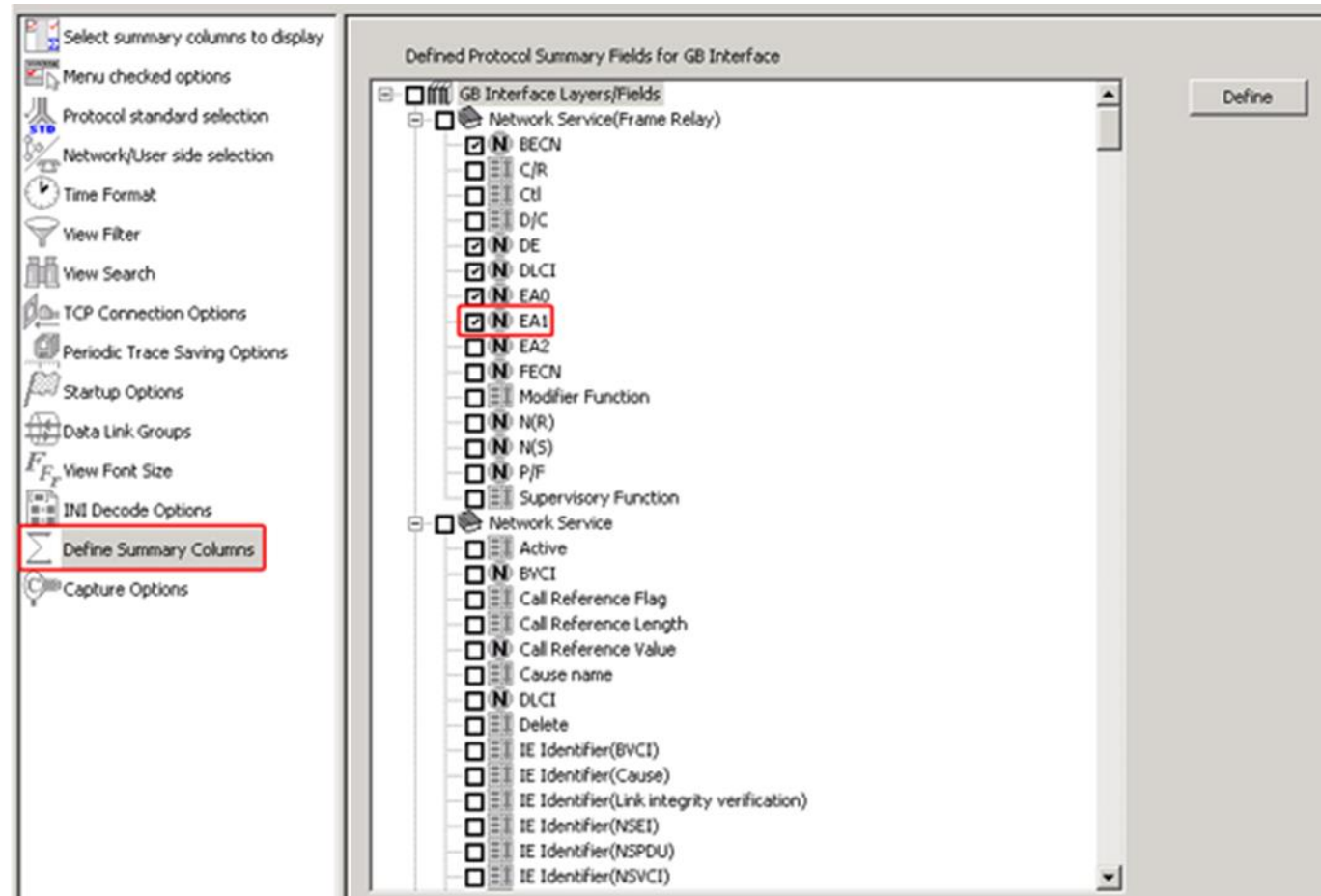
Dev	TS	Su...	Frame#	TIME (Relative)	Len	DLCI	BE...	FECN	NS...	BS...	C/...	SAPI	CTL
2	0-23		0	00:00:00.000000	19	172	0	0	NS...	FL...			
2	0-23		1	00:00:00.155843	121	172	0	0	NS...	DL...	Res...	LL3	UI For...
2	0-23		2	00:00:00.350083	18	172	0	0	NS...	FL...			
2	0-23		3	00:00:00.548666	71	172	0	0	NS...	DL...	Res...	LLGMM	UI For...
- Table 2: PDU Type Summary**

Device #	PDU Type	Frame Count(PDU Ty...
2	DL-UNITDATA (0)	89
2	SUSPEND-ACK (12)	6
2	FLOW-CONTROL-MS-ACK (41)	55
2	FLUSH-LL (42)	39
total 2	Total	189
- Table 3: Call Detail Records**

