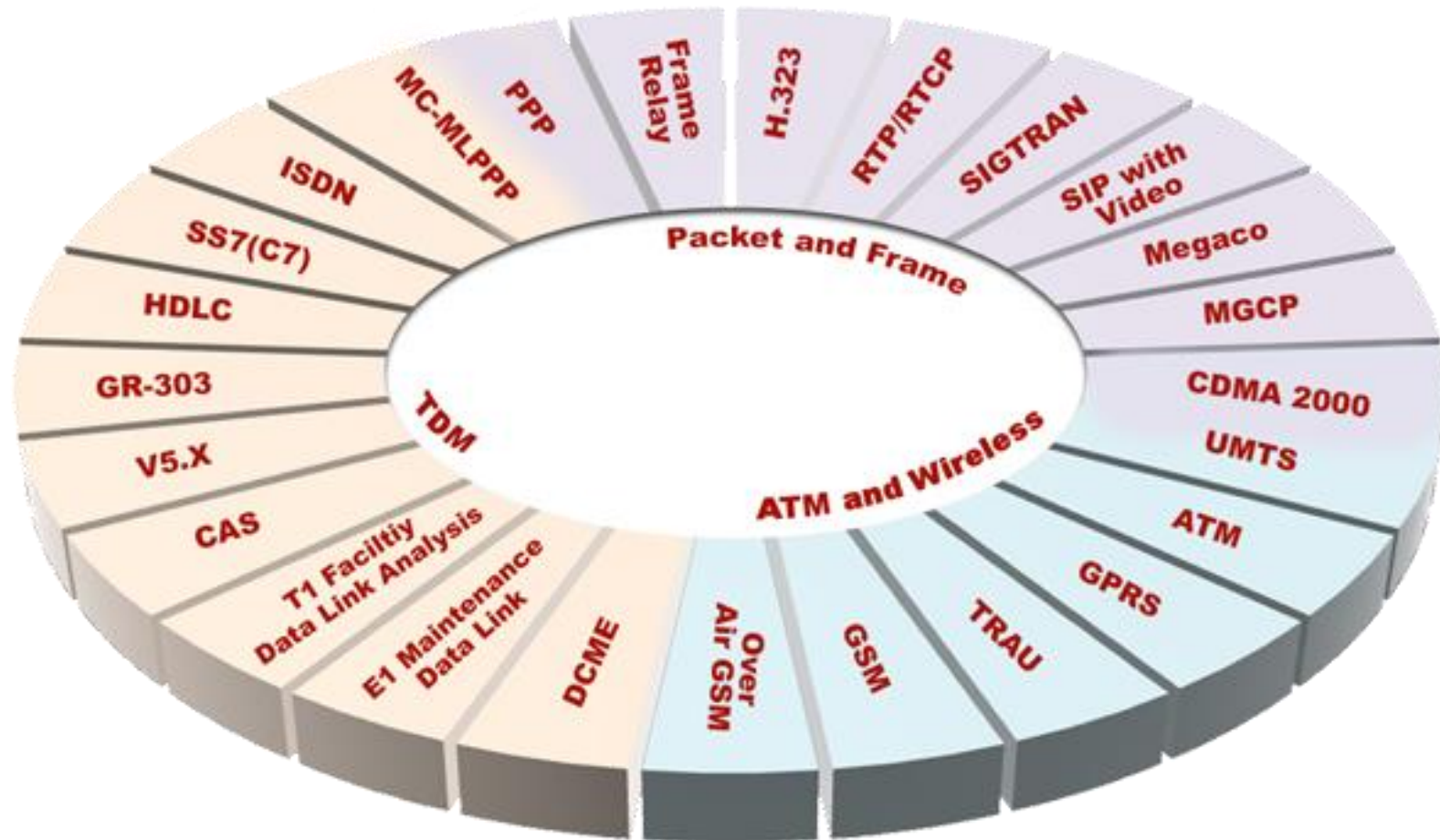

UMTS Protocol Analyzer



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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



