

Introduction

Liberator Pro from Broadframe™ provides a cost-effective ADSL/SHDSL AAL5 packet Protocol Analyzer and a DSL Network Simulator for use in the development and testing of DSL equipment. Liberator Pro provides powerful protocol analysis capabilities to engineers and technicians by capturing, decoding and displaying the detailed contents of the DSL ATM AAL5 packets passed across a DSL line. Liberator Pro is the first protocol analyzer to provide the user with visibility of nested packet headers directly on the DSL line. Liberator Pro displays the contents of DSL-specific encapsulation protocols such as RFC1483/2684, PPPoA and PPPoE.

Features

- ◆ DSL Protocol Analysis for developing and testing DSL equipment and connections.
- ◆ Captures DSL ATM AAL5 packets in both directions on the DSL line attached to Liberator.
- ◆ DSL Protocol Support (protocol decode)
 - ATM AAL5 packets over DSL
 - RFC 1483/2684 LLC SNAP
 - RFC 2364 PPPoA VC MUX
 - RFC 2364 PPPoA LLC NLPID
 - RFC 2516 PPPoE
 - PPP LCP, CHAP, PAP and related protocols
 - IP, TCP and related protocols
 - Other decodes under development. Updates will be posted on the Broadframe web site when available.
- ◆ User-Friendly Protocol Analyzer GUI
 - Summary sub-window displays a single packet
 - Detail sub-window shows a complete decode of the selected packet.
 - Packets may be searched or filtered to simplify decode.
 - DSL encapsulation protocols are automatically detected.
- ◆ Full DSL Network Simulator (CO side)
 - Encapsulates several popular DSL protocols.
 - Configures and monitors DSL link parameters
 - Consult the Liberator Data sheet for more information
- ◆ Available support for ADSL and SHDSL interfaces.



Functional Description

Liberator Pro consists of the Liberator Pro chassis, DSL interface card, processor card, and application software than runs on the Central Office-side PC (CO PC). A complete system diagram is shown in Figure 1.

An DSL Customer Premises Unit (CPE, such as a modem, router, or IAD) connects to Liberator Pro over telephone cable. An DSL connection is established when the CPE and Liberator have synchronized (called showtime).

Liberator Pro and the CPE can pass data to one another. Most encapsulation protocols that run in the CPE are accepted and terminated in Liberator Pro's Network Simulator.

Liberator Pro is connected to the CO PC via 10BaseT Ethernet. The CO PC runs host applications (Web server, FTP server, etc.), and Graphical User Interface (GUI) software for Liberator Pro.

The Protocol Analyzer GUI captures and decode packets transmitted in both directions on the DSL line. The Network Simulator GUI configures network parameters, encapsulation protocols and DSL connection parameters. See the Liberator Data Sheet for additional information.

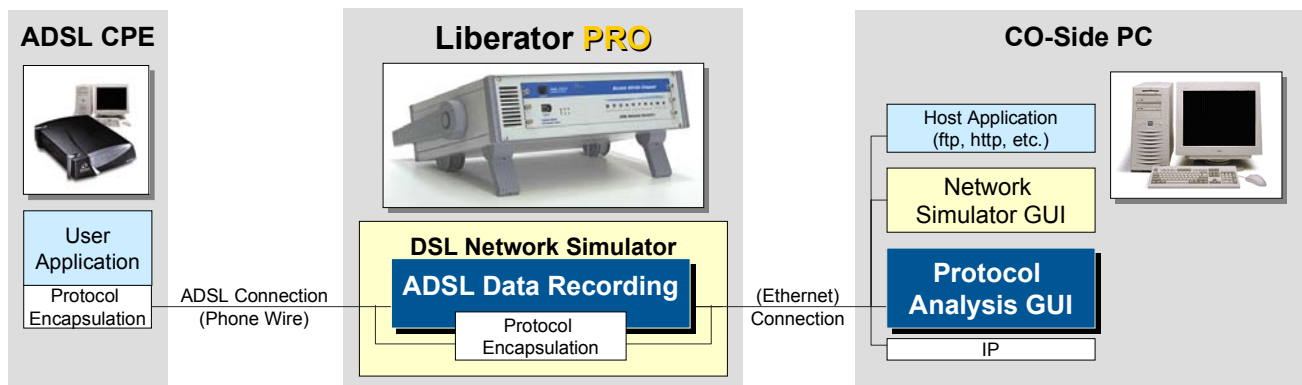


Figure 1 - System Diagram for Liberator Pro

Applications

Liberator Pro is compact and easy to use, which makes it ideal for many applications.

