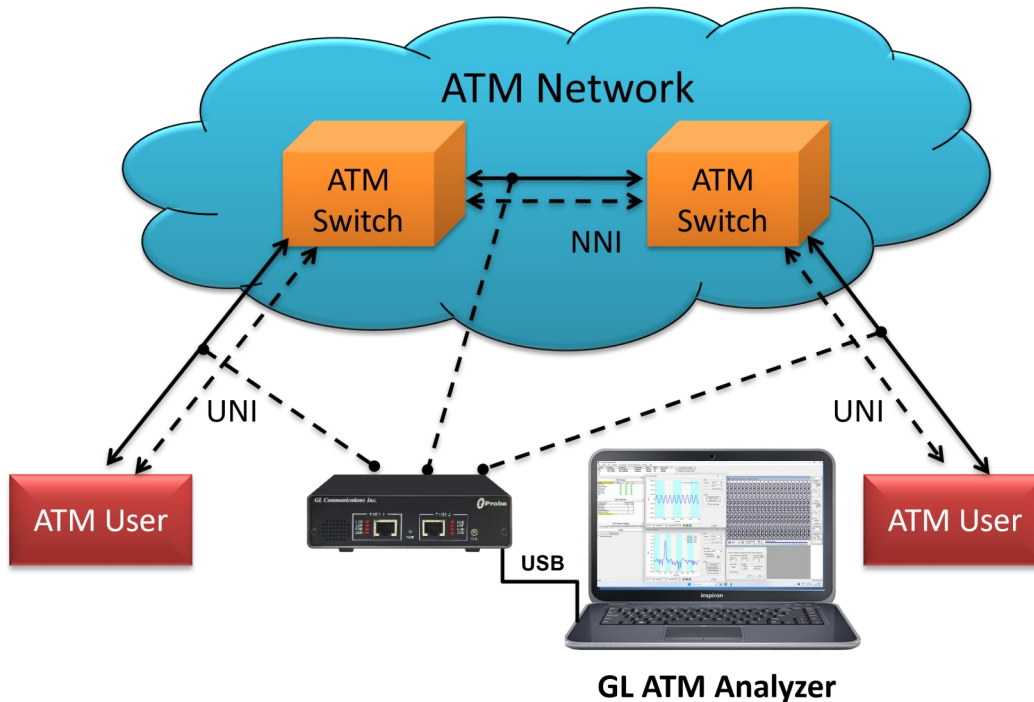


# ATM Protocol Analyzer



## Overview

GL's ATM Analyzer is used to analyze and decode different ATM protocols like ATM, AAL2 protocols (CPS-SDU, SSSAR-SDU, and SSSC), AAL5 (CPCS), UNI and others across U plane and C plane of UNI and NNI interface. The analyzer can also decode ATM frames constituting Classical IP over ATM, or CIP based networks, and High-Speed SS7 Links over ATM, IP Routing protocols such as BGP (Border Gateway Protocol), RIP (Routing Information Protocol), and OSPF (Open Shortest Path First).

The analyzer is also capable of capturing and reassembling frames that were transmitted with Inverse Multiplexing. IMA combines up to 8 T1 E1 links to form a single high-speed connection with flexible bandwidth options.

- Real-time ATM Analyzer (Pre-requisites: GL's T1 E1 internal cards or USB T1 E1 external units, required licenses and Windows® Operating System)
- Offline ATM Analyzers (Pre-requisites: Hardware dongle Windows® Operating Systems)

The ATM Analyzer can capture and reassemble frames that were transmitted with Inverse Multiplexing option. With Inverse Multiplexing over ATM (IMA) feature, up to 8 T1 E1 links can be configured to form a high-speed connection. ATM cells are transmitted across multiple interfaces in a cyclical fashion, and recombined to form the original stream.

For more details, visit [ATM Protocol Analyzer](#) webpage.



