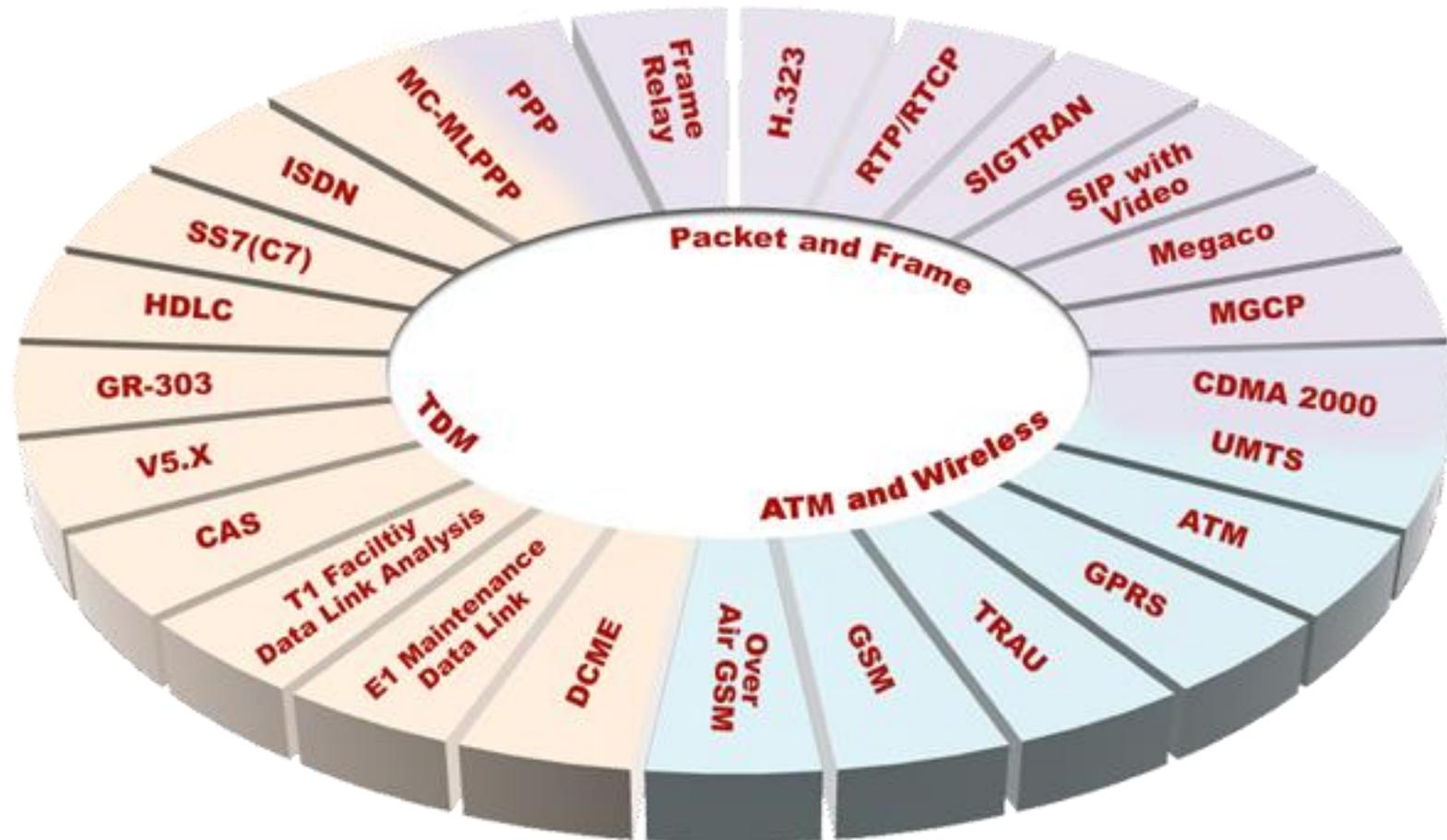

UMTS Protocol Analyzer



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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