Developers use Liberator Pro to debug and regression-test their complex CPE encapsulation protocol software for such protocols as PPPoA and PPPoE. Programmers can compare the protocol handshake message exchanges between Liberator and CPE that successfully connect with message exchanges between Liberator and CPE under development or test.

Liberator Pro can show all the bytes and protocol layers in packets travelling across a DSL line which is critical in quickly resolving DSL networking and interoperability issues.

Graphical User Interface (GUI)

Liberator Pro is controlled by two GUIs that run on the CO PC. The Protocol Analyzer GUI allows the user to capture and decode DSL line traffic. Network parameters, encapsulation protocols and DSL connection parameters are controlled by the Network Simulator GUI.

Protocol Analyzer GUI Overview

The Protocol Analyzer GUI records, filters, and displays DSL AAL5 packets that run over a DSL connection. The interface is simple to use and similar to other popular interfaces.

- ◆ The window for viewing packets provides the user with two different perspectives. (Figure 2)
 - Summary view displays summary line for each packet and allows users to quickly navigate to packets of interest.
 - Selected summary packet is decoded in detail. The raw hex contents and the descriptive text for each protocol header is displayed in a second area.
- ◆ Two record modes are supported. "Wrap-around mode" or "record until full mode"
- ◆ Flexible packet filtering quickly reduces large packet files to retain only packets of interest.
- ◆ Find utility allows quick navigation.
- ◆ "MoreDetail" feature lets users quickly switch between levels of detail in the summary sub-window.
- ◆ Multiple Window/File functions.
- ◆ Packet recording files can be saved to disk at any stage of filtering and analysis.
- ◆ Previously saved files may be opened in multiple decode windows as needed.
- ◆ Multiple decode windows can be tiled to simultaneously display packet recordings side-by-side.
- ◆ Print the currently selected decode window screen display contents.

