

Network Links

LAN Links

10/100Base-T Fast Ethernet Network Link

PCI 100Base-T (A5230A) is available for A- and N-Class Systems. Through NMMGR software, the 100Base-T card can be configured to operate either at 100-Mb levels (when communicating with a suitable 100VG hub or switch), or at 10-Mb levels in 10Base-T mode (full- or half-duplex).

PCI 100Base-T (A5230A) card requires MPE/iX 7.0 release (and A- and N-Class Servers). Each HP e3000 system is supplied with software included with the FOS that allows trace and log file entries produced by the driver to be formatted. Additional software required to operate and diagnose the card is provided by the link products.

On multiple PCI or HP-PB bus systems, the customer can configure multiple 100Base-T LAN network interfaces (LAN1, LAN2, etc.) on the same system. The system must be configured to place multiple NIs (LAN1, LAN2, etc.) on different IP addresses. A card can be shared between the 3000/iX Link, FTP, NS Services, Telnet, and all supported sockets applications. DTC connectivity, including X.25, must pass through 10-100 bridge hardware (not provided) to connect in 100 MB mode.

100Base-T is a half-height PCI card (A5230A for A- and N-Class Servers) or HP-PB interface card (A5488A for Series 900 Servers) with one RJ-45 (female connector) for use with twisted pair cable (ThinLAN Transceivers or AUI ports are not provided).

It is expected that the customer would have all wiring installed by non-HP, third-party cabling vendors and that all networking appliances (100Base-T hub/switch) will be correctly attached and configured. The customer must use UTP cabling of a category appropriate to the link type.

A 10/100Base-T Fast Ethernet (802.3u) LAN card is also available for the HP e3000 Series 900 family of servers. Through NMMGR software, the card can be configured to autosense to 100 or 10 Mb speed and full- or half-duplex (when communicating with a 100Base-T hub or switch, which supports autosensing), or can be configured to a fixed speed and duplex. The 100Base-T card supports only CAT-5 UTP cabling (see **Table 8.1**).

Table 8.1 IBM Cable Types Supported for 100Base-T Network Link

Data Grade	AWG	Type
Type 5	22, 24	unshielded twisted pair

10/100VG-AnyLAN Network Link (discontinued)

The sale and further development of the 100VG-AnyLAN High Speed Network Card (A5487A and all options) and 100VG-AnyLAN License, Software and Documentation (B5426BA and all options) for the HP e3000 is discontinued as of November 1, 2000. 100Base-TX High Speed Network Card (A5488A and all options) and 100Base-T License, Software and Documentation (B5427BA and all options) is recommended as the replacement networking solution on the current HP e3000 HP-PB based systems (9x7, 9x8, 9x9, 99x).

802.3 LANIC Cards (ThinLAN Link)

Each Series 900 system is supplied with one 802.3 LAN Interface Channel (LANIC) required for connections to the LAN and a Datacommunications and Terminal Controller (DTC). The Asynchronous Serial Communication (ASC) software included with the FOS uses this card and the 802.3 LAN to communicate between the SPU and the DTC. Series 9x8LX/RX and 9x9KS servers come standard with a Multi-Function I/O card (MFIO) which has the 802.3 LANIC and a built-in ThinLAN Transceiver. Each 99x Server comes with a LAN/Console card that has the 802.3 LANIC and a built-in ThinLAN Transceiver. In addition, both the Multi-Function I/O card and the LAN/Console card have an external Attachment Unit Interface (AUI) connector for customers who want a connection to either a ThickLAN Transceiver or Twisted Pair RJ45 Transceiver (ordered separately).

An additional HP-Precision Bus (HP-PB) 802.3 LAN card is available for Series 9x8, 9x9KS, and 99x Servers. The card is a single-high HP-PB 802.3 LAN interface with a built-in ThinLAN Transceiver. An AUI connector is also available on the card for connection to alternate cabling, such as a ThickLAN Transceiver or Twisted Pair Transceiver. In order to use the second HP-PB card, MPE/iX Release 5.0 is required.