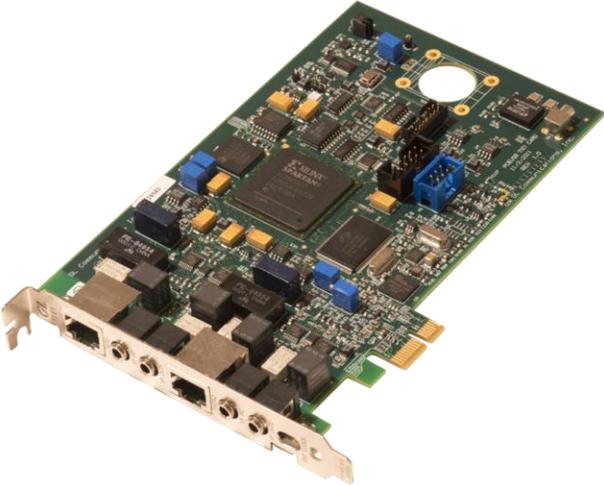
Front Panel

Back Panel

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

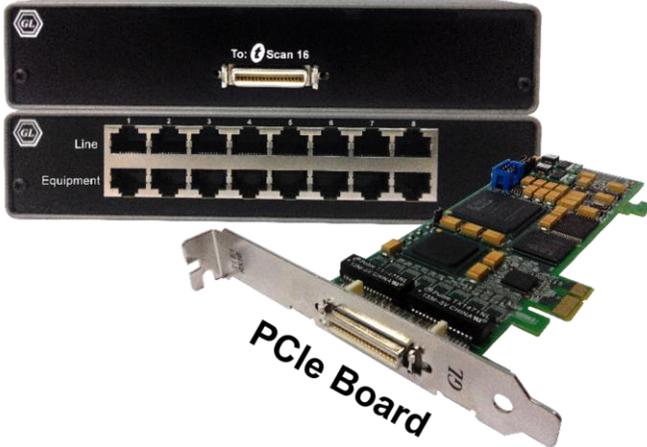


Quad / Octal T1 E1 PCIe Card



Dual T1 E1 Express (PCIe) Board

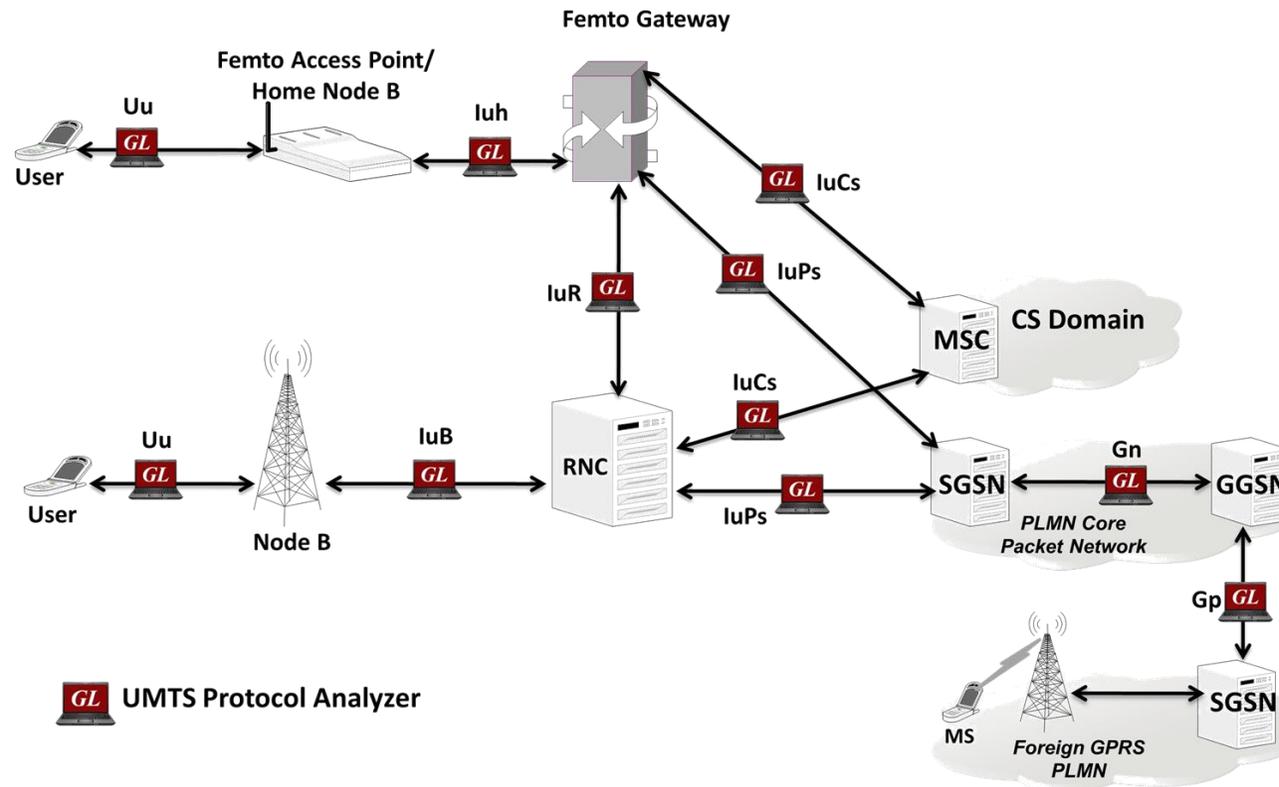
**tScan16™ with
16-port T1 E1 Breakout Box**



PCIe Board

Overview

- GL's 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 is set to '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:

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 'Device2 TScout=30 Frame=4 at 00:00:02.055958 OK Len=101' are shown:

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)