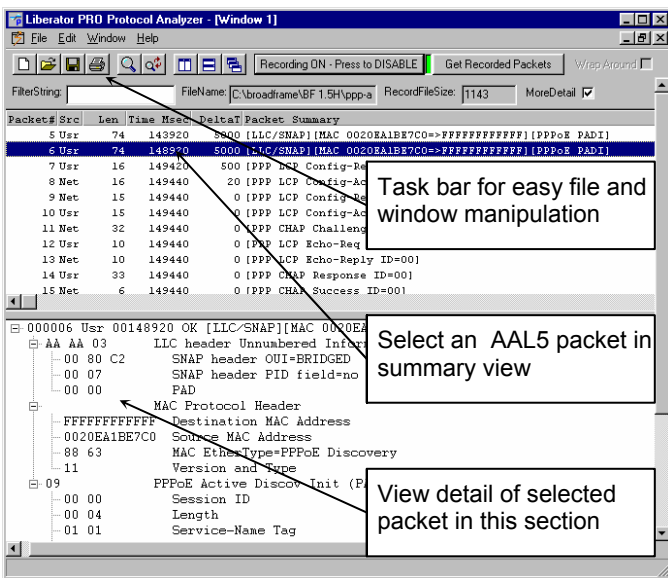


Figure 2 - Liberator Pro Protocol Analyzer GUI

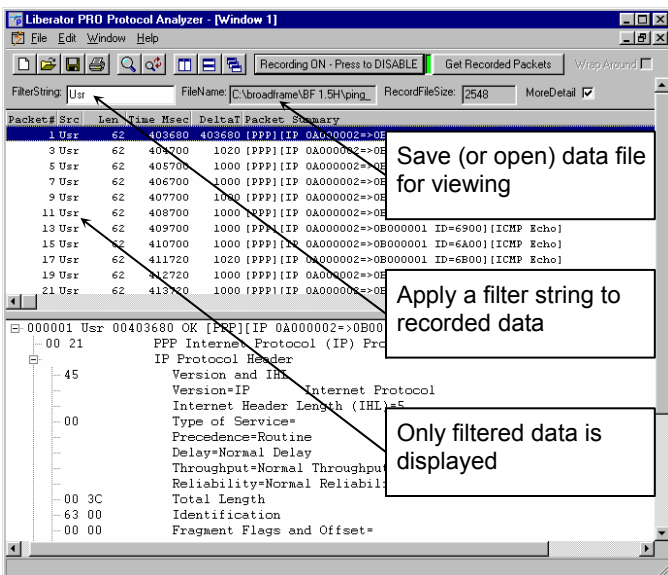


Figure 3 - GUI file and filter features

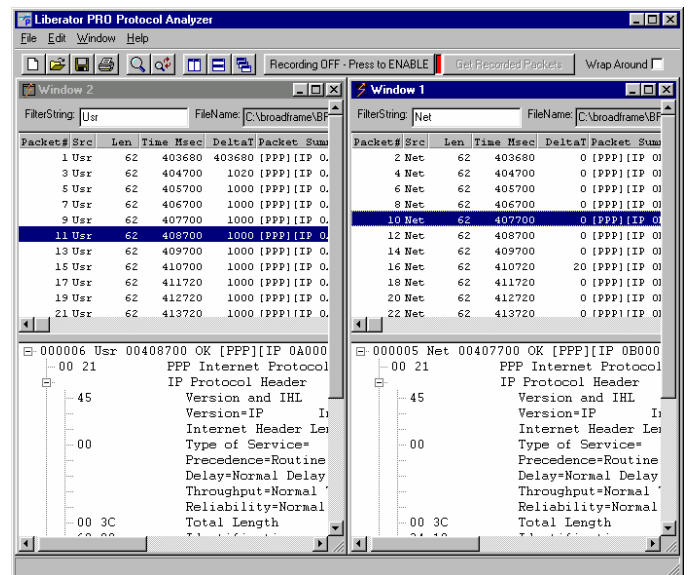


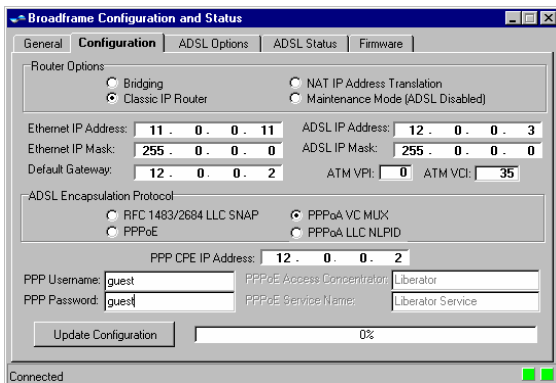
Figure 4 - View packet recordings side-by-side

Network Simulator GUI Overview

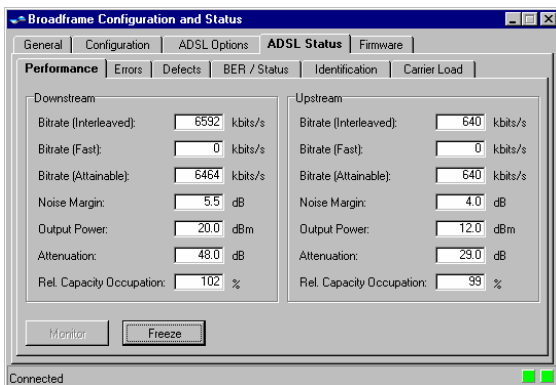
The user interface controls the following network and DSL functions of Liberator Pro:

- ◆ Configuring system parameters for Liberator Pro:
 - Encapsulation protocol selection
 - IP addresses, gateway, and PPP parameters
 - ATM VPI/VCI settings
- ◆ Command and control of the DSL CO chipset
- ◆ Liberator Pro firmware updates and upgrades may be downloaded from the Web and then flashed into Liberator.
- ◆ DSL chipset microcode downloads.

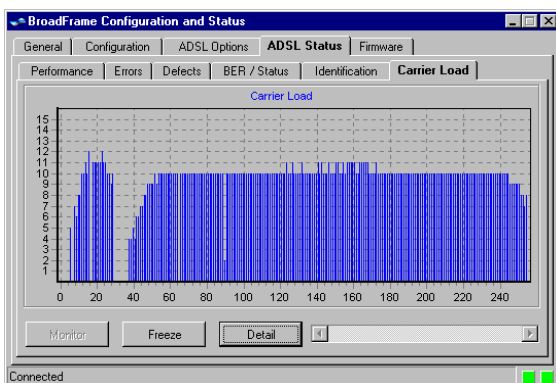
Consult the Liberator Data Sheet for more details.



Configure IP, ATM and PPP network parameters



Monitor DSL link operational data and performance



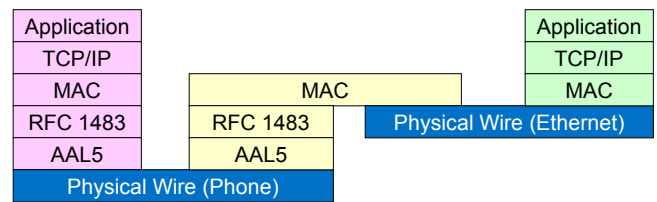
Monitor DSL upstream and downstream bits per tone