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## Main Features

### Display Features

- Displays Summary, Detail, Hex-dump, and Statistics Views
- Summary view displays Dev #, Time Slot, Frame #, VPI/VCI, PT (Payload Type), HEC, OSF, AAL Type, Frame Type, CID, LI, CPI, UUI, SSSAR CID, SSSC message type and more in a tabular format
- Detail View
  - Displays decodes of a user-selected frame from the summary view
  - Provides options to display or hide the required protocol layers
  - Contents of this view can also be copied to clipboard
  - Provides option to toggle detail view vertically or horizontally as feasible for the user
- Hex dump View displays the frame information in HEX and ASCII format, the contents of this view can also be copied to clipboard
- Statistics View displays statistics based on frame count, byte count, frames/sec, bytes/sec etc. for the entire capture data
- Any protocol field can be added to the summary view, filtering, and search features providing users more flexibility to monitor required protocol fields
- Call Detail View displays called/ calling number, released calls, call status, and more
- 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

### Supported Protocols

- UNI signaling protocols i.e. UNI 4.0, UNI 3.1 and UNI Q-293

### Filtering and Search

- Advanced filtering and search based on any user selected protocol fields
- Allows the user to automatically create search/filter criteria from the current screen selection

### Capturing Streams

- Streams may be captured on the selected time slots (contiguous or non-contiguous) and on full bandwidth
- 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
- Supports decoding of Classical IP over ATM, Multi-Protocol Over ATM, and SS7 signaling over ATM

### Export Options

- Exports Summary View information to a comma delimited file for subsequent import into a database or spreadsheet
- Capability to export detailed decode information to an ASCII file

### Record/Playback

- Recorded raw data can be played back using raw data playback application

### Remote Monitoring

- Remote monitoring capability using GL's Network Surveillance System

## Main Features (Contd.)

### Additional Features

- Unscrambling of ATM cells based on SDH  $X^{43} + 1$  algorithm
- Inverted or non-inverted data, byte reversal or non-reversal, with or without Inverse Multiplexing option
- Ability to configure .ini file for PVC carrying UNI signaling messages to get the proper decoding options
- Call trace capability based on UNI signaling parameters, VPI/VCI and others
- CRC verification for AAL5 carrying packet data
- Ability to configure .ini file for PVC carrying UNI signaling messages to get the proper decoding options
- The following variations are accommodated (in the T1 E1 software only): inverted or non-inverted data, byte reversal or non-reversal, with or without Inverse Multiplexing option
- Trace files for analysis can be loaded through simple command-line arguments
- Multiple trace files can be loaded simultaneously with different GUI instances for offline analysis

## Summary, Detail, and Hex dump Views

The analyzer displays Summary, Detail, and Hex dump in different panes. The Summary View displays Dev#, Time Slot, Frame#, Time, Length, Error, VPI/VCI, PT, HEC, OSF, AAL Type, Frame Type, CID, LI, CPI, UII, SSSAR CID, and so on. User can select a frame in Summary View to analyze and decode each frame in the Detail View. The Hex dump View displays the frame information in HEX and ASCII format. The contents of detail and hex dump view can also be copied to clipboard. The Statistics View helps to study the performance and trends in the ATM network based on protocol fields and different parameters.

The screenshot displays the ATM Protocol Analysis AAL2,5(UNI3.1) 64-bit software interface. The main window is titled "ATM Protocol Analysis AAL2,5(UNI3.1) 64-bit" and includes a menu bar (File, View, Capture, Statistics, Database, Call Detail Records, Configure, Help) and a toolbar. The interface is divided into several panes:

- Summary View:** A table listing captured frames. The columns are Dev, TScout, Frame#, TIME (Relative), Len, Error, Frame Type ATM, VCI ATM, VPI ATM, PT ATM, PID Multi Protocol Encapsulation, and Multi. The table shows five frames with Frame# 0 through 5, all with a length of 53 and no errors.
- Detail View:** Displays the selected frame (Device2 TScout=24 Frame=0) at 00:00:00.000000. It shows the ATM Frame Data structure with fields: GFC (0), VPI (0), VCI (0), PT (0), CLP (0), and HEC (85).
- Hex Dump View:** Shows the frame data in hexadecimal and ASCII format. The hex dump consists of several lines of 6A and 00 characters, followed by a vertical column of 'U' characters in the ASCII column.
- Statistics View:** A table showing the frame count for each device. Device # 2 has a frame count of 12775, and the total is 12775.