Hex Dump of the Frame Data

```
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, a summary table shows:

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 ▼ Clear ALL
011 ▼
... ▼

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 consists of four main components:

- Table:** A table showing protocol analysis data. The first row is highlighted in blue, and a context menu is open over it.
- Context Menu:** A menu with three 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 small dialog box titled "Use Ctrl, Shift for Extended Selection" containing a list with "ATM::VCI" and "ATM::VPI". It has "OK", "Select All", and "Cancel" buttons.
- Configuration Window:** A larger window titled "Analyzer GUI and Protocol Configuration" with a sidebar of options. The "Filter Selection" section is active, showing a tree view of protocol layers. The "Value Selection" section is empty. Below these is a table for "All Selected" and a section for "Conditions for all selections".

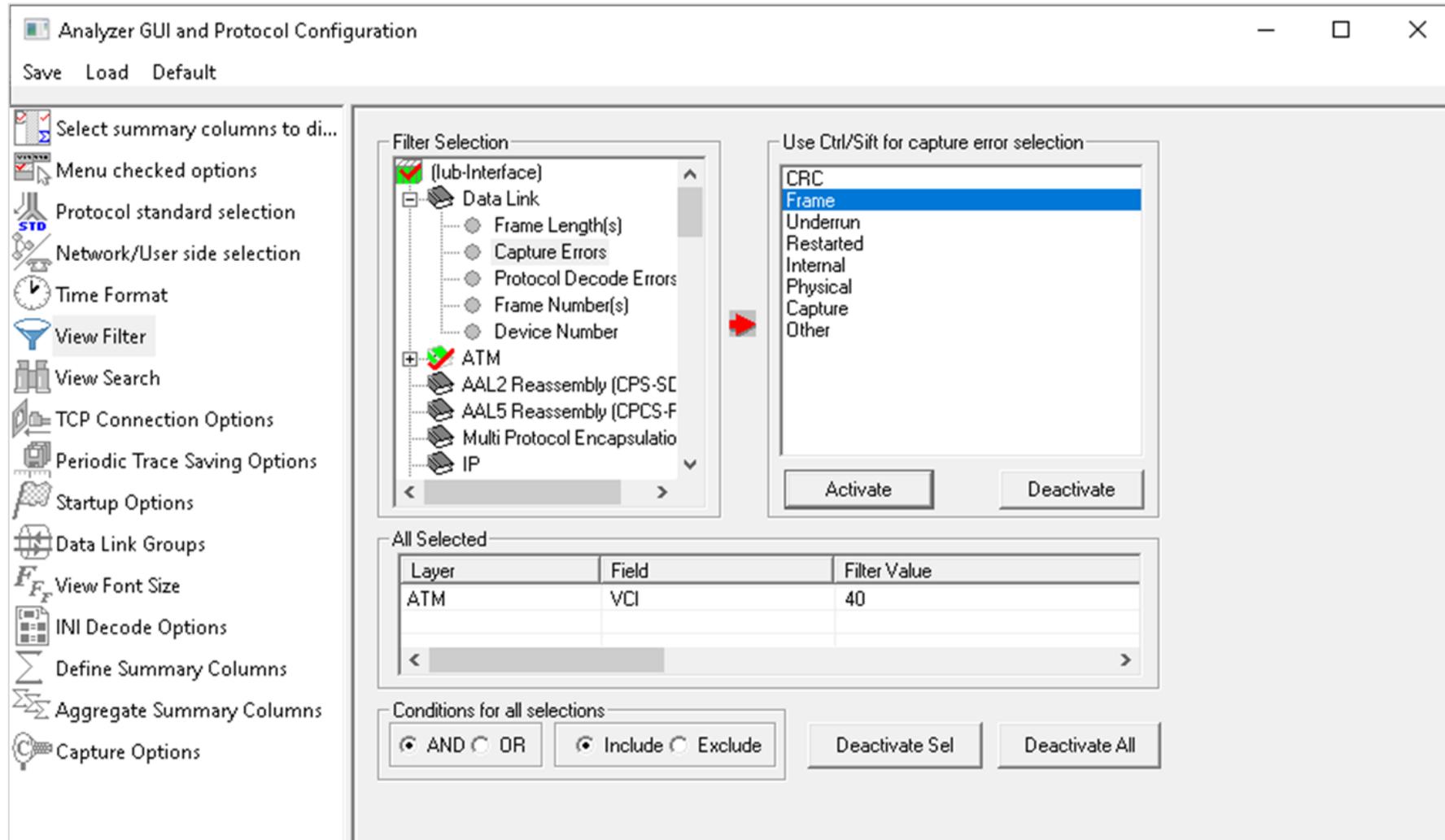
Red arrows indicate the flow of the process: from the "Set Filter Criteria as Sel Values" menu item to the dialog box, and from the dialog box to the configuration window.

Dev	TScount	Frame#	Time (Relative)	Len	Error	VPI ATM	VCI ATM	Procedure Co RANAP	Message Ty RR	Message Ty MM	Type of id MM
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



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 the UMTS Protocol Analysis software. It consists of four main components:

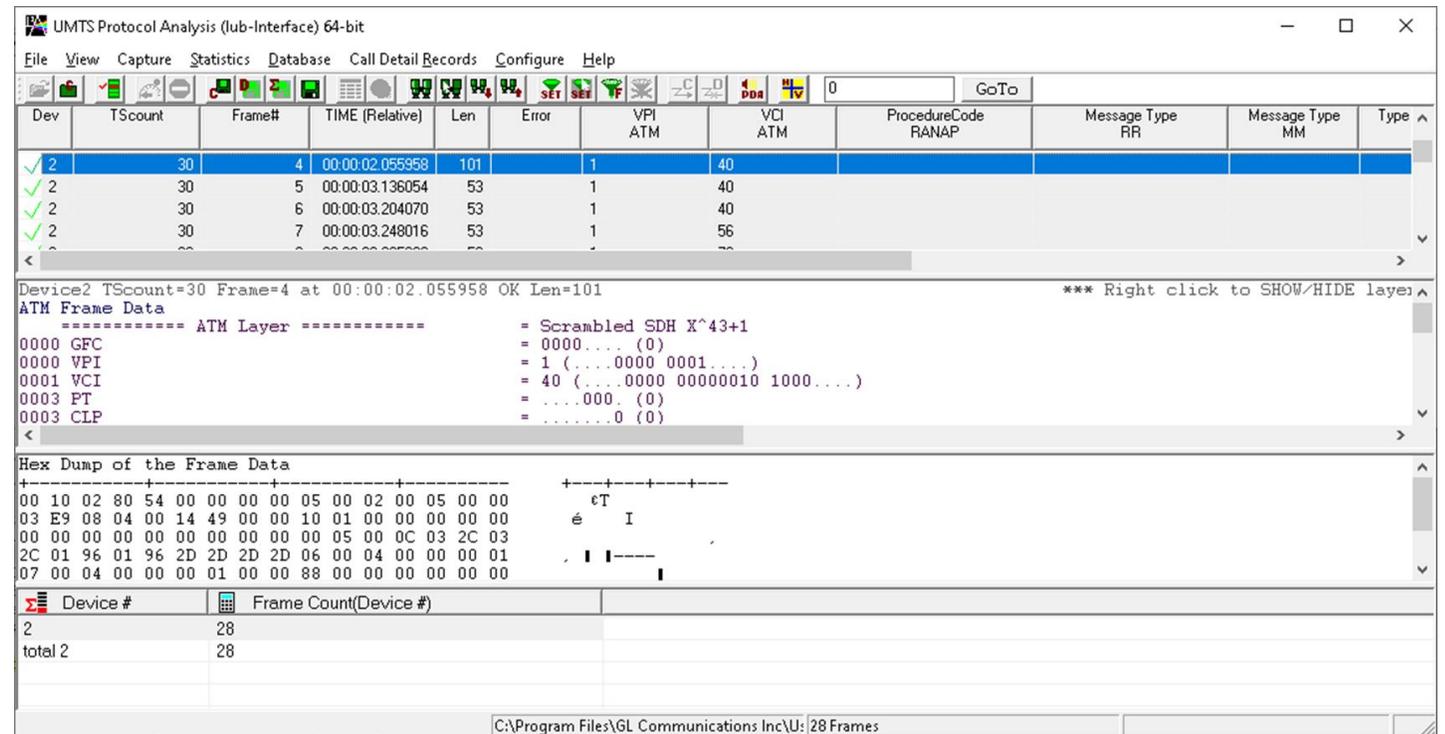
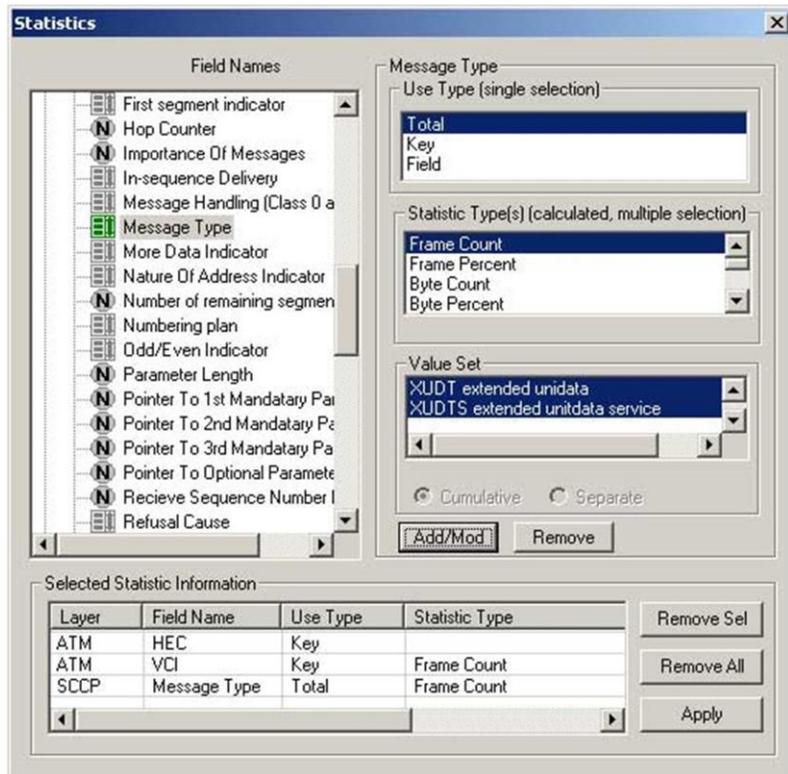
- Table:** A table showing protocol analysis data. The selected row is highlighted in blue.
- Context Menu:** A menu is open over the selected row, with the option "Set Search Criteria as Sel Values" highlighted.
- Dialog Box:** A dialog box titled "Use Ctrl, Shift for Extended Selection" is shown, containing a list of selected values: "ATM::VCI" and "ATM::VPI".
- Configuration Window:** The "Analyzer GUI and Protocol Configuration" window is shown, with the "Value Selection" section highlighted. The "All Selected" table is visible, showing the search criteria derived from the selection.