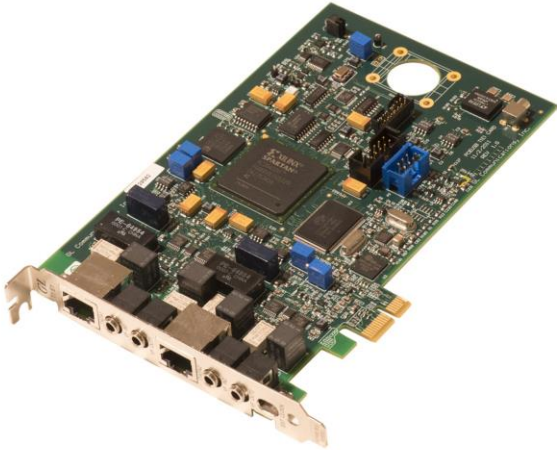
Supported Platforms



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



Quad / Octal T1 E1 PCIe Card



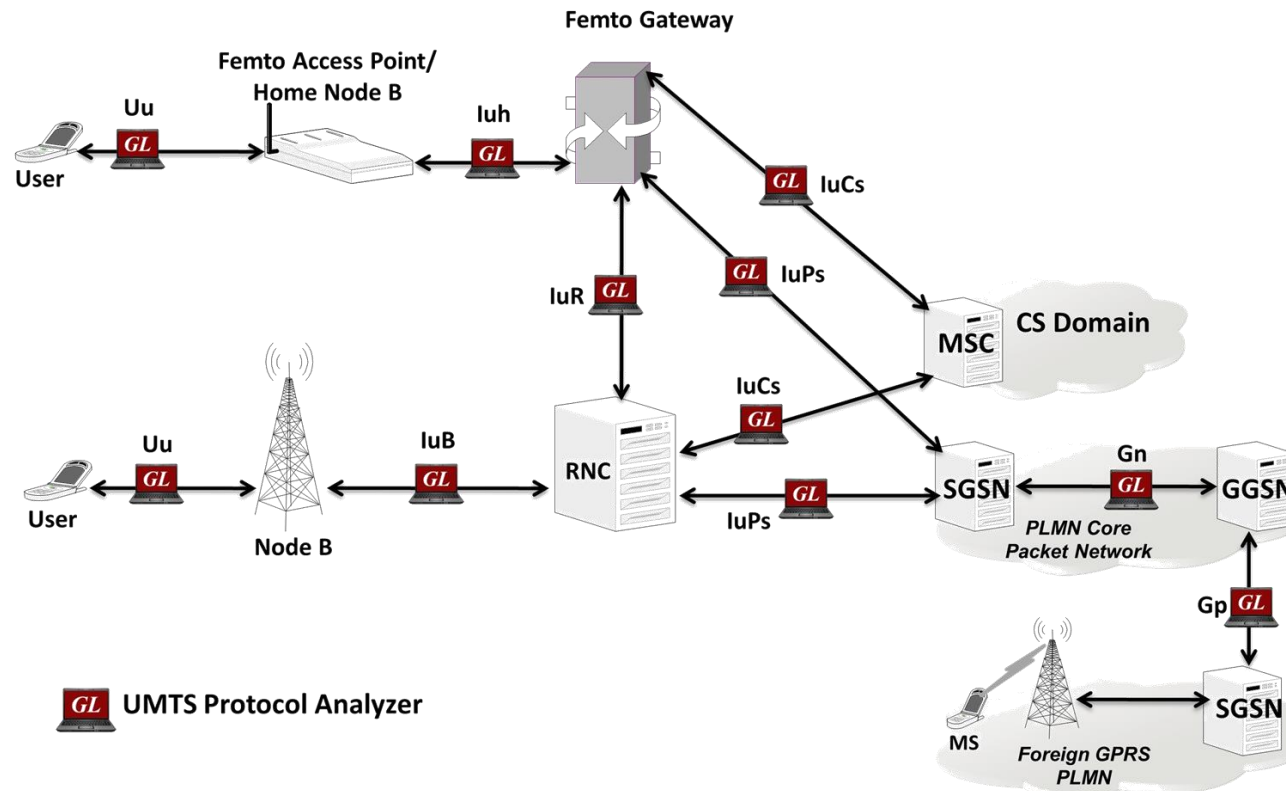
Dual T1 E1 Express (PCIe) Board

tScan16™ with 16-port T1 E1 Breakout Box



Overview

- GL's UMTS Analyzer adds capability to monitor various interfaces within UMTS network. The tool allows end user to capture, decode and collect essential information across various interfaces i.e., Iub, Iuh, IuCs, and IuPs. Also, it supports GSM over ATM i.e., DTAP Layer over BSSAP
- Simultaneous handling of ATM based AAL2 and AAL5 virtual channels and reassembly, helps in fault diagnosis and troubleshooting UMTS network. GL Communications supports the following types of UMTS analyzers