The status bar at the bottom indicates the file path: C:\Program Files\GL Communications Inc\U: 12 775 Frames.

Figure: Summary, Detail, and Hex dump Views

## Real-time and Offline Analysis

Users can capture and analyze UNI and NNI interfaces in real-time and record all or filtered traffic into a trace file. The recorded trace file can be transmitted using playback file application, used for offline analysis or exported to a comma-delimited file, or ASCII file.

ATM analyzer is capable of capturing and reassembling frames that were transmitted with bit inversion, octet bit reversion, user/network side, ATM mapping, scrambling, and inverse multiplexing (IMA). By default ATM supports IMA Frame Length equal to 128. User can configure IMA Frame Length ranging from 32, 64, or 256. The captured raw data.

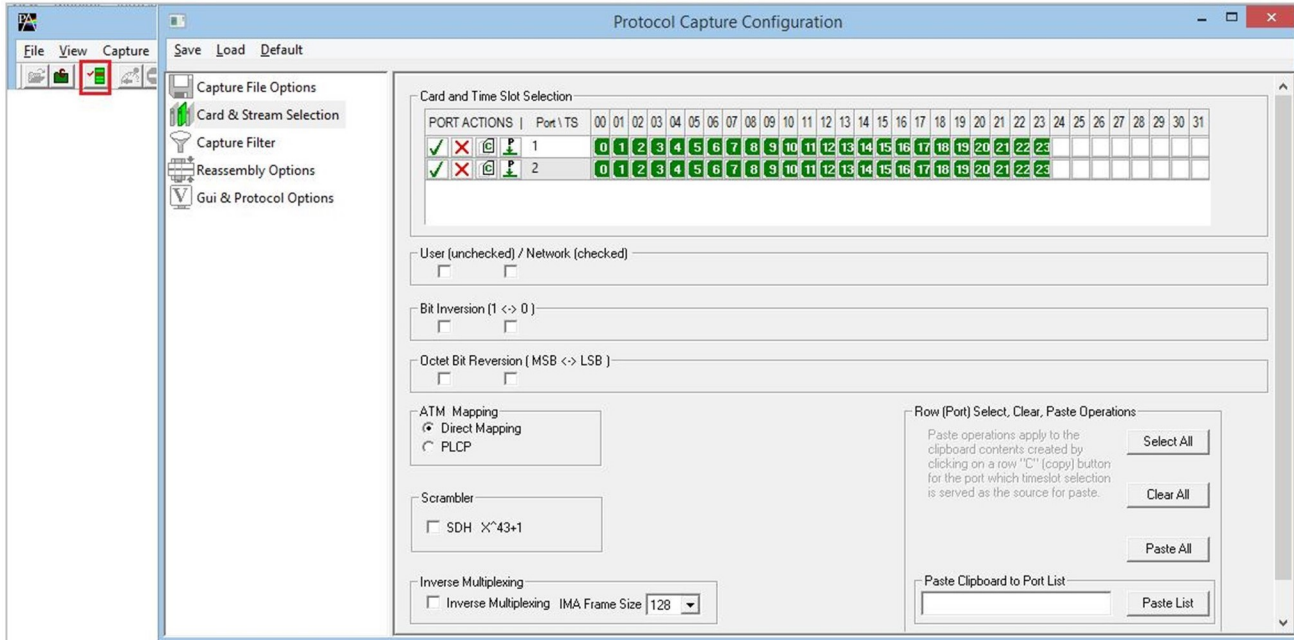


Figure: Stream / Interface Selection

## Filtering and Search

User can record all or filtered traffic into a trace file and also can create search/filter criteria automatically from the current screen selection. The filter and search options add a powerful dimension to the ATM Analyzer that isolates required frames from the captured frames in real-time/remote/offline. Users can specify custom VPI, VCI, and PT type values to filter frames during real-time capture. The frames can also be filtered after completion of capture based on Time Slot, Frame #, Time, Length, Error, VPI/VCI, PT (Payload Type), HEC, and more. Similarly, Search capability helps user to search for a particular frame based on specific search criteria.

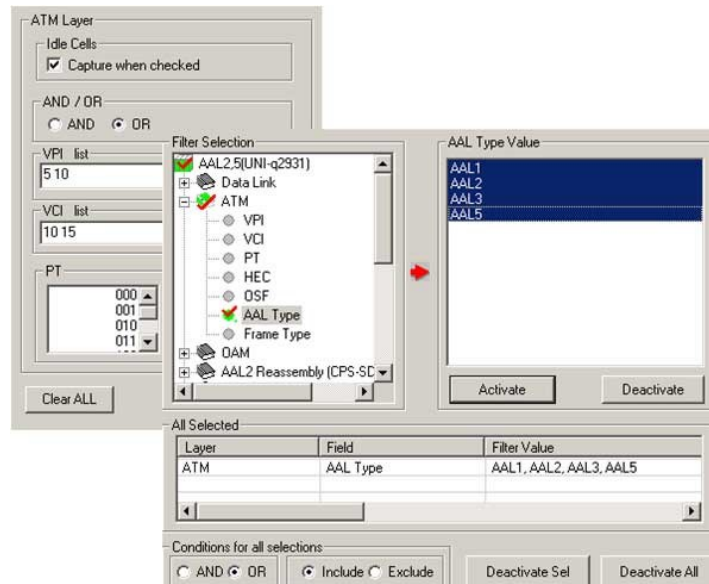


Figure: Real-time and Offline Filter

## Reassembly

Using reassembly option user can specify VPI /VCI value to reassemble using the segmentation and reassembly rules defined by the specified AAL type.