For system-to-system communication via an 802.3 LAN, the customer may either use the HP-PB 802.3 LANIC supplied with the Series 900 system, or order a second HP-PB 802.3 LANIC. From a performance perspective, the 802.3 LANIC supplied with the system should be sufficient to meet both DTC and system-to-system traffic needs. However, there are circumstances where a second HP-PB 802.3 LANIC should be considered. For example, if the system-to-system traffic is high, the customer may want to use a second HP-PB card. Another possibility is that for topology reasons, a customer may want to split DTC and system-to-system traffic. The ThinLAN Link product (36923A) provides the second HP-PB 802.3 LANIC card. ThinLAN software components (802.3 LANIC driver and TCP/IP transport) are bundled with the FOS in MPE/iX Release 5.0 or later.

MPE systems support two LANIC cards, with MPE/iX Release 4.0 or 5.0. The customer can configure two LAN Network Interfaces (LAN1, LAN2) on the same system. The system can be configured to have two NIs (LAN1 and LAN2) with separate IP addresses. With MPE/iX 5.0 or later, MPE/iX 6.0 or later, or MPE/iX 7.0, the maximum number of LANICs supported on a system is three, one for DTC and two for the 802.3. The minimum is one LANIC card that can be shared between the DTC and the 802.3. TCP/IP-based Services and all sockets applications are supported over the extra card. This new functionality applies only to 802.3.

Table 8.2 802.3 LANIC Channel Card Summary

Systems	DTC Connection (supplied with system)	System-to-System Communication
9x8, 9x9KS	HP-PB 802.3 LANIC and ThinLAN Transceiver and AUI port included on MFIO card	Use MFIO card supplied with system or second 802.3 LANIC card
99x	HP-PB 802.3 LANIC and ThinLAN Transceiver and AUI port included on LAN/Console card	Use LAN/Console card supplied with system or use second 802.3 LANIC card

Table 8.3 Networking Services Supported Over 802.3 Link (36923A)

Product Description	Product Number
NS 3000/iX Network Services	36920B
NetWare for the HP 3000 (product is discontinued)	32020A/B
HP ARPA Services	Bundled with MPE/iX 5.0 or later

Token Ring Network Link

The Token Ring 3000/iX and SNA Token Ring Network Link license product (J2167B) provide a native Token Ring connection for Series 900 Servers. These products can connect the HP e3000 Series 900 system to a Token Ring Network that is compatible with IBM Token Ring. Token Ring 3000/iX provides a Token Ring connection for TCP/IP and SNA environments. The Token Ring 3000/iX software driver (in J2167B) requires MPE/iX Release 5.5 Express 7, MPE 6.0 Express 1 or later, or MPE/iX 7.0. The Token Ring Link/iX provides a Token Ring connection for SNA environments as well as TCP/IP. Token Ring will not be available on PCI based platforms (A- and N-Class).

The Token Ring adapter is a single-high HP-PB card. A 9-pin D-type connector on the Token Ring adapter card is used to connect the adapter to the Token Ring network via a cable that plugs into a Multi-station Access Unit (MAU). The Token Ring adapter supports either 4Mb/s or 16 Mb/s link speeds over shielded twisted pair (STP) and 4 Mb/s over unshielded twisted pair (UTP). For UTP, the customer will need to use a media filter that attaches to the DB-9 connector. Ring speed configuration is done on the card with a jumper. The default configuration is 4 Mb/s. The card will not be able to connect to other systems on the Ring if the speed is not properly configured.

Table 8.4 IBM Cable Types Supported for Token Ring Link

Data Grade	AWG	Type
Type 1	2	2-wire shielded twisted pair
Type 2	22	2-wire shielded twisted pair or 4-wire unshielded twisted pair
Type 3 ¹	22, 24	unshielded twisted pair
Type 6	26	2-wire shielded twisted pair
Type 9	26	2-wire shielded twisted pair

¹Type 3 cabling supports only a 4Mbps link speed

Table 8.5 Networking Services Supported over 802.5 Token Ring Link

Product Description	Product Number
NS 3000/iX Network Services	36920B
HP ARPA Services	Bundled with MPE/iX Release 5.0 or later
NetWare for the (product is discontinued)	32020A/B

SNA Network Link and IBM Services

The SNA/Token Ring Link/iX product is made up of the Token Ring HP-PB adapter card, Token Ring driver, SNA Transport software, and manuals. MPE/iX Release 5.5 Express 7 MPE/iX 6.0 Express 1 or later, or MPE/iX 7.0 is required for SNA/Token Ring. Multiple transport stacks are supported, which means SNA services (using the SNA transport) and NS and ARPA/Internet services (using the TCP/IP transport) can run concurrently over the same Token Ring card.

