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LAN/9000 Series 800 Link

HEWLETT PACKARD

For HP 9000 Series 800 Computers

The LAN/9000 Series 800 Link provides all the necessary hardware to interface between an HP 9000 Series 800 computer and an IEEE 802.3 Carrier-Sense Multiple Access with Collision Detection (CSMA/CD) Local Area Network. Also included in the link product is networking software corresponding to layers 1 through 5 of the Open Systems Interconnect (OSI) Reference Model and node management software. Users can choose to write their own software to access NetIPC or Berkeley Sockets or choose one of the higher level networking software products provided by Hewlett-Packard.

The LAN/9000 Series 800 Link, together with Network Services/9000 enable an HP 9000 Series 800 computer to communicate not only with other HP 9000 Series 800 computers but also with the HP 1000 A-Series, HP 9000 Series 300, HP 9000 Series 500 and Digital Equipment Corporation VAX™ (running VMS™) families of computers over a single coaxial cable.

For those users needing multi-vendor communications, the LAN/9000 Series 800 Link can also be used with ARPA Services/800. ARPA Services/800 provides defacto networking software as defined by the Department of Defense Advanced Research Project Agency (ARPA) and the Berkeley Software Distribution (BSD) UNIX® 4.2 system.

For existing networks that use Ethernet hardware and need to transfer Ethernet-type packets instead of 802.3, both NS/9000 and LAN/9000 Link can be configured to operate accordingly. ARPA Services/800 will always transfer Ethernet-type packets.

Key Features

- A complete link connection to the local area network coaxial cable, which includes hardware and transport software to ensure a reliable connection.
- Operational compatibility with IEEE 802.3 and Ethernet Rev. 1.

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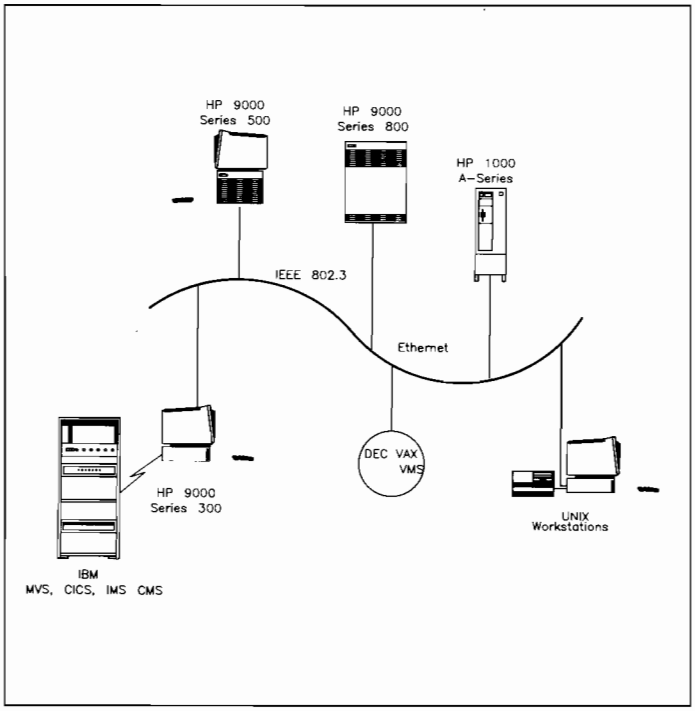

Series 800 in a Multi-vendor Environment

- 10 Megabits/second burst transfer rate.
- Carrier-Sense Multiple Access with Collision Detection (CSMA/CD) protocol controls network access without centralized control. All nodes have equal access.
- Any node may be connected or disconnected while the network is active.
- Microprocessor-driven interface controller that minimizes Series 800 overhead associated with communications line handling.
- Network transport software based on defacto industry-standard Department of Defense Advanced Research Projects Agency (DARPA) protocols, corresponding to the transport and network layer functions.
- Integrated node management software provides on-line network configuration and logging. An example of on-line network configuration would be adding another node without having to shut down the network.