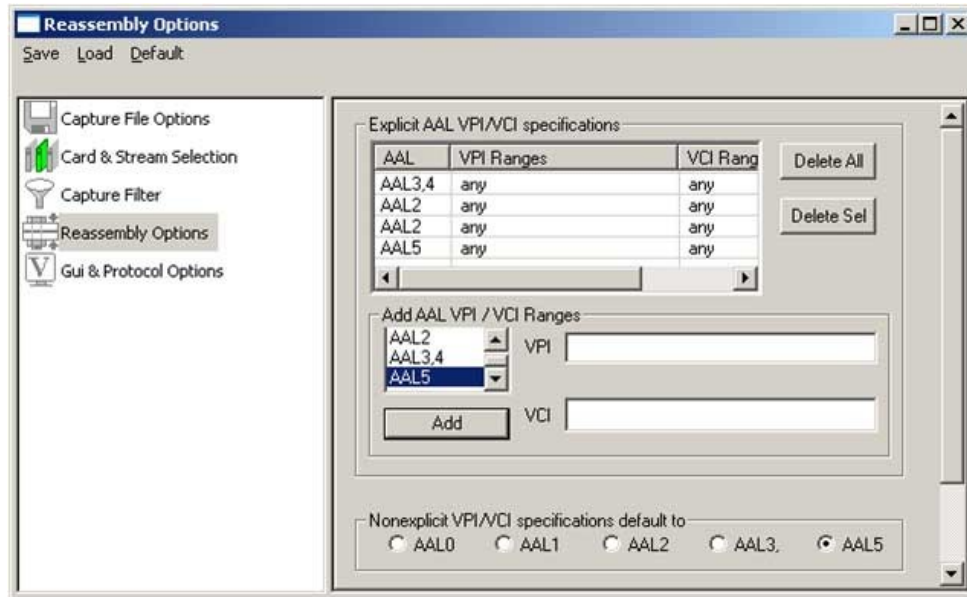


Figure: Reassembly Options

## Scripted ATM IMA Emulation using MAPS™

GL's IMA (Inverse Multiplexing over ATM) Emulator is available as optional client-server based application with GL's T1 E1 Analysis hardware. The IMA Emulator application can simulate the inverse multiplexing of an ATM cell stream over multiple physical links ( up to 16 T1 E1 ports) and retrieve the original stream at the far-end from these physical links.

For more details, visit [ATM IMA Emulator](#) webpage.

## Aggregate Column Group

The enhanced feature of the protocol analyzer is aggregate column groups. The user can also create multiple aggregate column groups and prioritize the groups as per the requirement to display the summary results in an efficient way.