Supported Protocol Standards

Available Standards	Supported Protocols	Specification Used
Iub-Interface	ATM	ITU-T I.361
Iu-Cs/Iu-Ps-Interface	AAL	ITU-T I.363
Iur-Interface	AAL2	Class B (ITU-T I.363.2)
Gn Gp	AAL5	Class C & D (ITU-T I.363.5)
	SSCOP	ITU-T Q.2110
	SSCF for UNI	ITU-T Q.2130 (07/94)
	AAL Type 2 (ALCAP)	ITU-T Recommendation Q.2630.1
	NBAP	3GPP TS 25.433 V6.3.0 (2004-09)
	Iub FP	GPP TS 25.427 V6.1.0 (2004-12) and 3GPP TS 25.435 V6.1.0(2004-03)
	RANAP	3GPP TS 25.413 V6.3.0 (2004-09)
	Iu-UP	GPP TS 25.415 V6.1.0
	MTP3-B	ITU-T Recommendation Q.2210
	RNSAP	3GPP TS 25.423 V6.4.0 (2004-12)
	SCCP ITU / ANSI	ITU-T Q.711-Q.714 / ANSI T1.112-1996
	SCTP	RFC 2960
	IP	RFC 791
	UDP	RFC 768
	GMM (GPRS Mobility Management) / SMG (GPRS Session Management)	3GPP TS 04.08 V7.19.0
	GSM CC / GSM MM	3GPP TS 04.08 V7.17.0
	SMS	3GPP TS 03.40 V7.5.0 & 3GPP TS 04.11 V7.1.0 GSM 03.38 version 7.2.0
	AMR	3GPP TS 26.101 V6.0.0
	SSSAR	ITU-T I.366.1
	UMTS MAC RLC	3GPP TS 25.321 V6.1.0 and 3GPP TS 25.322 V6.1.0
	RRC	3GPP TS 25.331 V6.4.0
	M3UA	RFC 3332
	SSCF-NNI (Service Specific Coordination Function - Network Node Interface) Protocol	ITU-T Recommendation Q.2140 (02/95)
	SAAL-NNI (Signaling ATM Adaptation Layer - Network Node Interface)	ITU-T Recommendation Q.2100 (07/94)

Features

- Summary View provides the information about few important fields (Dev #, Time Slot, VPI/VCI, PT, HEC, OSF, AAL type, CID, AAL type 2 signaling message (ALCAP message) and more in a tabular format
- Summary view (Call Quality Matrix) displays complete summary of call information in graphical format, along with a summary of alerts
- Multiple streams of ATM traffic on various T1 E1 channels can be simultaneously decoded with different GUI instances
- Captures, decodes, filters, and reassembles AAL-2 and AAL-5 frames in real-time, from within the ATM cells according to user defined VPI/VCI
- Decodes different control plane protocols i.e. NBAP, RNSAP, RANAP, ALCAP, SSCOP etc and user plane protocols i.e. Iu-UP, Iu-FP, AMR and so on
- Detail View displays packet by packet statistics for call information in tabular format

Features (contd.)

- 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
- Unscrambling of ATM cells based on SDH X43 + 1 algorithm
- Remote monitoring capability using GL's Network Surveillance System

Real-time Analysis

UMTS Protocol Analysis (Iub-Interface) 64-bit

File View Capture Statistics Database Call Detail Records Configure Help

0 GoTo

Dev	TScout	Frame#	TIME (Relative)	Len	Error	VPI ATM	VCI ATM	ProcedureCode RANAP	Message Type RR	Message Type MM	Type
✓ 2	30	4	00:00:02.055958	101		1	40				
✓ 2	30	5	00:00:03.136054	53		1	40				
✓ 2	30	6	00:00:03.204070	53		1	40				
✓ 2	30	7	00:00:03.248016	53		1	56				

Device2 TScout=30 Frame=4 at 00:00:02.055958 OK Len=101 *** Right click to SHOW/HIDE layers

ATM Frame Data

```

===== ATM Layer =====
0000 GFC          = Scrambled SDH X^43+1
0000 VPI          = 0000.... (0)
0001 VCI          = 1 (...0000 0001....)
0003 PT          = 40 (...0000 00000010 1000....)
0003 CLP         = ....000. (0)
                   = .....0 (0)
    
```