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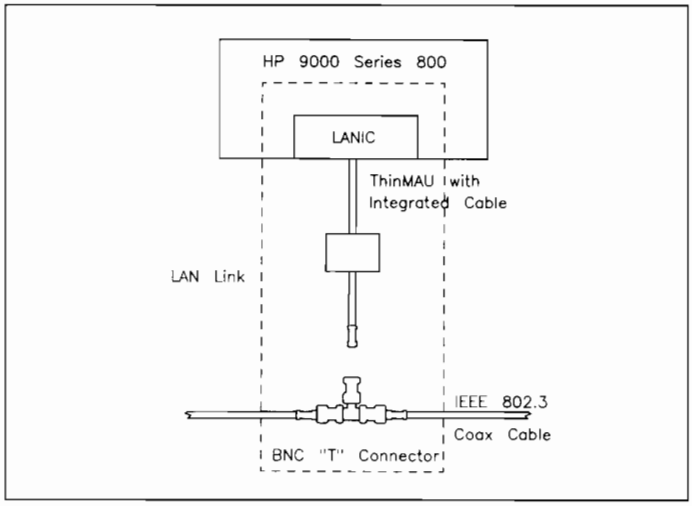
Hardware Components

The following diagram shows the three major hardware components of the LAN/9000 Series 800 Link: Local Area Network Interface Controller (LANIC), card connector cable and ThinMAU.



Local Area Network Interface Controller

Local Area Network Interface Controller is a microprocessor-based communication controller that plugs into the Series 800 backplane. It handles buffering, IEEE 802.2 and 802.3 protocols, error checking, and keeps track of network statistics. When addressed by another node on the network, the LANIC receives frames of information and checks for accuracy of the data before passing the frames to the host. Before transmission, an addressed frame is sent from the host to the LANIC, which adds error checking information. The LANIC then tests to see if the cable is busy and, if not, transmits the frame.

Features

- Frame size of 1500 bytes
- Operational compatibility with IEEE 802.3 and Ethernet Rev. 1
- On board microprocessor
- 32K bytes of on board RAM allowing buffering for both transmit and receive packets
- Capable of receiving multiple back-to-back packets
- Provides for multicast, broadcast, and individual addressing
- Collection of link statistics (collided packets, bad packets, etc.)
- Power-on self-test
- Environmental: Class B
- EMC: will pass FCC, VDE Level A

IEEE 802.3 and Ethernet Card Connector Cables

Many times the differences between IEEE 802.3 and Ethernet create confusion. Ethernet LANs are very similar to IEEE 802.3 LANs. Since they utilize the same coaxial cable medium, Ethernet nodes may co-exist on the same LAN segment with IEEE 802.3 nodes. The most significant differences are in the data packet format and the electrical grounding of the hardware. Both the ThinMAU (28641A) and MAU (30241A) can transmit either IEEE 802.3 or Ethernet type packets.

When connecting the LANIC to either the ThinMAU (HP 28641A) or HP MAU (HP 30241A), the IEEE 802.3 Card Connector Cable must be used. This cable is part of the standard ThinMAU product. Some users may have MAUs/transceivers already installed at a node location. It is very important to identify whether the MAU/transceiver is an IEEE 802.3 or Ethernet version. The hardware for IEEE 802.3 and Ethernet nodes reference different electrical grounds. Thus, all the hardware of a particular node must conform to one standard or the other. For new nodes, conformance to IEEE 802.3 is recommended. However, if Ethernet hardware is already installed at a node location, an optional Ethernet card connector cable is available to make this connection.

Medium Attachment Unit

The Medium Attachment Unit (MAU) provides the physical and electrical connection by connecting the Attachment Unit Interface (AUI) cabling to the network coaxial cable. It receives signals from and sends signals to the coax cable, and also detects collisions resulting from two nodes starting to transmit simultaneously. The MAU also provides electrical isolation from the coaxial cable and performs several other functions to ensure network reliability, e.g., if a MAU fails by continuously transmitting, a circuit will detect the failure and shut down the MAU.

The LAN/9000 Link comes standard with a ThinMAU and integrated 1 meter AUI cable and BNC "T" Connector. These hardware components make the connection to the IEEE 802.3 Type 10BASE2 ThinLAN coaxial cable.

By ordering the appropriate option, customers can receive the ThickLAN Medium Attachment Unit with a coaxial tap. These components make the connection to the IEEE 802.3 Type 10BASE5 "thick" coaxial cable.