Dev	TScout	Frame#	ME (Relativ	Len	Error	VPI ATM	VCI ATM	ProcedureCo RANAP	Message Typ RR	Message Typ 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					

Layer	Field	Search Value
ATM	VPI	1

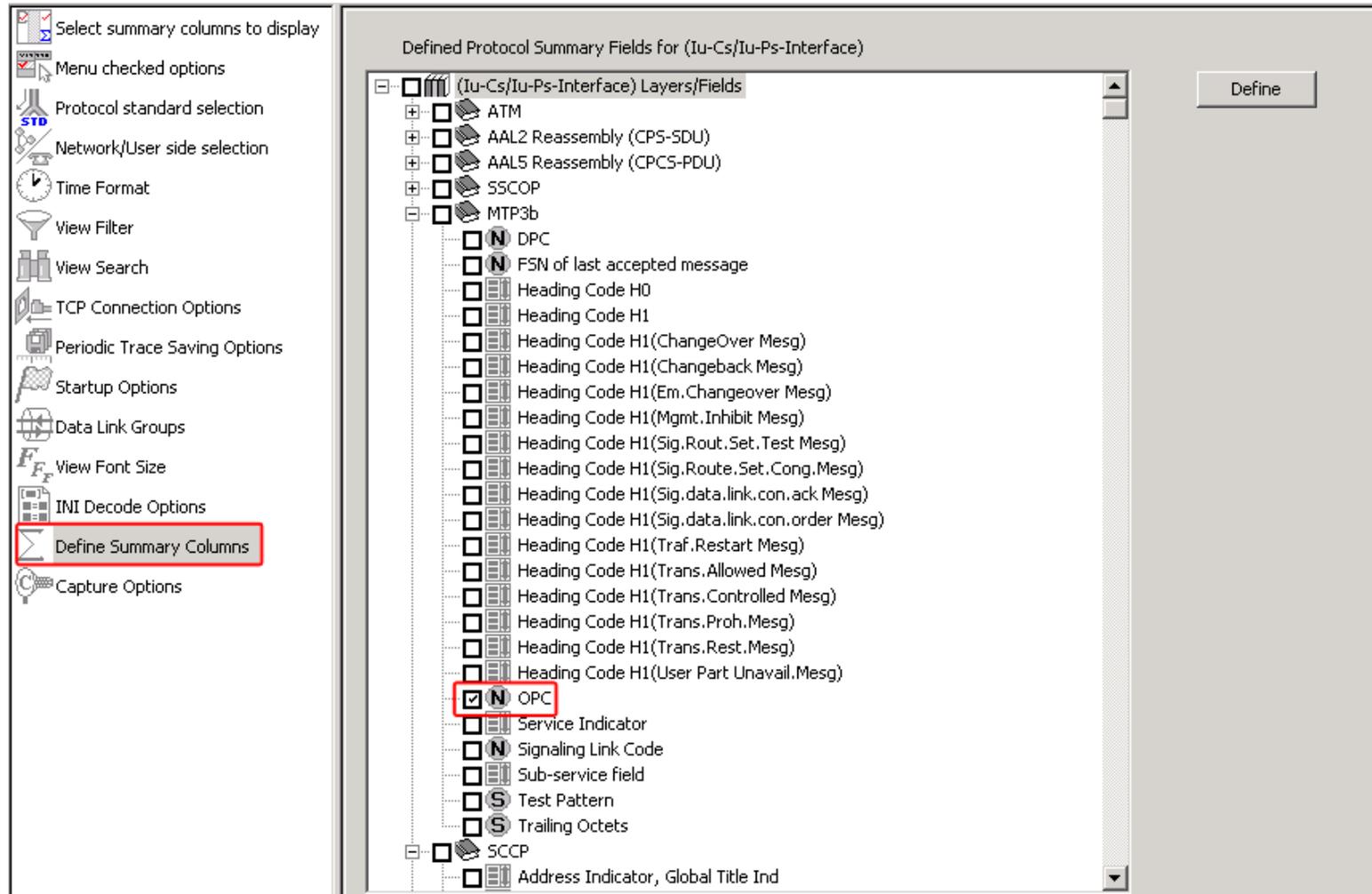
Statistics

- 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



Aggregate Summary Column

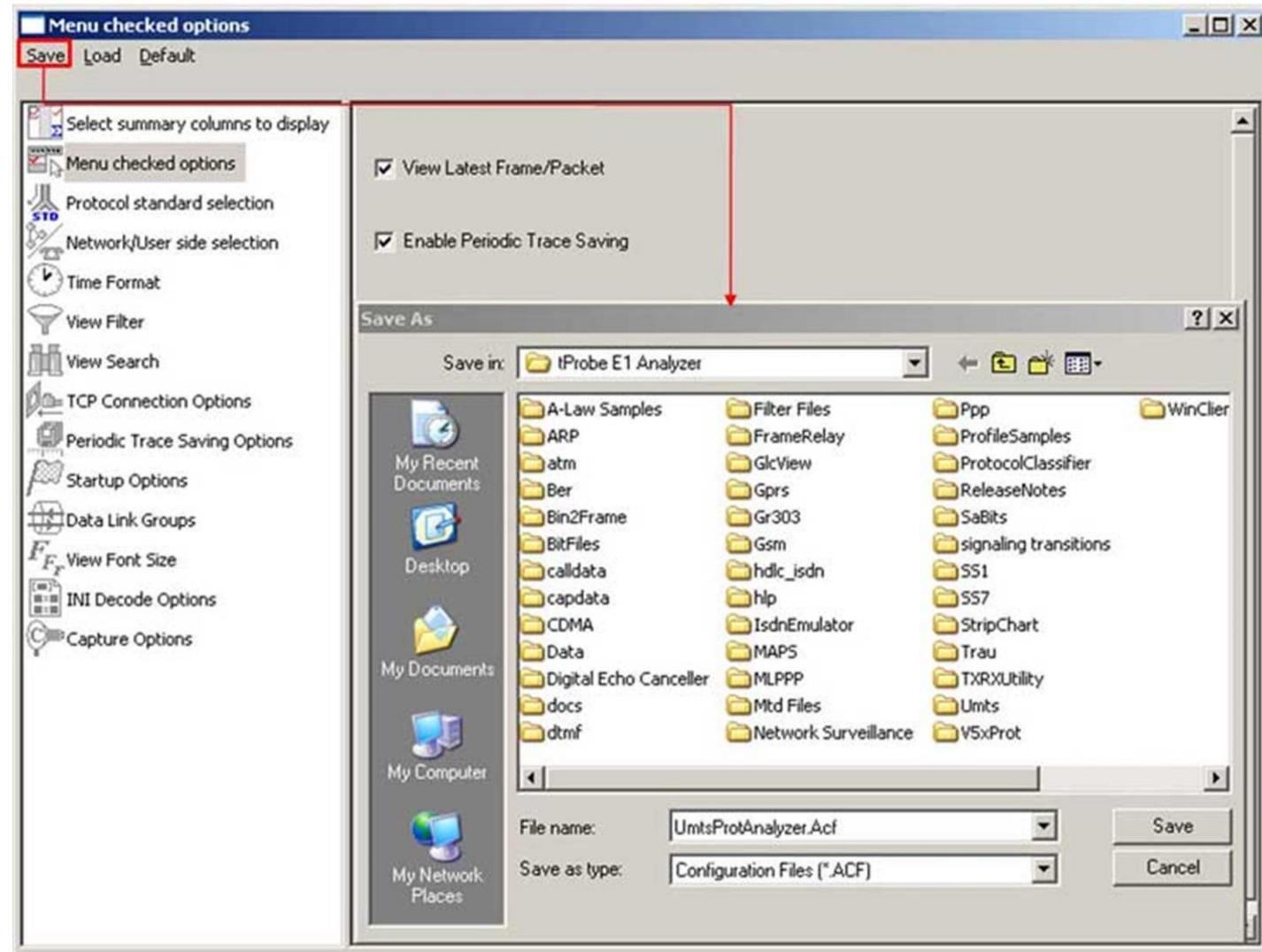
- The user can use this option to combine the two or more summary columns and remove unnecessary empty columns into a single Aggregate Summary Column

The screenshot shows the 'Aggregate Summary Columns' dialog box in the foreground. It has a menu bar with 'Save', 'Load', and 'Default'. Below the menu bar are several icons and labels: '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', and 'Capture Options'. The main area of the dialog contains a table with the following columns: 'Name', 'Display Format', 'Summary Columns', and 'Separator'. The table has one row with 'Message' in the 'Name' column, 'Concat' in the 'Display Format' column, 'Message Type_MM' and 'Message Type_RR' in the 'Summary Columns' column, and '---->' in the 'Separator' column. Above the table are buttons for 'Add', 'Delete', 'Aliases', 'Reorder', and 'Reverse', along with the text 'Use '_' in the name for multiline headers'.

In the background, the 'UMTS Protocol Analysis (Iub-Interface) 64-bit' window is visible. It has a menu bar with 'File', 'View', 'Capture', 'Statistics', 'Database', 'Call Detail Records', 'Configure', and 'Help'. Below the menu bar is a toolbar with various icons and a 'GoTo' field. The main area is a table with columns: 'Dev', 'TScount', 'Frame#', 'ME (Relatn)', 'Len', 'Error', 'Message Type', 'VPI ATM', 'VCI ATM', 'ProcedureCo', 'Message Ty', 'Message Ty', 'pe of iden', 'Identity', 'Message Ty', 'Messag'. The table contains 13 rows of data. A red box highlights the 'Message Type' column. Below the table is a text area showing the details of a frame: 'Device2 TScount=30 Frame=0 at 00:00:00.000000 OK Len=53'. The text area contains a detailed breakdown of the frame structure, including ATM Frame Data, AAL5 Reassembly (CPCS-PDU) Layer, and SSCOP 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!