BROADFRAME
BROADBAND NETWORK TOOLS

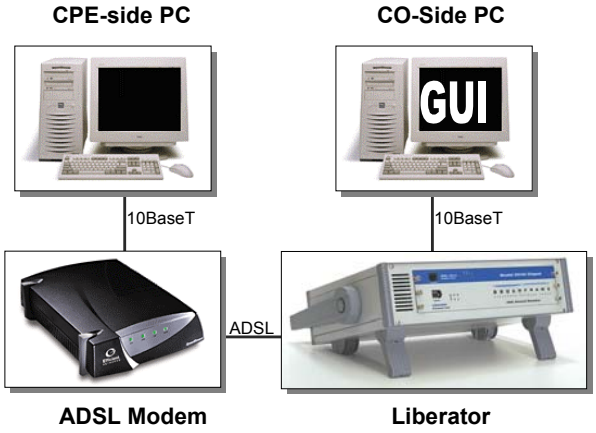
LIBERATOR
DSL Network Simulator

Introduction

The Broadframe™ Liberator provides a cost-effective network emulator/simulator for development, test and demonstration of ADSL and SHDSL CPE equipment. The Broadframe Liberator simulates an DSL Access Multiplexer (DSLAM), an access concentrator and a sample of Internet content to provide the appearance of a live Internet connection. Liberator is an excellent tool for DSL product developers, test engineers, test technicians, and field sales representatives who benefit from connecting their products to a virtual Internet in a controlled environment.

Functional Description

The Broadframe Liberator DSL Network Simulator consists of a chassis with one interface card, one processor card, and application software that runs on a Central Office-side PC (CO PC).



The interface card plugs into the Liberator chassis to provide a specific DSL interface. The first family of interface cards simulates a DSLAM based on chipsets from ST Microelectronics (Alcatel) and Conexant/Globespan.

The processor card features an advanced communications microcontroller, RAM and FLASH memory, and an Ethernet port. The processor card controls the Liberator system and connects via Ethernet to a user-supplied CO PC.

A simple Graphical User Interface (GUI) utility runs on the CO PC. The utility configures the Liberator system and controls such parameters as IP address and FLASH download.

A web server runs on the CO PC and acts as a virtual Internet for the user's application.

From a network view, the user's CPE product plugs into a simulated DSLAM (an interface card inside the Liberator) which connects via Ethernet to a virtual Internet. Once connected to the virtual Internet, the CPE product can ping IP addresses on the Internet side of the DSLAM. Connection to the Liberator virtual Internet allows the user to develop or demonstrate their application over a live network.

Features

- DSL Internet simulation for evaluation, development, testing, and demonstration of CPE equipment.
  - Supports ftp, ping, http
  - Connects to a virtual Internet with a user-supplied CO PC
- Powerful GUI provides extensive access and control of the DSL CO chipset that is not available with DSLAMs.
  - Analyze line performance reported by the chipset.
  - Monitor/set key parameters such as down/upstream bits rates, carrier mask, noise, power, HEC errors
- DSL Encapsulation Protocol Support
  - 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
- World's first DSL ATM AAL5 Packet Protocol Analysis utility (optional module).
- Chassis is portable and requires only 100-240V AC
- Interface Cards – ATU-C
  - ITU G.992.x compliant cards featuring
    - ST Micro (Alcatel) DynaMiTe chipset
    - Conexant (Globespan) chipset
    - Other chipsets under development
  - Easily download different chipset microcode revisions
- Embedded MPC860 Processor board
  - 8MB FLASH; program updates can be downloaded from the Internet and quickly flashed into Liberator.
  - 10BaseT port for connection to CO PC
- Utility Software
  - Simple, Quick Configuration of System Parameters
    - ATM VPC/VCI, DSL encapsulation protocol, IP addresses, PPP parameters
  - Liberator program code FLASH update
  - DSL chipset microcode download
  - Automated test remote control (using TCL)

User Interface

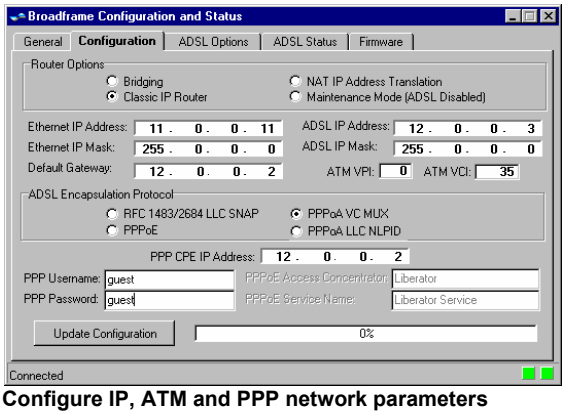
The user interface that configures, controls, and monitors the Liberator system is a Windows GUI application that runs on the CO PC.