The customer is responsible for supplying their own cables and other Token Ring accessories (i.e., MAU, CAU/LAM, media filter). Supported IBM cable types are shown in **Table 8.4**.

The software (Token Ring driver and TCP/IP or SNA transport) provides the foundation for system-to-system communication between a Series 900 HP-PB system and another system over the Token Ring network. The appropriate networking services (i.e. NS, ARPA/Internet, SNA, etc.) are also required for system-to-system communication to occur. The software included in the Token Ring product corresponds with layer 2 through 5 of the Open System Interconnection reference model.

Table 8.6 SNA Services Supported over SNA 802.5 Token Ring Link (A5563A) and SNA/SDLC Link/iX (30291B)

Product Description	Product Number
HP SNA NRJE/iX (also requires BSC/iX 32007B)	30295B
HP SNA Services (includes IMF/iX,, LU6.2 API, DHCF/iX, SNA/RJE/iX)	30291B
HP BSC/iX	32007B

IBM Services

HP SNA Distributed Host Command Facility/iX

The HP SNA Distributed Host Command Facility/iX (HP SNA DHCF/iX) software product provides IBM mainframe users who use IBM 3270 display stations with interactive access to an HP e3000 A- and N-Class or Series 900 system. *Included in 30292B.*

SNA NRJE Network Remote Job Entry

SNA NRJE/iX provides enhanced batch data communications between the HP e3000 and an IBM System/370-compatible mainframe in a System Network Architecture (SNA) environment. *Included in 30292B.*

SNA IMF/iX Interactive Mainframe Facility

SNA IMF/iX on an HP e3000 A- and N-Class or Series 900 allows interactive communications between the HP e3000 and an IBM System/370-compatible mainframe using SNA 3270 protocols. *Included in 30292B.*

HP LU 6.2 Application Programming Interface

LU6.2 API/iX on an HP e3000 A- and N-Class or Series 900 provides HP e3000 users with a way to program HP e3000 application programs for program-to-program communication in an SNA environment. *Included in 30292B.*

Table 8.7 BSC Services Supported over BSC Link (32007A)

Product Description	Product Number
BSC RJE/iX	30295B

Point-to-Point and IBM WAN Links

The hardware component for the A- and N-Class SNA/SDLC Link (30291C), and NS point-to-point 3000 (36922C) is the 8-Port Serial PCI HP ACC card (Z7340A) and for the Series 900 (or HP-PB based Server platforms) SNA/SDLC Link (30291B), BSC Link (32007B), and NS point-to-point 3000 (36922B) is the Programmable Serial Interface (PSI) card. The HP ACC card and the PSI card are included as an option with each order of the appropriate Network Link product. PSI cards are not interchangeable among all Series 900 systems.

Table 8.8 Networking Services Supported over NS Point-to-Point Link for A- and N-Class or HP-PB based Servers

Product Description	Product Number
NS 3000/iX Network Services	36920B

FDDI Network Link

The FDDI 3000/iX Network Software Driver product (J2245B) and FDDI HP-PB Interface Card (A5664A) provide a Single Attach Station (SAS) connection to the ISO standard 9314 Fiber Distributed Data Interface (FDDI) network for the HP e3000 Series 900 Servers only. The FDDI 3000/iX product is fully compliant with the ISO 9314 standard, providing a fiber optic interface to the 100 Mb/s FDDI network. The product includes a double-high HP-PB adapter, FDDI driver, and on-line diagnostics. FDDI 3000/iX for Series 900s is supported on the HP e3000 Model 9x8LX/RX and 9x9KS servers as well as the 99x Servers. MPE/iX Release 5.5 Express 7 or MPE 6.0 Express 1 or later is required. FDDI connectivity for HP e3000 A- and N-Class Servers can be supported through the PCI 100Base-T card (A5230A) and a switch product manufactured by an external vendor.