Functional Specifications

General Characteristics

Coaxial Cable Alternatives

Cable Type	ThinLAN (Standard with LAN/9000 Series 800 Link)	ThickLAN (backbone, optional)
IEEE cable specification	Type 10BASE2	Type 10BASE5
Maximum segment length	185 meters	500 meters
Maximum number of nodes per segment	30	100
Maximum distance between nodes	0.5 meter	2.5 meters
Maximum AUI cable length	1 meter	48 meters

Transmission Characteristics

Transmission Mode: Baseband Digital

Access Method: Carrier Sense Multiple Access with Collision Detection (CSMA/CD)

Impedance: 50 Ohms

Environmental Characteristics

Temperature:
Non-operating: −40°C to +75°C
Operating: O°C to +70°C

Humidity: 5% to 95% relative humidity

Electrical Specification

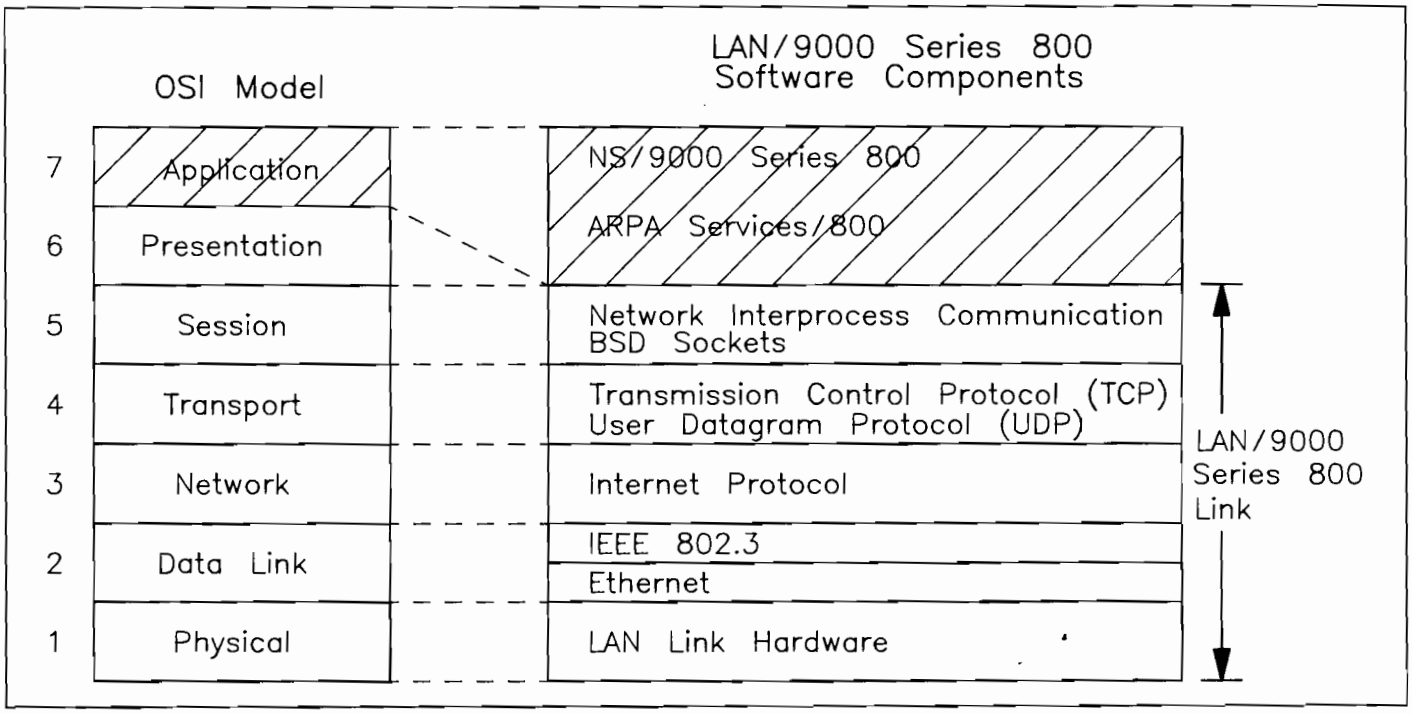
The Maximum Power Consumption for the interface is: 5 Volts; 15 Watts

The interface also powers the ThinMAU which requires: 12 Volts; 4.3 Watts Typical

Software Components

The LAN/9000 Series 800 Link includes software corresponding to Layers 1 through 5 of the Open Systems Interconnect (OSI) Reference Model, (see figure which follows). Node management software is also included.