If the user has five different aggregate columns and wants to prioritize some columns, the user can create a group of aggregate columns with the highest priority and will display only the columns of chosen priority. If the values are null, then the next group values are displayed. The aggregate columns comprising a group will have the same prefix and suffix index as ~0, ~1 ... ~N. The **group~0** is the root aggregate group that has the highest priority

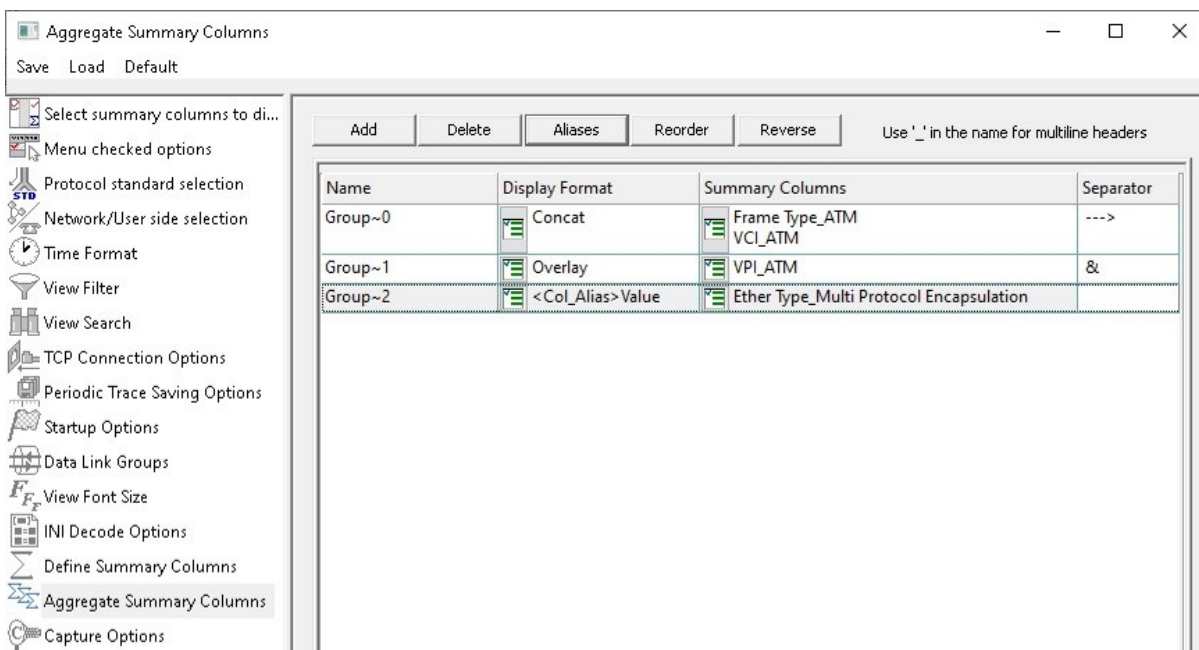


Figure: Aggregate Column Group

The updated results are as shown in the figure below. Here the root aggregate group~0 summary columns are displayed first and then Group~1 and Group~2 as per the assigned priority if the higher group values are null.

