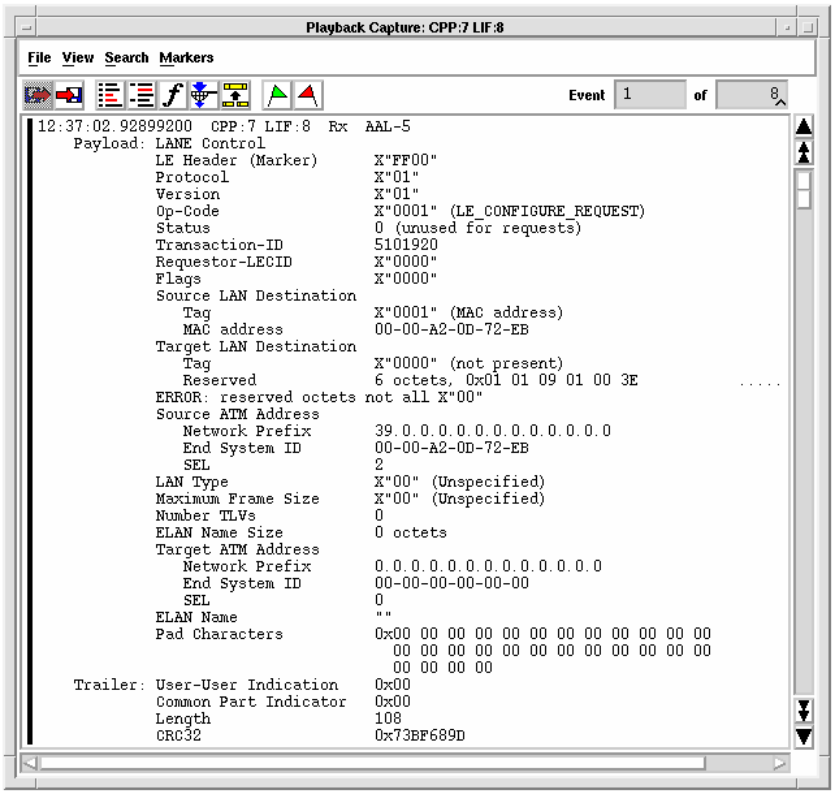
LAN Emulation Test Software

For the HP Broadband Series Test System

E6272B



Traffic captured from local area networks emulated over ATM networks is decoded and displayed as per ATM Forum standards.

The HP E6272B LAN Emulation Test Software decodes and displays traffic captured from ATM networks emulating local area networks as per the ATM Forum's LAN Emulation Over ATM Version 1.0 and LAN Emulation Over ATM Version 2.0 – LUNI specifications. It also decodes and displays over 100 local area network (LAN) protocols so that encapsulated LAN packets carried over the emulated LAN can be examined.

Specifically, it displays:

- LAN emulation control messages passed between a LAN Emulation Client (LEC) and LAN Emulation Configuration Server (LECS), LAN Emulation Server (LES), and Broadcast and Unknown Server (BUS)
- LAN emulation data messages passed between LAN emulation clientS

Product Features

- Decodes and displays the ATM Forum's LAN Emulation v1.0 and v2.0 control and data frames
- Decodes and displays over 100 different LAN protocols suchas IP stack, Appletalk, DECnet, etc., embedded within LAN Emulation data frames
- Real time decode and display of LAN Emulation control and data frames and the embedded LAN protocols

Typical Applications

The E6272B functionally verifies LAN emulation implementations for customer premise equipment manufacturers who develop products designed to connect to ATM services. Such products fall into two categories: devices such as hubs, routers, bridges and switches which connect IEEE 802.3 Ethernet or IEEE 802.5 Token Ring networks to ATM backbones; and ATM network interface cards used by workstations to communicate over an emulated LAN.

In both cases, it is necessary to verify that:

- The client obtains configuration parameters from a configuration server
- The client connects properly to a configuration server
- The LES resolves LAN Emulation Address Resolution Protocol (LE_ARP) requests and/or passes them to other clients for resolution
- The BUS properly distributes broadcast and unknown frames to all members of the emulated LAN
- Communication between LANE clients is established, and LAN data traffic is transferred properly

Network operators will also wish to verify these functions during field trials and interoperability tests.