Call ID	Call Status	DevNo	TS	Call Start Date & Time	Call Duration	BVCI	TLLI
A 0	active	2	0	2004-03-03 20:08:19.885645	00:00:27.521911	116	37805...
A 1	active	2	0	2004-03-03 20:08:20.428796	00:00:26.978760	384	37804...
A 2	active	2	0	2004-03-03 20:08:22.184479	00:00:25.223078	72	37796...
A 3	active	2	0	2004-03-03 20:08:23.064062	00:00:24.343494	402	27063...
A 4	active	2	0	2004-03-03 20:08:23.166442	00:00:24.241114	116	27071...
A 5	active	2	0	2004-03-03 20:08:23.656895	00:00:23.750661	29	27064...

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 screenshot displays the 'Aggregate Summary Columns' dialog box in the foreground, which is used to configure summary columns for the data table. The dialog has a 'Name' field, a 'Display Format' dropdown (set to 'Concat'), a 'Summary Columns' list (containing 'Message Type_NS' and 'IMSI Identity_BssGp'), and a 'Separator' field (set to '&'). Buttons for 'Add', 'Delete', 'Aliases', 'Reorder', and 'Reverse' are also present.

In the background, the main data table is visible, showing a list of GPRS frames. The 'Message Type' column is highlighted with a red box. The table columns include Dev, TSlot, SubCh, Frame#, TIME (Relative), Len, Message Type, Error, TLLI value BssGp, TMSI BssGp, and IMSI Identity BssGp.

Dev	TSlot	SubCh	Frame#	TIME (Relative)	Len	Message Type	Error	TLLI value BssGp	TMSI BssGp	IMSI Identity BssGp
2	0-23		0	00:00:00.000000	19			3780682106		
2	0-23		1	00:00:00.155843	121	466921304023437		3747714426		466921304023437
2	0-23		2	00:00:00.350083	18			3779291258		
2	0-23		3	00:00:00.548666	71	466921201213076		3780573050		466921201213076
2	0-23		4	00:00:00.586213	19			2699313018		
2	0-23		5	00:00:00.764218	19			3779520890		
2	0-23		6	00:00:00.878963	26			3780452986		
2	0-23		7	00:00:01.091817	71	466921304859061		3780475770		466921304859061
2	0-23		8	00:00:01.100932	18			3780475770		
2	0-23		9	00:00:01.328770	19			2700901242		
2	0-23		10	00:00:01.451817	121	466921304023437		3747714426		466921304023437
2	0-23		11	00:00:02.073760	48	466921304610519		2706494330		466921304610519
2	0-23		12	00:00:02.081062	18			2706494330		
2	0-23		13	00:00:02.152458	18			2706494330		

Card2 TimeSlots=0-23 Frame=0 at 00:00:00.000000 OK Len=19
HDLC Frame Data + FCS
***** LAPD Layer *****
0000 EA0 =0 (0)
0000 C/R =0. Command(User), Response(Network)
0000 DICI = 172 (001010.. 1100....)
0001 EA1 =1 (1)
0001 DE =0. (0)
0001 BECN =0... (0)
0001 FECN =0... (0)
***** NS Layer *****

Off-line Viewing. C:\Program Files\GL Communications Inc\Usb E1 An 192 Frames

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 displays the 'Aggregate Summary Columns' dialog box and the main protocol analysis window. The dialog box is used to configure summary columns for display. It includes a list of summary columns on the left and a table for configuring the display format and separator for each group.

Aggregate Summary Columns Dialog:

Name	Display Format	Summary Columns	Separator
Group~0	Concat	TMSI_BssGp Mobile Identity_GMM	---->
Group~1	Overlay	IMSI Identity_BssGp	&
Group~2	<Col_Alias> Value	Message_Type_NS	

The main window shows the protocol analysis results for GPRS PR GB Interface 64-bit. The table below represents the data shown in the 'Group~0' column, which is highlighted with a red box.