Layers 1 and 2 of the OSI model consist of IEEE 802.2 and 802.3 protocols; CSMA/CD gives every node on the coaxial cable equal access to the network; a sending node listens on the network to ensure that no other node is transmitting before it attempts transmission. If, while transmitting, the sending node detects a collision, the sending node initiates a jam signal and waits for a random period of time before retransmitting. Transmission consists of sending addressed frames of data on the coaxial cable at a signaling rate of 10 megabits per second. The IEEE 802.3 and Ethernet type of service are Type 1 which is unacknowledged datagrams.



LAN/9000 Series 800

The Networking Layer, corresponding to OSI Layer 3, is based on the ARPA Internet Protocol (IP). IP provides fragmentation and reassembly of data as well as internal addressing. The Transport Layer, corresponding to OSI Layer 4, is based on the ARPA Transmission Control Protocol (TCP). TCP provides end-to-end reliable connection oriented services with flow control and multiplexing. TCP has mechanisms for detecting duplicate, lost, or out of sequence packets. Layer 4 also provides User Datagram Protocol (UDP) supported by BSD IPC. UDP provides an unacknowledged datagram service.

Network Interprocess Communication (NetIPC) and BSD Sockets are interfaces between Layer 7, and the product's transport protocols. NetIPC will enable programmers to establish peer-to-peer communication between processes running on HP 9000 Series 800 computers or HP 1000 A-Series computers. NetIPC is a Hewlett-Packard proprietary programmatic interface which currently resides on HP's 1000, 9000, and 3000 computer families. Currently, LAN/9000 Series 800 supports Series 800 to Series 800 and Series 800 to HP 1000 A-Series IPC communications. BSD Sockets also enables customers to establish peer-to-peer communications between processes running on HP 9000 Series 800's, as well as between processes running on HP 9000 Series 300, DEC systems running BSD 4.2 and other UNIX system workstations.

The node manager software uses the commands of the nodal management module to establish computer-to-network connections and to maintain the network. Network maintenance includes initialization and configuring; establishing network security; and using various diagnostic tools to assure proper network operation. Some of the diagnostics are loopback verification at Level 2, 3, and 5, nodal statistics, tracing, logging and security files.

Network Capacity and Performance

Although the signaling rate of the line may be 10 megabits per second, the throughput achieved at a Series 800 node will be lower. This is primarily due to the overhead of the software providing networking services and the user's application programs. Among the factors affecting user throughput is the type of software being used, the main memory and speed of each processor (and its peripherals) involved in the transfer, and the load on each system from non-network applications.

Installation Policy

Hewlett-Packard will provide software installation of the Local Area Network Link product for customers with Account Management Support (AMS). For customers not covered by AMS, Hewlett-Packard software installation is available on a time and material basis.

Customer Installation Responsibility

Installation of the LAN/9000 is the responsibility of the customer. Prior to installation of the LAN/9000, the customer should perform a full Series 800 backup. At that point, the customer will install and verify the operation of the LAN interface controller and perform a system update to add the product software modules to the system, then verify that the correct number and version of the software module has been installed.

The customer is responsible for installation of the coaxial cable, including terminators, T-connectors, taps, MAU's, and routing of the AUI cable to each MAU and to AUI cables on the Series 800. The customer should then connect the LANIC to the AUI cable and verify that the product properly accesses the AUI cable, and ensure that all safety grounds in the power system that are served by the coaxial cable are interconnected. The customer should then verify that proper access is made to the AUI from the product. At this point, installation of the LAN/9000 Series Link product is complete.

System Environment

LAN/9000 Series 800 is supported on the HP 9000 Series 800 computer systems. The minimum memory size required is 8 megabytes of main memory. This minimal configuration includes memory requirements for the HP-UX operating system. One LAN/9000 Series 800 Link product is supported per system.