Hex Dump of the Frame Data

```

+-----+-----+-----+-----+
00 10 02 80 54 00 00 00 00 05 00 02 00 05 00 00          eT
03 E9 08 04 00 14 49 00 00 10 01 00 00 00 00 00          é  I
00 00 00 00 00 00 00 00 00 00 00 05 00 0C 03 2C 03
2C 01 96 01 96 2D 2D 2D 2D 06 00 04 00 00 00 00 01
07 00 04 00 00 00 01 00 00 88 00 00 00 00 00 00          . | |----- |
    
```

Device #	Frame Count(Device #)
2	28
total 2	28

C:\Program Files\GL Communications Inc\U: 28 Frames

Summary View

Detail View

Hex Dump View

Statistics View

Different Views

- The analyzer displays Summary, Detail and Hex dump View in different panes. The Summary View displays Frame Number, Time, Length, Error, VPI, VCI, PT, HEC, OSF, AAL Type, CID, LI, UUI, CPI and Frame Type message
- 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 UMTS Protocol Analysis (lub-Interface) 64-bit software interface. On the left, an 'Open' dialog box is open, showing a file explorer view of the 'Gr303' directory. The file list includes 'cia5fixed.hdl', 'eoc931.hdl', 'prs1.hdl', 'tmc931.HDL', and 'tmcH.hdl'. The 'File name' field contains 'eoc931' and 'Files of type' is set to 'HDLC Files (*.*)'. The 'Open as read-only' checkbox is unchecked.

The main window shows a table of captured frames. The table has columns for Dev, TScout, Frame#, TIME (Relative), Len, Error, VPI ATM, VCI ATM, ProcedureCode RANAP, Message Type RR, Message Type MM, and Type. The first row is highlighted in blue.

Dev	TScout	Frame#	TIME (Relative)	Len	Error	VPI ATM	VCI ATM	ProcedureCode RANAP	Message Type RR	Message Type MM	Type
2	30	4	00:00:02.055958	101		1	40				
2	30	5	00:00:03.136054	53		1	40				
2	30	6	00:00:03.204070	53		1	40				
2	30	7	00:00:03.248016	53		1	56				

Below the table, the details for the selected frame (Device2 TScout=30 Frame=4 at 00:00:02.055958 OK Len=101) are shown. The 'ATM Frame Data' section displays the following information:

```
***** ATM Layer *****
0000 GFC = Scrambled SDH X^43+1
0000 VPI = 0000.... (0)
0001 VCI = 1 (...0000 0001....)
0003 PT = 40 (...0000 00000010 1000....)
0003 CLP = ...000. (0)
```

The 'Hex Dump of the Frame Data' section shows the following hex values:

```
00 10 02 80 54 00 00 00 05 00 02 00 05 00 00
03 E9 08 04 00 14 49 00 00 10 01 00 00 00 00
00 00 00 00 00 00 00 00 00 05 00 0C 03 2C 03
2C 01 96 01 96 2D 2D 2D 06 00 04 00 00 00 01
07 00 04 00 00 00 01 00 00 88 00 00 00 00 00
```

At the bottom of the main window, a summary table shows the frame counts for each device:

Device #	Frame Count(Device #)
2	28
total 2	28

The status bar at the bottom indicates the file path: 'C:\Program Files\GL Communications Inc\U:28 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 Frame Number, Time, Length, Error, VPI, VCI, PT, HEC, OSF, AAL Type, CID, LI, UII, and more. Similarly, Search capability helps user to search for a particular frame based on specific search criteria

ATM Layer

Idle Cells
 Capture when checked

AND / OR
 AND OR

VPI list
5 10

VCI list
10 15

PT
000 ▲ Select ALL
001
010
011 ▼ Clear ALL

Clear ALL

Filter Selection

- (Iub-Interface)
- Data Link
- ATM
 - VPI
 - VCI
 - PT
 - HEC
 - OSF
 - AAL Type
 - Frame Type
- AAL2 Reassembly (CPS-SC)
- AAL5 Reassembly (CPCS-F)