Key Features

LAN emulation control and data frame monitoring

Decodes and displays all fields in LAN emulation control and data frames. Decoded control frame fields include op-codes, status, LEC identifiers, source and target LAN MAC addresses, source and target ATM addresses, and type/length/value fields. Frames carrying IEEE 802.3 Ethernet and IEEE 802.5 Token Ring data frames are also decoded; all fields are decoded including the LEC_ID header, the Ethernet or Token Ring frame header, and the source and destination MAC addresses.

Protocol error isolation

Errors are automatically detected and indicated on screen. Decoded fields are verified for valid frames.

PDU reassembly into LAN emulation packets

Cells can be reassembled into AAL-5 protocol data units and decoded into LAN emulation frames. Powerful hardware-based reassembly allows real-time decoding and display; can also be done off-line. Select specific virtual paths and channels for reassembly.

Decodes over 100 LAN protocols to examine encapsulated LAN packets

Protocol suites which are decoded include: Appletalk, Banyan Vines, Berkeley Services, DARPA, DECnet, IBM NetBIOS, IBM/SNA, ISO, Microsoft LAN Manager/X, Novell Netware, SUN, TCP/IP, X11, XEROX/XNS, and XWINDOWS.

Multiport Monitoring

When monitoring LAN emulation implementations, you can use the BSTS to view control and data frames in real-time, or capture them for further analysis.

The BSTS captures and decodes LAN emulation messages into an English-language display using the same terminology found in standards documents. Errors are automatically detected and highlighted on-screen, complete with explanatory messages.

Large 8 MB capture memory

Data can be captured and analyzed —an 8 MB capture memory buffer is available for extensive analysis. Complete control is available; continuously capture with memory buffer lapping, or trigger on user-defined events.

Multiport capability

Multiple test ports can be configured per session. You can add additional line interfaces and cell protocol processors (up to the number of free slots in your BSTS chassis) for even more test ports.

Programmable filters & triggers increase test productivity

Since high-speed broadband networks generate large volumes of data, the E6272's filtering capabilities let you increase your testing productivity by drilling down to the specific data of interest. Triggers can be used to capture data matching a specific pattern or after a user-specified event occurs -- great for tracking down intermittent problems!

Applicable Standards

- ATM Forum af-lane-0021.000, LAN Emulation Over ATM Version 1.0, January 1995
- ATM Forum af-lane-0050.000, LAN Emulation Over ATM Version 1.0 Addendum, Letter Ballot, December 1995
- ATM Forum/95-1081R3 LAN Emulation Over ATM Version 2.0 - LUNI Specification, Draft 3, August 1996

Configuration and Use with Other BSTS Hardware and Software

The E6272B LAN Emulation Test Software requires a minimal Broadband Series Test System hardware configuration of a chassis, E4209A or E4209B Cell Protocol Processor, and any ATM cell-based line interface. Two cell protocol processors and line interfaces are recommended since LAN emulation protocols are full duplex; two receivers are required to capture both sides of the protocol exchange across the UNI. Since the E6272B tests higher layer protocols above the ATM layer, the E4212A AAL Test Software is also needed.

Use With Other BSTS Software

Several related products can be used in conjunction with E6272B software to provide additional test functionality. The E7293A ATM Forum LAN Emulation 1.0 Test Software, the E4214 UNI Signalling Test Application, the E6273A ILMI Test Software, and the E4215B LAN Protocols Test Software. For the latest series of BSTS products, please visit the BSTS web site at **WWW.hp.com/go/bsts**

Warranty & Support Options

HP Broadband Series Test System software and firmware products are supplied on transportable media such as disk, CD-ROM or integrated circuits. The warranty covers physical defects in the media, and defective media is replaced at no charge during the warranty period. When installed in an HP Broadband Series Test System, the software/firmware media has the same warranty period as the product.