The MAUs which come with the LAN Link can be used with any coaxial cable which fully complies with IEEE 802.3 specification for 0.4 inch diameter baseband coaxial cable. Use of Hewlett-Packard coaxial cable is recommended, since it contains relative distance markings to allow easy installation, maintenance and troubleshooting of the product.

Ordering Information

Hardware and Software

Order 98194A for Model 840, 91786A for Model 825, and 91788A for Model 850.

Each LAN/9000 Series 800 includes:

27125-60001	Printed Circuit Assembly
27125-63003	IEEE 802.3 Card Connector Cable
28641-60001	ThinMAU
28641-90001	ThinMAU Manual
1250-0781	Coax Adapter
1252-1154	T-Connector
	Lower Level Software on 1/4-inch Linus Tape

Specify Software Media Option

AA1: Replaces 1/4-inch Linus tape media with 1600 bpi, 9 track tape media (98194-13501)

Delete Options

740: Replaces ThinMAU assembly with MAU assembly (30241-60101), coaxial tap (0362-0819), and 6 meter Attachment Unit Interface (AUI) Cable (92254A)

811: Substitutes Ethernet Rev. 1 based card connector cable (98194-63004) for standard cable. The 28641A ThinMAU is also deleted. Due to grounding difference between the two types of hardware, it is important to distinguish the type of media access hardware being used at the node. If it is the 30241A MAU, or compatible 802.3 MAU then the 802.3 card connector cable will be necessary and therefore the standard product should be ordered. If the media access hardware conforms to Ethernet Rev. 1 then Option 811 substitutes an Ethernet card connector cable.

841: Deletes ThinMAU, Coaxial Cable Adapter and BNC "T" Connector

Documentation

Included with LAN/9000 Series 800 Link:

98194-90001	Local Area Network Interface Controller (LANIC) Reference Manual
98195-61000	NS/9000 Series 800 User Programmer Reference Manual
50980-60004	NS-ARPA Series 800 Node Manager Reference Manual
98195-61002	NS/9000 Series 800 Manual Reference Pages
50980-60000	ARPA Services Series 800 User's Guide
50980-60001	ARPA Services Series 800 Node Manager's Guide
50980-60002	Services Overview and Documentation Map
50980-60003	ARPA Services Series 800 Manual Reference Pages

Related Documents

5957-4624	Making the LAN Connection
5955-7680	LAN Cable and Accessories Manual
98195K	NS/9000 Series 800 Manual Kit. Includes customized binders, spines and documentation as described below:
98195-61000	NS/9000 Series 800 User Programmer Manual
50980-60004	NS-ARPA Series 800 Node Manager Reference Manual
98195-61002	NS/9000 Series 800 Manual Reference Pages
98195-61003	NS Cross-System NFT Reference Manual
98195-61004	NS Cross-System Network Reference Manual

Support Products

98194A+S00	Software Material Subscription (SMS) for LAN/9000 Series 800 Model 840
98194A+W00	Extended SMS (EMS) for LAN/9000 Series 800 Model 840
91786A+S00	SMS for LAN/9000 Series 800 Model 825
91786A+W00	Extended SMS (EMS) for Series 800 Model 825
91788A+S00	SMS for LAN/9000 Series 800 Model 850
91788A+W00	Extended SMS (EMS) for Series 800 Model 850

Response Center Support and Account Management Support customers must also order the Data Communications Category Support C, if it has not already been purchased.

Customers with hardware support agreements must add the appropriate level of coverage (SMMC or BMMC) for this Link product to their support agreement.

Coaxial Cable and LAN Accessories

LAN/9000 Series 800 Link provides all the components of a connection to the coaxial cable of an IEEE 802.3 Type 10BASE2 (workstation, "thin") local area network or, optionally, to a Type 10BASE5 (backbone, "thick") coaxial cable. A complete line of local area network products, including coaxial cable, installation tools, and connector products is available from Hewlett-Packard; refer to the current Computer Users Catalog. For cable planning information, refer to the LAN Cable and Accessories Installation Manual (P/N 5955-7680), available from your HP Sales Representative.

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