Version 2.0 User Interface

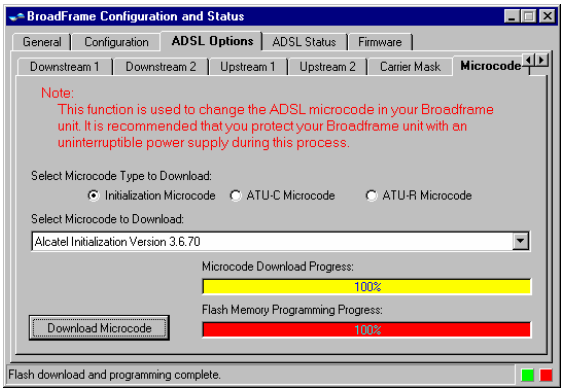
The Version 2.0 user interface controls the following functions of the Broadframe Liberator:

- Configuring system parameters for the Liberator system, including:
  - Encapsulation protocol selection
  - Liberator Ethernet and DSL IP addresses and default gateway
  - ATM VPI/VCI
  - PPP parameters such as login username, password, access concentrator name and service name

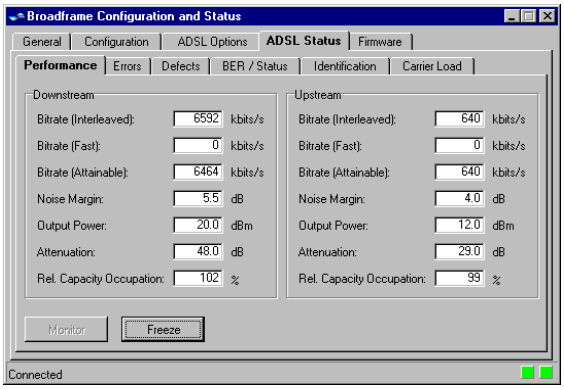
  Liberator ships with factory default system parameters, which are easily modifiable via the user interface.
- Extensive access and control of the DSL CO chipset that is not available with DSLAMs.
- Flash downloads – Liberator firmware updates and upgrades may be downloaded from the Web and then flashed into Liberator.
- DSL chipset microcode downloads.



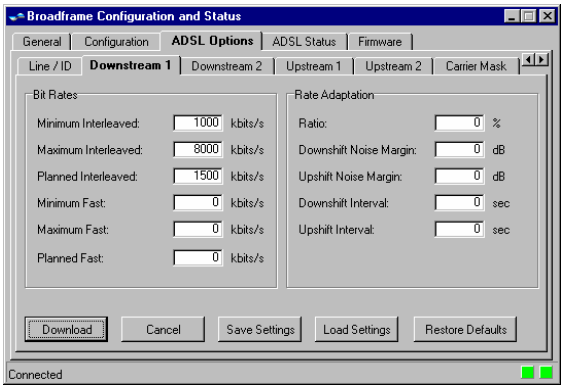
Configure IP, ATM and PPP network parameters



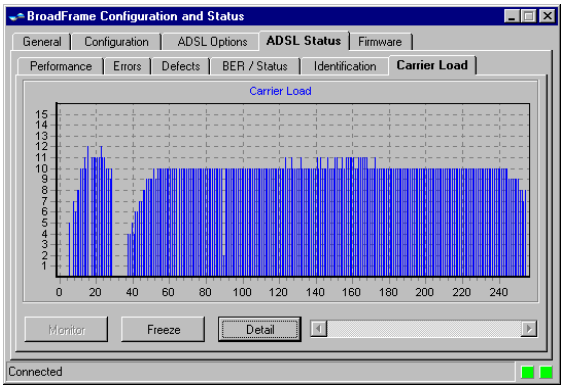
Load DSL chipset microcode



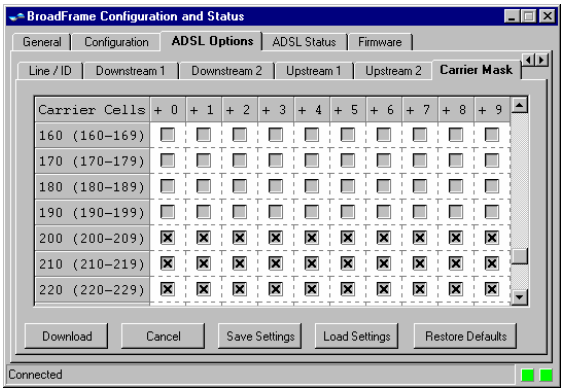
Monitor DSL modem operational data and performance