Frame Type Value

ATM-Cell
CPS-Frame
SSSAR-Frame

Activate Deactivate

All Selected

Layer	Field	Filter Value
ATM	VPI	35
ATM	Frame Type	CPS-Frame

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 image illustrates the process of creating filter criteria from a screen selection in the UMTS Protocol Analysis software. It shows three main components:

- Table:** A table with columns: Dev, TScount, Frame#, VPI (Relative), Len, Error, VPI ATM, VCI ATM, ProcedureCode, Message Type, Message Type, and Type of id. The first row is highlighted in blue.
- Context Menu:** A menu with options: Search Selected Value, Set Search Criteria as Sel Values, and Set Filter Criteria as Sel Values. The last option is selected.
- Dialog Box:** A dialog box titled "Use Ctrl, Shift for Extended Selection" with a list containing "ATM::VCI" and "ATM::VPI". It has buttons for "OK", "Select All", and "Cancel".
- Configuration Window:** A window titled "Analyzer GUI and Protocol Configuration" with a "Filter Selection" section. It shows a tree view of protocol layers (Data Link, ATM, AAL2 Reassembly, AAL5 Reassembly, Multi Protocol Encapsulation, IP, UDP, TCP, SCTP, GTP/GTP, GTP IP). The "ATM" layer is selected, and its "VCI" field is highlighted in the "All Selected" table. The "Filter Value" is set to "40".

Dev	TScount	Frame#	VPI (Relative)	Len	Error	VPI ATM	VCI ATM	ProcedureCode	Message Type	Message Type	Type of id
2	30	0	00:00...	53		1	40				
2	30	1	00:00...	53		1	40				
2	30	2	00:00...	149		1	56				
2	30	3	00:00...	101		1	40				

Layer	Field	Filter Value
ATM	VCI	40

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. The main area is divided into several sections:

- Filter Selection:** A tree view showing selected filters. 'Data Link' is expanded, and 'ATM' is selected. A red arrow points from the 'ATM' filter to the 'Frame' option in the adjacent list.
- Use Ctrl/Sift for capture error selection:** A list of options including CRC, Frame (highlighted), Underrun, Restarted, Internal, Physical, Capture, and Other. Below this list are 'Activate' and 'Deactivate' buttons.
- All Selected:** A table showing the current filter configuration.
- Conditions for all selections:** Radio buttons for 'AND' (selected) and 'OR', and 'Include' (selected) and 'Exclude'.

Layer	Field	Filter Value
ATM	VCI	40

Search Criteria From Screen Selection

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

UMTS Protocol Analysis (Iub-Interface) 64-bit

File View Capture Statistics Database Call Detail Records Configure Help

Dev	TScout	Frame#	ME (Relativ	Len	Error	VPI ATM	VCI ATM	ProcedureCo RANAP	Message Ty RR	Message Ty MM	pe of ident MM	Id
✓ 2	30	0	00:00:...	53		1	40					
✓ 2	30	1	00:00:...	53		1	40					
✓ 2	30	2	00:00:...	149		1	56					
✓ 2	30	3	00:00:...	101		1	40					

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

Use Ctrl, Shift for Extended Selection

ATM::VCI
ATM::VPI

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

- (Iub-Interface)
- Data Link
- ATM
 - AAL2 Reassembly (CPCS-SC)
 - AAL5 Reassembly (CPCS-F)
 - Multi Protocol Encapsulatio
 - IP
 - UDP
 - TCP
 - SCTP
 - GTP/GTP
 - GTP IP