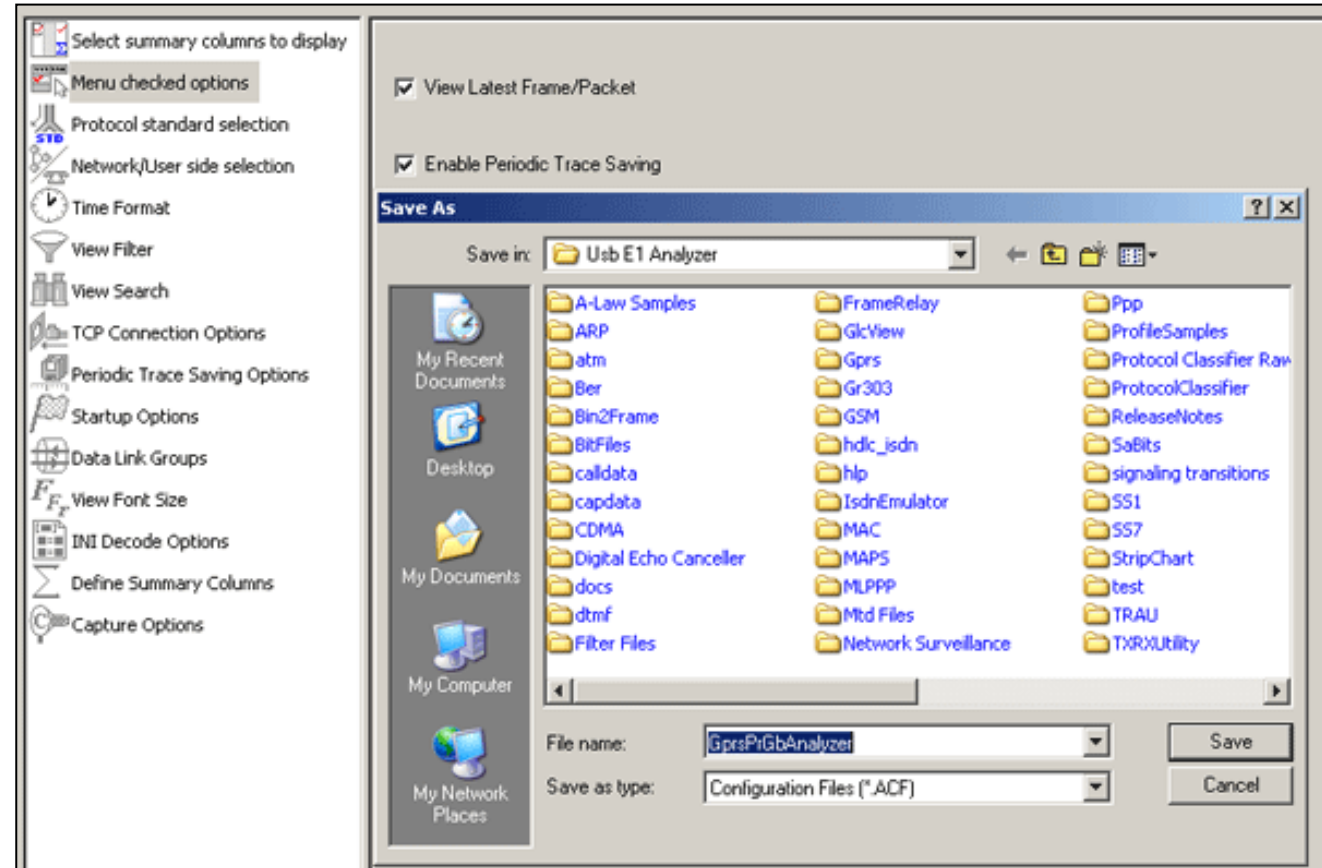
Dev	TSlot	SubCh	Frame#	TIME (Relative)	Len	Group~0	Error	TLLI value BssGp	TMSI BssGp	IMSI Identity BssGp
2	0-23		0	00:00:00.000000	19			3780682106		
2	0-23		1	00:00:00.155843	121	466921304023437		3747714426		466921304023437
2	0-23		2	00:00:00.350083	18			3779291258		
2	0-23		3	00:00:00.548666	71	xE15CD47A		3780573050		466921201213076
2	0-23		4	00:00:00.586213	19			2699313018		
2	0-23		5	00:00:00.764218	19			3779520890		
2	0-23		6	00:00:00.878963	26			3780452986		
2	0-23		7	00:00:01.091817	71	xE15CE07A		3780475770		466921304859061
2	0-23		8	00:00:01.100932	18			3780475770		
2	0-23		9	00:00:01.328770	19			2700901242		
2	0-23		10	00:00:01.451817	121	466921304023437		3747714426		466921304023437
2	0-23		11	00:00:02.073760	48	466921304610519		2706494330		466921304610519

The bottom part of the window shows the protocol details for the selected frame (Frame 0). The details are as follows:

```
Card2 TimeSlots=0-23 Frame=0 at 00:00:00.000000 OK Len=19
HDLG Frame Data + FCS
***** LAMP Layer *****
0000 EA0 = .....0 (0)
0000 C/R = .....0. Command(User). Response(Network)
0000 DLCI = 172 (001010...1100....)
0001 EA1 = .....1 (1)
0001 DE = .....0. (0)
0001 BECN = .....0.. (0)
0001 FECH = .....0... (0)
***** NS Layer *****
0002 PDU Type = 00000000 NS-UNITDATA
0003 BVC1 = .....0 (0)
0004 BVC1 = 0 (x0000)
***** BssGp Layer *****
```

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!