Configure DSL upstream and downstream parameters



Monitor DSL upstream and downstream bits per tone



Configure Carrier mask parameters for modem

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. The Broadframe Liberator supports the following popular DSL encapsulation protocols:

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

Other protocols are under development. Updates may be downloaded from the Broadframe web site as additional protocols are released.

Interface Cards

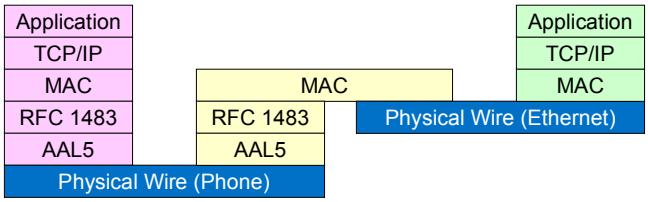
The DSL interface card provides an ATU-C connection to the user's CPE device. The Broadframe Liberator is an excellent platform to pre-test a CPE device for DSL interoperability. To facilitate interoperability testing, the Liberator will have optional ATU-C interface cards featuring chipsets from the leading ATU-C chipset vendors. All of these cards are ITU G.992.1 and G.992.2 compliant.

- ST Microelectronics/Alcatel DynaMiTe chipset
  - Featured in DSLAMs from Alcatel, the leading DSLAM vendor
- Conexant/Globespan G.SHDSL chipset.

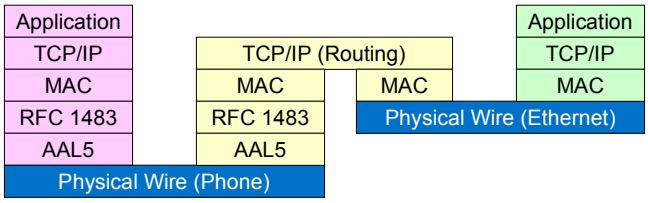
Applications

The Broadframe Liberator is portable and easy to configure, which makes it ideal for many applications.

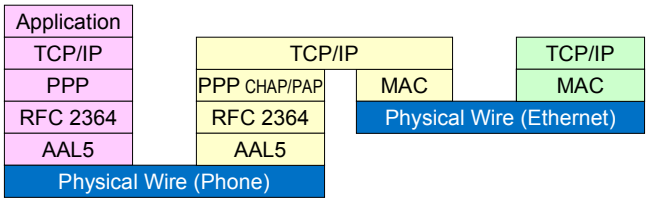
- Initial development of a CPE product when modem synchronization and basic network connection needs to be established on new designs.
- DSL interoperability and conformance testing of CPE products.
- Performance analysis over a controlled DSL connection.
- Demonstration device for DSL equipment in virtually any location.
- Tester for simple functional verification of CPE products.



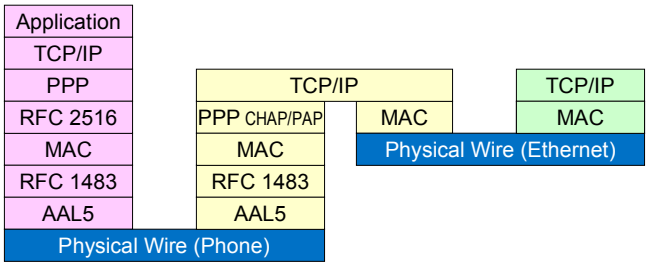
RFC 1483 LLC/SNAP Diagram - Liberator bridging