Encapsulation Protocol Support

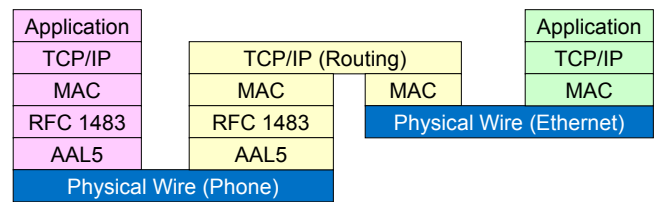
ITU and ANSI specify the Layer 1 standards for DSL; these specifications do not describe the higher level protocols. As a result, there are many data and voice protocols being deployed. Liberator Pro supports the following popular DSL encapsulation protocols:

- RFC 1483/2684 LLC/SNAP
- RFC 2364 PPPoA VC MUX
- RFC 2364 PPPoA LLC NLPID
- RFC 2516 PPPoE

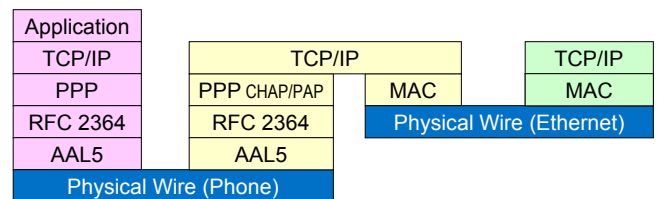
Other protocols are under development. Upgrades may be obtained as additional protocols are released.



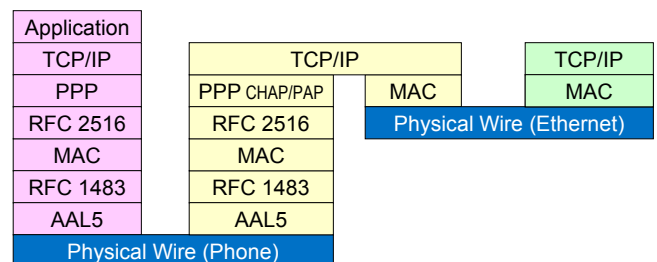
RFC 1483 LLC/SNAP Diagram - Liberator bridging



RFC 1483 LLC/SNAP Diagram - Liberator routing



RFC 2364 PPPoA Diagram



RFC 2516 PPPoE Diagram

Liberator Product Family

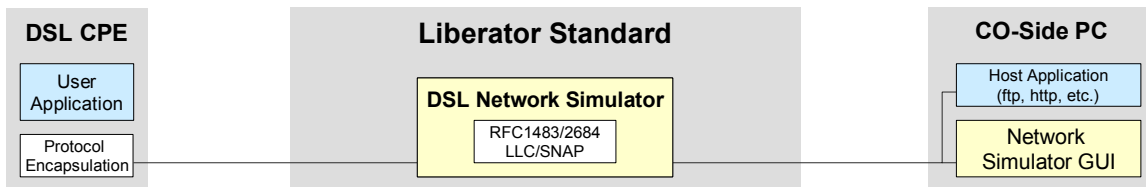
Standard System Configuration

Liberator connects directly to a DSL modem and functions as the DSLAM.



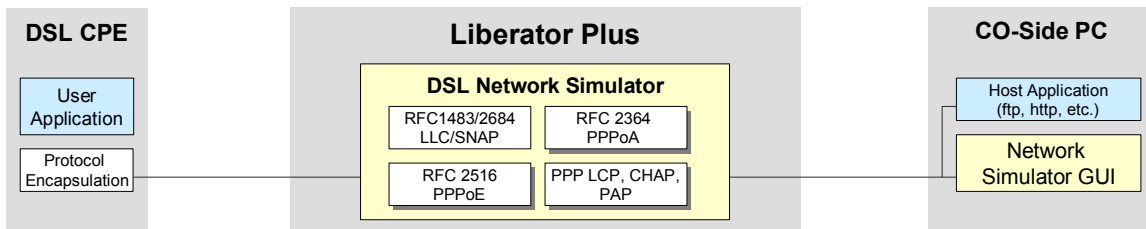
Liberator Standard

The Liberator Standard provides a basic network simulation and terminates the most common protocol, RFC 1483/2684. Liberator Standard may be upgraded to other Liberator products.