Value Selection

Activate Deactivate

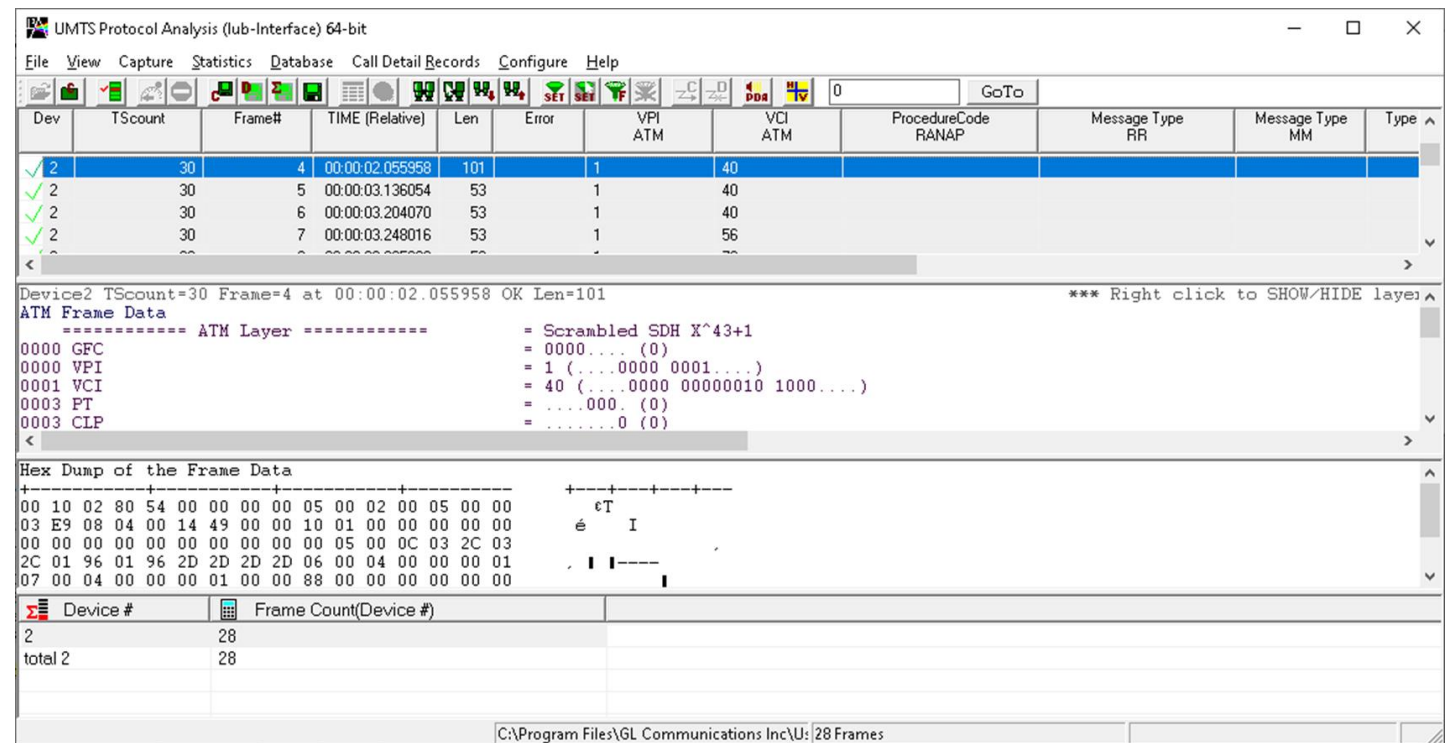
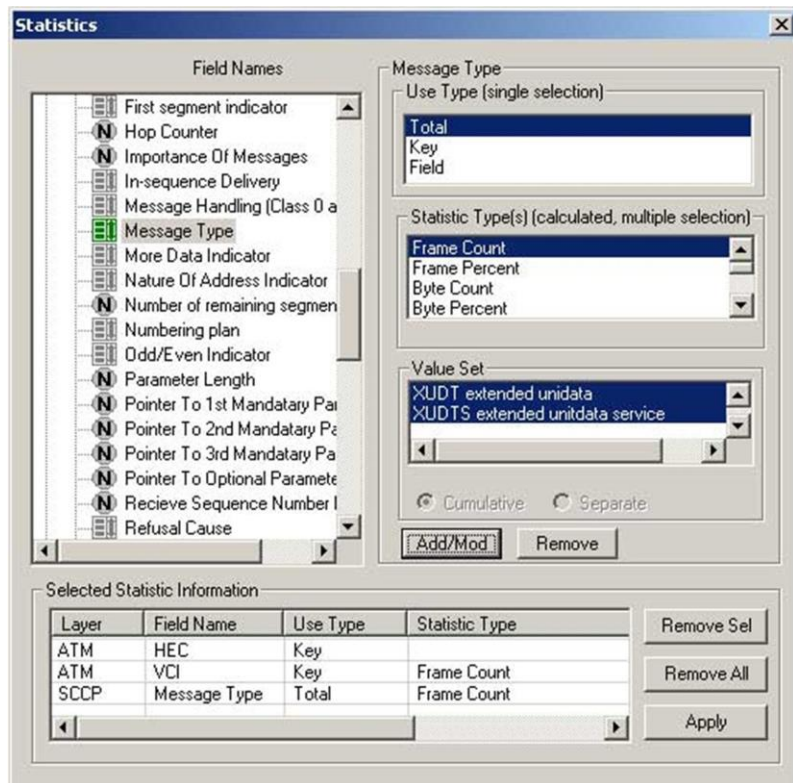
Layer	Field	Search Value
ATM	VPI	1