RFC 1483 LLC/SNAP Diagram - Liberator routing



RFC 2364 PPPoA Diagram



RFC 2516 PPPoE Diagram

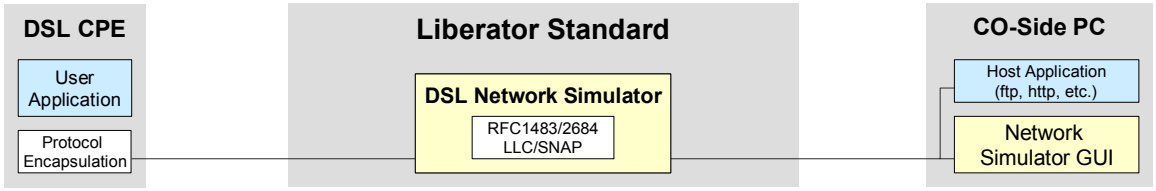
Liberator Product Family

Standard System Configuration

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

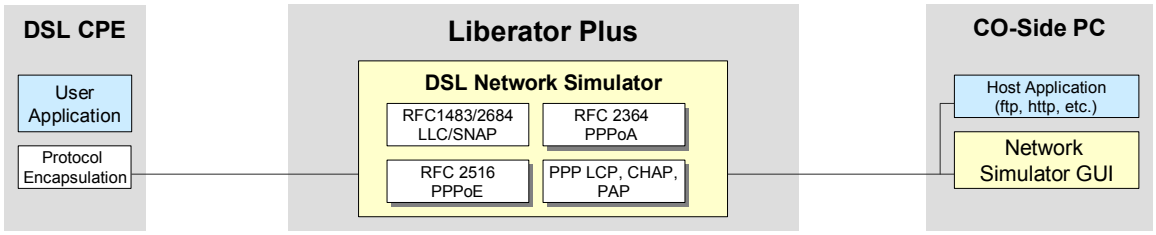
Liberator Standard

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.



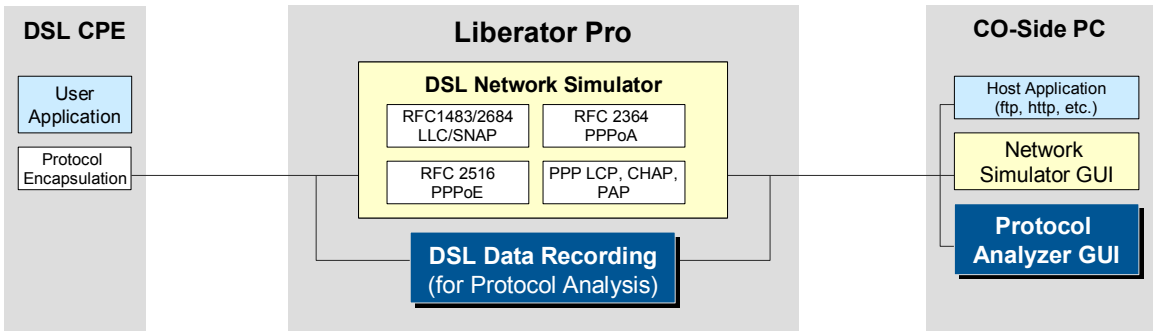
Liberator Plus

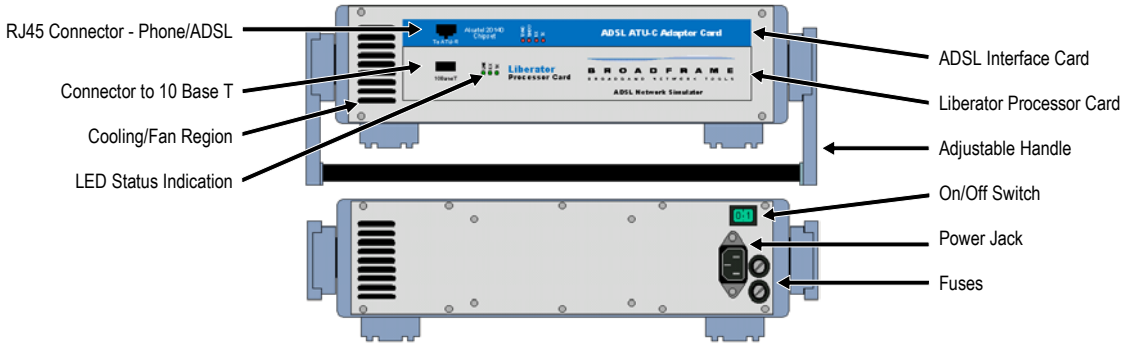
Liberator Plus adds a complete set of network termination options. PPPoE and PPPoA protocols are supported including a choice of PPP authentication protocols. Liberator Plus may be upgraded to other Liberator products.



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 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	✓	✓	✓	✓		✓