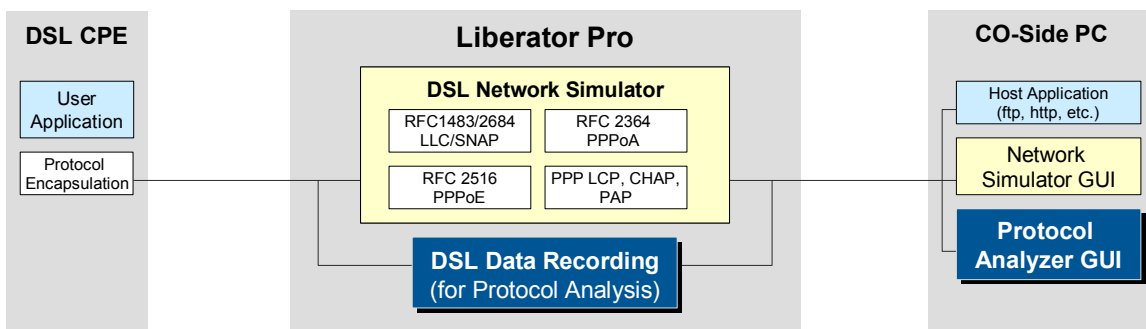
Liberator Plus

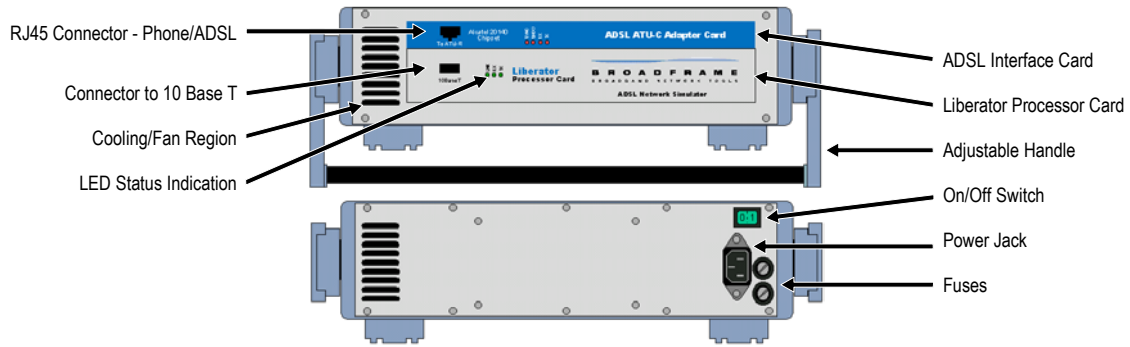
Liberator Plus adds a complete set of network termination options. PPPoE and PPPoA protocols are supported including a choice of PPP authentication protocols. Liberator Plus may be upgraded to other Liberator products.



Liberator Pro

Liberator Pro adds an end-point protocol analyzer to record and view all network traffic between the DSL modem and the network simulator inside of Liberator. A separate user interface on the CO-side PC configures and controls protocol analysis.





Mechanical/Electrical

Item	Limit
Power	
Voltage	100-240 VAC
Frequency	50/60 Hz
Power	100W (Maximum)
Fuses	2 x 2A, 250V fuse
Operating Environment	
Temperature	0 – 40°C
Humidity	10% to 90%, non-condensing
Dimensions and Weight	
Height *	3.46" (88.05 mm)
Width *	13.5" (343 mm)
Depth *	9.64" (245mm)
Weight	9 lbs (4.1 Kg)
Certification	
FCC	Complies with FCC Part 15 Paragraph 15.103(c)

* Excludes external handle dimensions.

Warranty

Liberator Pro is provided with a 90-day warranty, including parts and labor.

PC Requirements

The Broadframe Liberator Pro is controlled with a user-supplied CO PC. The CO PC configuration is defined below.

Item	Minimum	Recommended
CPU	Pentium II or Athlon	Pentium III or equivalent
Operating System	Windows 98	Windows 98, ME, 2000, or XP
Memory	128 MB	128 MB
HDD	1 GB free space	2 GB free space
Communications	10 Base T Ethernet & Hub	10/100 Ethernet & Hub
Misc.	CD-ROM drive	CD-ROM drive

Contact Information

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Order Information

Part No.	Product Name	RFC1483/2684 LLC/SNAP MPoA	RFC 2364 PPPoA	RFC 2516 PPPoE	End-point Protocol Analyzer	ST Micro (Alcatel) ADSL Chipset	Conexant (Globespan) SHDSL Chipset
L100-2	Liberator Standard ADSL Network Simulator	✓				✓	
L100-3	Liberator Plus ADSL Network Simulator	✓	✓	✓		✓	
L100-4	Liberator Pro ADSL Network Simulator	✓	✓	✓	✓	✓	
L101-2	Liberator Standard SHDSL Network Simulator	✓					✓
L101-3	Liberator Plus SHDSL Network Simulator	✓	✓	✓			✓
L101-4	Liberator Pro SHDSL Network Simulator	✓	✓	✓	✓		✓