Conditions for all selections

AND OR Include Exclude Deactivate Sel Deactivate All

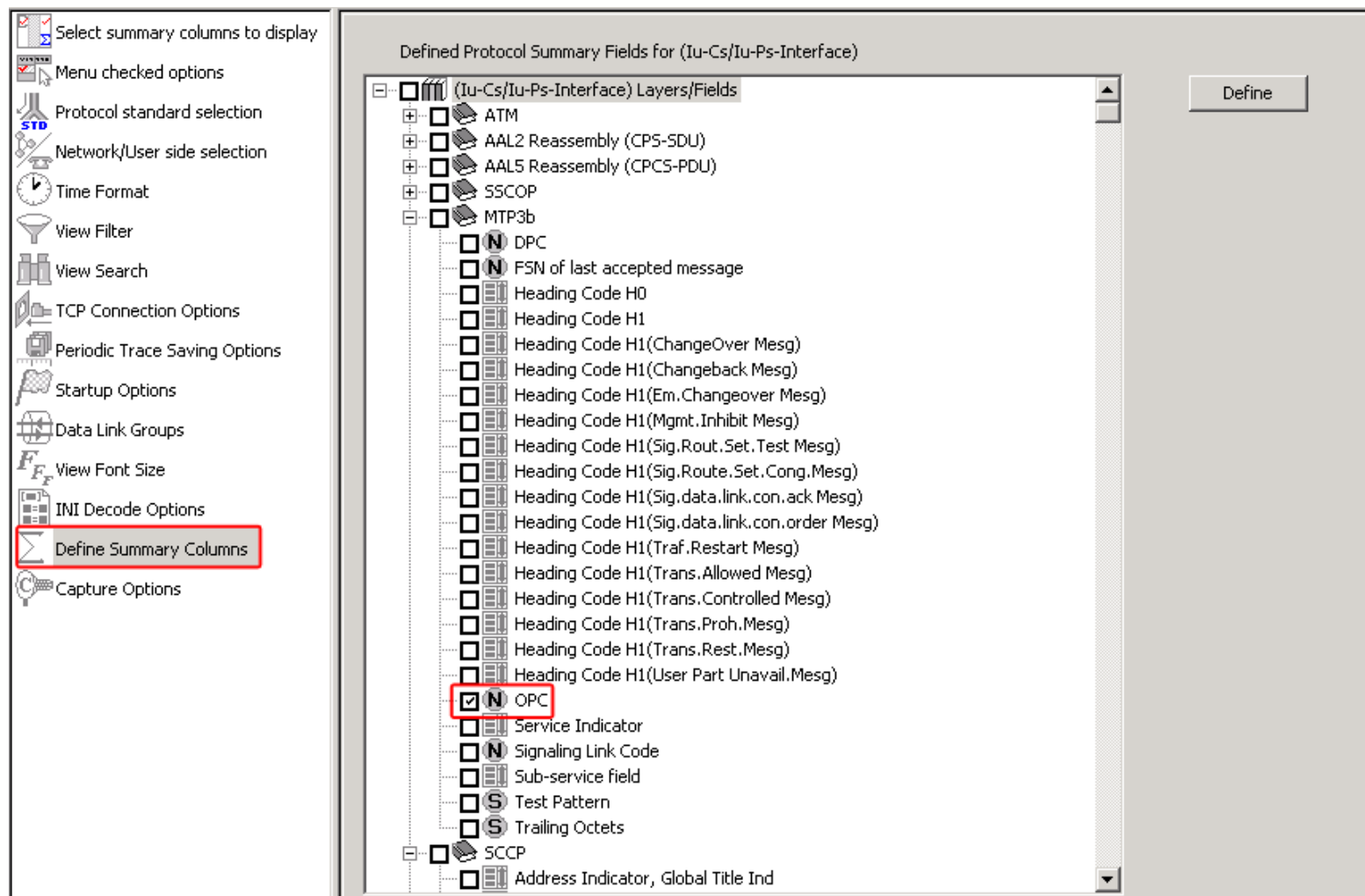
Statistics

- Important call specific parameters such as Call ID, Call disposition, Call duration, Mobile ID, Called/Calling Number, Call type (SMS/PDP/Setup/Location update etc.) are displayed in the Call Detail View. Additionally, users are provided with the option to search a particular call detail record from the captured traces
- Various statistics can be obtained in statistics view to study the performance and trend in the UMTS network on protocol fields and parameters