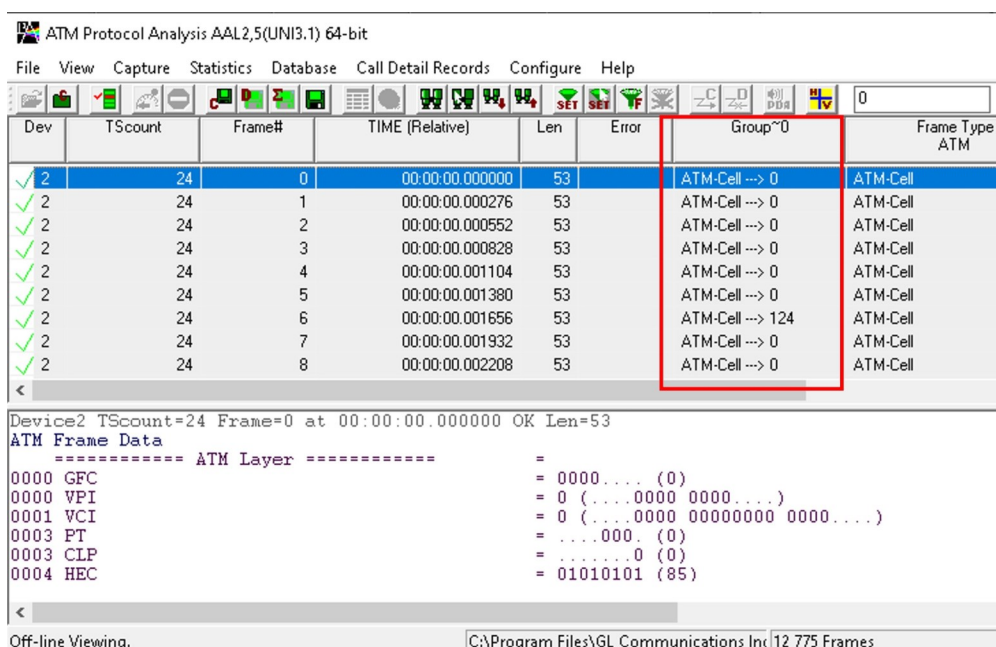


Figure: Aggregate Column Group Display

## Save/Load All Configuration Settings

Protocol Configuration window provides a consolidated interface for all the important settings required in the analyzer. This includes various options such as protocol selection, startup options, stream/interface selection, filter/search criteria and so on. Any protocol field can be added to the summary view, filtering, and search features from this GUI providing the users more flexibility to monitor required protocol fields. All the configuration settings can be saved to a file and then loaded for future operations. Users may also just revert to the default settings using the default option.