This test software has no components requiring calibration.

Documentation Included

- User's Guide
- Programmer's Guide
- Product Release Notice

Part Numbers

- **E6272B** LAN Emulation Test Software
- **E4200A/B** BSTS Form-7 Transportable Chassis
- **E4210A/B** BSTS Form-13 Mainframe Chassis
- **E4209A/B** Cell Protocol Processor

Technical Specifications

Monitoring Features

Multiport Testing	• Single- or dual-port test capability per session • Monitor independently on each test port • Synchronized timestamps correlates events from multiple physical test ports • Shows activity from both test ports (live or captured) merged in chronological order into a single display
Capture Memory	• Large 8 MB capture buffer
Decode Displays	• Summary mode; displays a single line description of each PDU • Detailed mode; displays a multi-line description of each event with field-by-field decoding; includes header/trailer and payload options • Hex mode; displays the entire PDU in hexadecimal • Timestamps; toggle on/off the display of timestamps • Port identifier; toggle on/off the display of the VXI slot number of the Cell Protocol Processor module and line interface module from which the data was captured; also indicates whether the captured data was transmitted or received
Save to Disk	• Save all captured data, or a portion, to a named disk file • Save as ASCII text, ATM cells or AAL-5 PDUs

Decode Errors

Decode Errors	• Invalid LE-HEADER • Truncated frame • Invalid PROTOCOL value • Invalid VERSION value • Undefined OP-CODE • Invalid STATUS • Invalid REQUESTER-LEC-ID • Undefined FLAG bit/s • Undefined or wrong SOURCE-LAN-DESTINATION value • Undefined or wrong TARGET-LAN-DESTINATION value • Invalid SOURCE-ATM-ADDRESS • Undefined LAN-TYPE • Undefined MAXIMUM-FRAME-SIZE • Non-zero NUMBER-TLVS • Invalid ELAN-NAME-SIZE • Non-zero ELAN-NAME • Invalid TARGET-ATM-ADDRESS • Missing TLV parameters • Invalid 802.5 control value

Filters

Filter Controls	• Protocol layer • All events, no events, specified events, non-specified events
Filter Criteria	• Bit string match
Library Support	• Save filter with name to disk • Load filter from disk

Decoded Protocols

Protocol Suites	• Appletalk • Banyan Vines • Berkeley Services • DARPA • DECnet • IBM NetBIOS • IBM/SNA • ISO • Microsoft LAN Manager/X • Novell/IPX • SUN • TCP/IP • X11 • XEROX/XNS
AppleTalk	• Ethernet Link Access Protocol (ELAP) • Appletalk Address Resolution Protocol (AARP) • Datagram Delivery Protocol, Small Header (DDP) • Datagram Delivery Protocol, Long Header (DDPL) • Name Binding Protocol (NBP) • Appletalk Echo Protocol (AEP) • Routing Table Maintenance Protocol (RTMP) • Appletalk Transaction Protocol (ATP) • Appletalk Data Stream Protocol (ADSP) • Appletalk Session Protocol (ASP) • Printer Access Protocol (PAP) • Zone Information Protocol (ZIP) • Appletalk Filing Protocol (AFP)
Banyan VINES	• VINES • Network Layer Protocol (VINES IP) • Echo Protocol (VINES_ECHO) • Sequenced Packet Protocol (VSPP) • Remote Procedure Call (VRPC)
Berkeley Services	• Remote Print (LPR) • Remote Login (RLOGIN) • Remote Shell (RSHELL) • Remote Execution (REXEC) • Remote Who (RWHO)