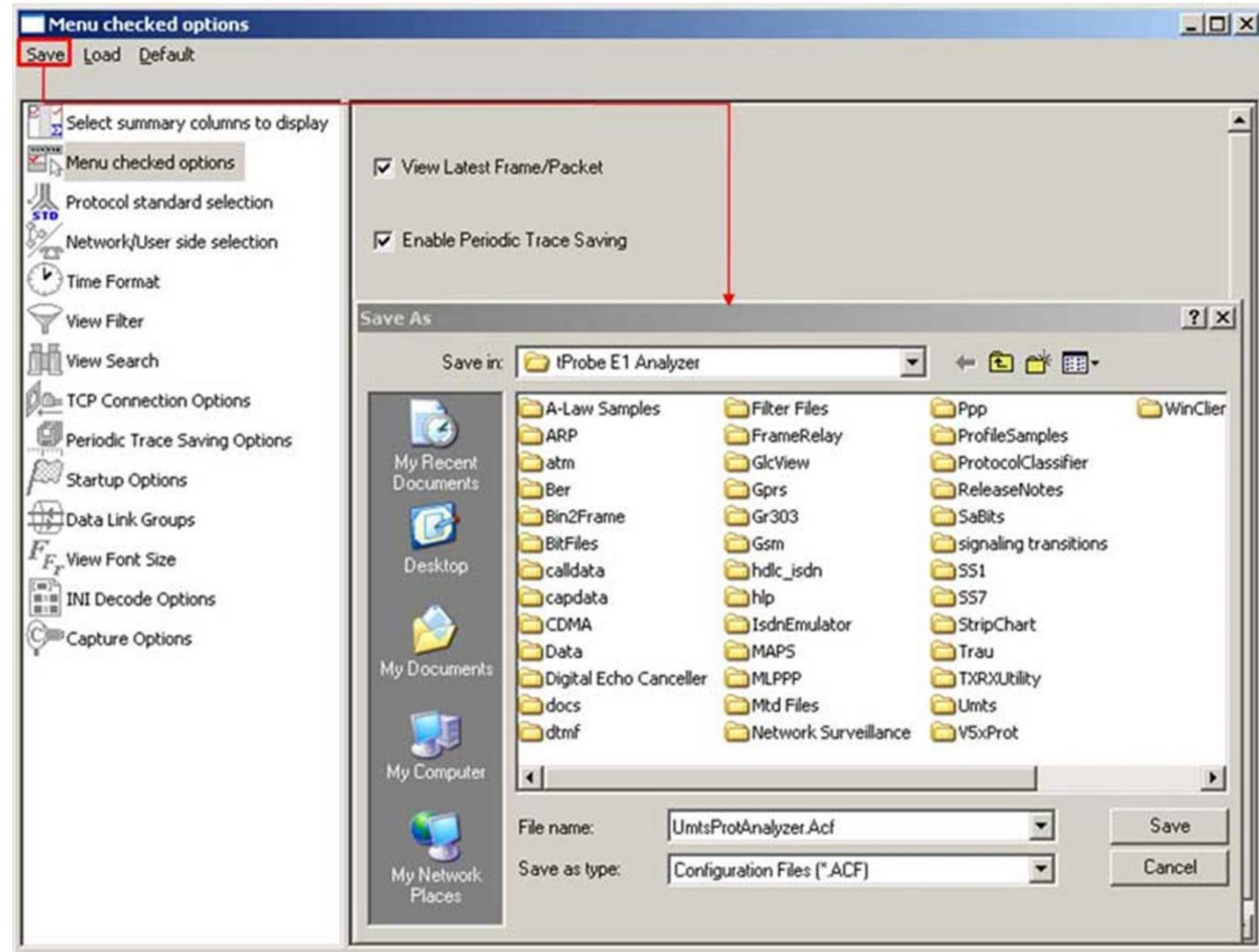
Define Summary Columns

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



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!