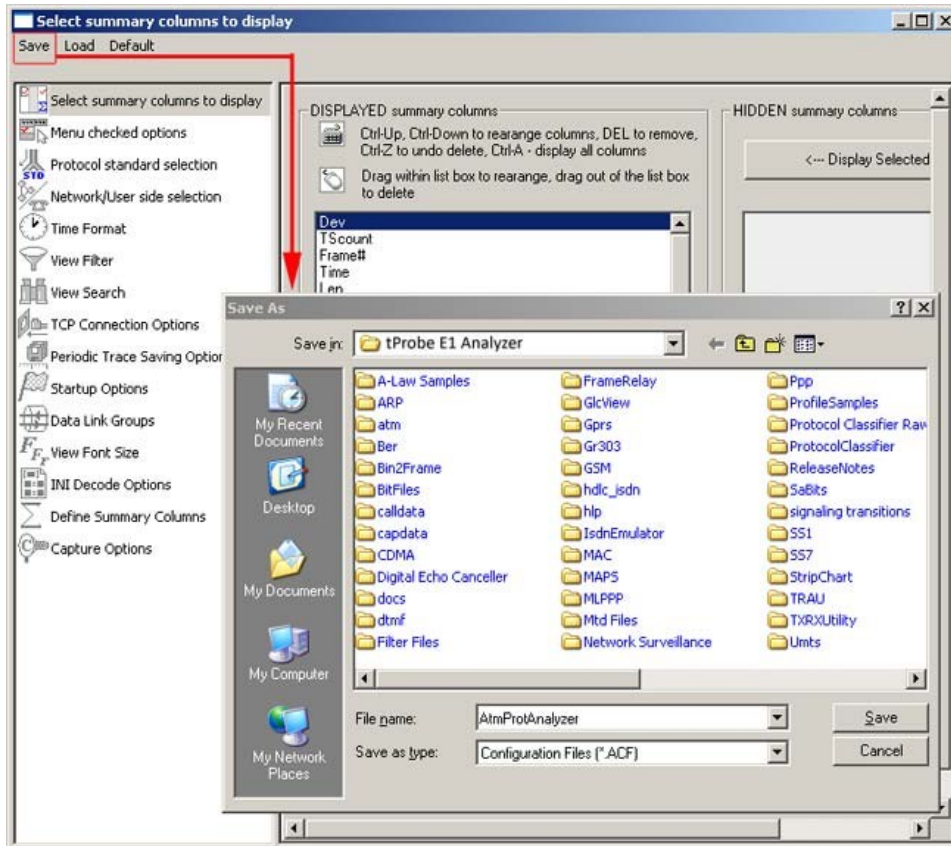


Figure: Save / Load Configuration

## Call Detail Record and Statistics View

Important call specific parameters like Call ID, Call disposition, Call duration, VPI/VCI, Call type (point-to-point/point-to-multipoint and more) calculated based on UNI signaling messages are displayed in Call Detail Record 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 ATM network based on protocol fields and parameters.

The screenshot displays two windows from the ATM Protocol Analysis software. The top window is the 'Statistics' dialog, and the bottom window is the main 'ATM Protocol Analysis AAL2,5(UNI-q2931)' interface.

**Statistics Dialog:**

- Field Names:** A tree view showing layers: Physical Link, ATM (AAL Type, CLP, Frame Type, GFC, HEC, Offset Field(OSF), PT, Parity(P), Sequence Number(SN), VCI, VPI), OAM, AAL2 Reassembly (CPS-SDU), SSSC, and AAL5 Reassembly (CPCS-PDU).
- AAL Type:** Use Type (single selection) with options: Total, Key, Field.
- Statistic Type(s) (calculated, multiple selection):** Frame Count, Frame Percent, Byte Count, Byte Percent.
- Value Set:** AAL1, AAL2, AAL3, AAL5.
- Options:**  Cumulative,  Separate.
- Buttons:** Add/Mod, Remove.
- Selected Statistic Information Table:**

Layer	Field Name	Use Type	Statistic Type
ATM	AAL Type	Total	Frame Count

**ATM Protocol Analysis AAL2,5(UNI-q2931) Main Window:**

- Menu Bar:** File, View, Capture, Statistics, Database, Call Detail Records, Configure, Help.
- Toolbar:** Standard software icons for file operations, capture, and analysis.
- Table 1: Call Detail Record**

Dev	T...	F...	TIME (...)	Len	VPI	VCI	PT	HEC	OSF	AAL ...	Frame Type
✓ 3	24	...	00:00:...	52	4	101	1	20		AAL2	CPS-Frame
✓ 3	24	...	00:00:...	50	4	101	1	20		AAL2	SSSAR-Frame
✓ 4	24	...	00:00:...	53	4	101	0	26	0	AAL2	ATM-Cell
✓ 4	24	...	00:00:...	52	4	101	0	26		AAL2	CPS-Frame
✓ 4	24	...	00:00:...	50	4	101	0	26		AAL2	SSSAR-Frame
✓ 3	24	...	00:00:...	53	4	101	1	20	0	AAL2	ATM-Cell
✓ 3	24	...	00:00:...	52	4	101	1	20		AAL2	CPS-Frame
✓ 2	24	...	00:00:...	50	4	101	1	20		AAL2	CPCS-Frame
- Table 2: Summary**