DARPA	• Address Resolution Protocol (ARP) • Reverse Address Resolution Protocol (RARP) • Internet Protocol (IP) • Internet Control Message (ICMP) • Internet Gateway Routine Protocol (IGRP) • Exterior Gateway Protocol (EGP) • Gateway to Gateway Protocol (GGP) • Border Gateway Protocol (BGP) • Open Shortest Path First (OSPF) • User Datagram Protocol (UDP) • Transmission Control Protocol (TCP) • Routing Info Protocol (RIP) • Finger • Telnet • File Transfer Protocol (FTP) • Simple Network Management Protocol (SNMP/SNMPv2) • Domain Name Services (DNS) • Time Services Protocol (TIMED) • Simple Mail Transfer Protocol (SMTP) • Network Time Protocol (NTP) • Bootstrap Protocol (BOOTP) • Trivial File Transfer Protocol (TFTP)
DECnet	• DECnet Architecture Routing Protocol (DNAR) • Network Services Protocol (NSP) • Session Control Protocol (SCP) • Local Area Transport Protocol (LAT) • Maintenance Operations Protocol (MOP) • System Communication Architecture (SCA) • Data Access Protocol (DAP) • Network Command Terminal (CTERM) • Network Information & Command Exchange (NICE)
FDDI SMT	• Station Management (SMT)
IBM NetBIOS	• Network Basic Input Output System (NetBIOS) • Server Message Block (SMB)
IBM/SNA	• Transmission Header (SNATH) • XID (SNAXID) • Request/Response Header (SNARH) • Data Flow Control (SNAD) • Functional Management Control (SNAFMD) • Network Control (SNANW) • Session Control (SNASC) • Management Services (SNAMS)

ISO	• Connectionless Network Protocol & End System -- Intermediate System (CLNP) • Transport Protocol (COTP) • Session Protocol (SESS) • Presentation Protocol (PRES) • Application Protocol (APPL) • Association Control SE (ACSE) • Reliable Transfer SE (RTSE) • Remote Operations SE (ROSE) • X.400 Message Transport Service (MTS) • X.500 Directory Access Protocol (DAP)
Microsoft LAN Manager/X	• Datagram Service (LMX_DG) • Name Service (LMX_NS) • Session Service (LMX_SS)
Novell/IPX	• Service Advertising Protocol (SAP) • IPX Diagnostics (IPXDIAG) • Network Core Protocol (NCP)
SUN	• Remote Procedure Call (RPC) • Network File System (NFS) • Yellow Pages (YP & YPBIND) • MountPort Mapper (PMAP) • Lock Manager Protocol (LOCKD) • Boot Parameter Protocol (BOOTPMD) • Stats Server Protocol (STATD) • PC Network File System (PCNFSD)
TCP/IP	• See DARPA
X11	• X Windows Version 11 (X11)
Xerox/XNS	• Internetwork Datagram Protocol (IDP) • Internet Packet Exchange (IPX) • Routing Info Protocol (RIP) • Echo Protocol (ECHO) • Error Protocol (ERROR) • Packet Exchange Protocol (PEP) • Sequenced Packet Exchange (SPX) • Sequenced Packet Protocol (SPP)

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E4200/E4210 Broadband Series Test System (BSTS)

The E4200/E4210 Broadband Series Test System (BSTS) is the industry-standard ATM/BISDN test system for R&D engineering, product development, field trials and QA testing. It offers:

- The widest variety of standard interfaces
- The broadest, most powerful range of signalling capabilities
- Complete, automated conformance testing
- Time-saving features for monitoring, emulation, simulation, load generation, performance and automated testing.

The HP BSTS is modular to grow with your testing needs. And, because we build all the BSTS products without shortcuts according to full specifications, you'll catch problems other test equipment may not detect.

For more information

For an introduction to the modular Broadband Series Test System, please request the *HP Broadband Series Test System* product catalog, HP publication 5091-7870E or visit the BSTS web pages at http://www.hp.com/go/bsts.

The *BSTS Ordering Guide*, HP publication 5964-0393E, helps you determine the appropriate system configuration for your testing needs. Technical specifications detailing other dedicated test modules and test software packages for the BSTS are also available.

How to Find Out About Other HP Products, Publications & Services

For more information on Hewlett-Packard Test & Measurement products, publications or services, please call your local Hewlett-Packard sales office. A current listing is available at http://www.hp.com.

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Specifications subject to change.

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