AAL Type	Frame Type	Frame Count(AAL Ty...)	Frame Count(Frame Ty...)
AAL2 (2)	ATM-Cell (0)	1390	1390
AAL2 (2)	CPS-Frame (1)	737	737
AAL2 (2)	SSSAR-Frame (2)	737	737
total AAL2 (2)	Total	2864	2864
- Table 3: Call Detail Record**

Call ID	Call Status	Calling Num	Called Num	Call Start Date & Time
- Status Bar:** C:\Program Files\Gl Commr 2864 Frames

Figure: Statistics and Call Detail Record View



## Supported Protocols Standards and Specifications

Supported Protocols	Specification Used
ATM	ITU-T I.361
AAL	ITU-T I.363
SSSAR	ITU-T I.366.1
SSCS	ITU-T I.366.2
AAL2	Class B (ITU-T I.363.2)
AAL5	Class C & D (ITU-T I.363.5)
SSCOP	ITU-T Q.2110
UNI	Q.2931 & Q.2971
UNI31	ATM User-Network Interface Specification Version 3.1
UNI40	ATM User-Network Interface Specification Version 4.0
OAM	IM for ATM Version 1.1 AF-PHY-0086.001 March, 1999
MAC	IEEE 802.3
IP	RFC 791
IPv6	RFC 2460, RFC 2402, RFC 2406
TCP	RFC 793
UDP	RFC 768
ICMP	RFC 792
ICMPv6	RFC 2463, 2461, 1885, 2894, 3122, 3810, 3775, 3971, 4286, 4066
Payload (Multiprotocol Encapsulation over AAL)	RFC2684
Classical IP and ARP over ATM	RFC 2225
MTP3b	ITU-T Q.2210
SSCF UNI	ITU-T Q.2130
SSCF NNI	ITU-T Q.2140
Border Gateway Protocol 4 (BGP-4)	RFC 1771, RFC 1997, RFC 2842, RFC 1965

## Buyer's Guide

Item No	Product Description
<a href="#">XX160</a>	T1 E1 Real-time ATM Analyzer
<a href="#">OLV160</a>	Offline ATM Analyzer

Item No	Related Software
<a href="#">XX020</a>	Record / Playback File Software
<a href="#">XX654</a>	Inverse Multiplexing over ATM Protocol Emulator

Item No	Related Hardware
<a href="#">PTE001</a>	tProbe™ Dual T1 E1 Laptop Analyzer (Require Basic Software)
<a href="#">FTE001</a>	QuadXpress T1 E1 Main Board (Quad Port)
<a href="#">ETE001</a>	OctalXpress T1 E1 Daughter boards (Octal Port)
<a href="#">XTE001</a>	Dual Express (PCIe) T1 E1 Boards

For more details, visit [ATM Protocol Analyzer](#) webpage.



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Item No	Product Description
<a href="#">XX160</a>	T1 E1 Real-time ATM Analyzer
<a href="#">OLV160</a>	Offline ATM Analyzer

Item No	Related Hardware
<a href="#">PTE001</a>	tProbe™ Dual T1 E1 Laptop Analyzer (Require Basic Software)
<a href="#">FTE001</a>	QuadXpress T1 E1 Main Board (Quad Port)
<a href="#">ETE001</a>	OctalXpress T1 E1 Daughter boards (Octal Port)
<a href="#">XTE001</a>	Dual Express (PCIe) T1 E1 Boards

Item No	Related Software
<a href="#">XX020</a>	Record / Playback File Software
<a href="#">XX654</a>	Inverse Multiplexing over ATM Protocol Emulator

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