The FDDI 3000/iX Link for Series 900 Servers is a single-attach HP-PB adapter. There are no jumpers or switches. The adapter is connected to the FDDI network concentrator via fiber optic cabling—both ends terminated with an MIC (Media Interface Connector). FDDI cables are not provided with the product. They may be purchased from HP or third-party vendor. See “FDDI3rd” on Power Tools for information on third-party vendors.

One FDDI card is supported for each NIO bus, with a maximum of four per system. This means one FDDI card is supported with each 9x7 or 9x8 system; two cards with each **9x9** system; and four cards with each 99x system.

FDDI 3000/iX supports NS services and ARPA/FTP. The Internet protocols TCP, UDP, IP, and ICMP are supported. Two application programmatic interfaces (APIs) are supported, Berkeley (BSD) sockets and HP Network Inter-Process Communication (NetIPC).

HP does not provide an FDDI concentrator. Several third-party vendor concentrators have been used and tested with the product.

It is expected that the customer should have all FDDI wiring installed by non-HP, third-party cabling vendors and that all networking appliances (FDDI Concentrator) will be correctly attached and configured. The customer must use multimode fiber optic MIC terminated cabling to connect the FDDI adapter to the FDDI concentrator. The customer must use a third-party vendor’s FDDI concentrator to connect to the FDDI network.

Table 8.9 Network Services Supported Over FDDI Link for Series 900 Servers

Product Description	Product Number
NS 3000/iX Network Services	36920B
HP ARPA Services	Bundled with MPE/iX Release 5.0 or later

Internet (ARPA) Services

ARPA/Internet services are bundled with MPE/iX Release 5.0 and later. The bundled ARPA/Internet services consist of TCP/IP, FTP (File Transfer Protocol), Telnet, BSD Sockets, and the SNMP (Simple Network Management Protocol) agent. A Telnet client (outbound) is provided as of MPE/iX 5.0, and a Telnet server (inbound) is provided as of MPE/iX 5.5. The 802.3 LAN driver and the HP 3000 NetIPC API are also bundled.

Additional Internet Services on the HP e3000

- Inetd is the Internet daemon, which is the master server for the group of Internet services. It must be configured on the system to use the other services: Telnet, bootp, and tftpd.
- Bootp is the Bootstrap Protocol daemon used to boot or start devices such as routers, printers, and diskless workstations. Client systems use bootp to find their own IP address and the name of the boot file to load into memory and execute.
- Tftpd is the Trivial File Transfer Protocol daemon used to transfer the boot files needed to start network devices. On the HP e3000, tftpd enables the booting of network printers.
- Other services, such as the Simple Mail Transfer Protocol (SMTP) and Gopher are available for the HP e3000 from third parties. The HyperText Transfer Protocol (http) is standard with the operating system with MPE 6.5 or later and is a Web server based on Apache.

X.25 Network Link

X.25 and PAD communications are provided by the DTC/X.25 Network Link (J2070A opt. 1CX, 1CW), which is part of the same Datacommunications and Terminal Controller subsystem used for terminal and serial device communications, and 36939C for A- and N-Class Servers or 36939B for Series 900 Servers (X.25/iX System Access). See **Table 8.10**.

Table 8.10 Networking Services Supported over X.25 Link*

Product Description	Product Number
NS 3000/iX Network Services	36920B
HP ARPA Services	Bundled with MPE/iX Release 5.0 or later
SNA/X.25 Link (A- and N-Class Servers)	36939C
SNA/X.25 Link (Series 900 Servers)	36939B

*Must have both X.25 System Access software (36939B) and a DTC/X.25 card to run the above networking services over X.25 link.

Connecting a PC to the HP e3000 via a LAN

To connect a PC to a LAN, several networking components are required for the PC:

- A Network Interface Card or “NIC” (also called a LAN adapter) for either Ethernet (A- and N-Class and Series 900) or Token Ring (Series 900 only) and a software driver for the card. There are several different products available for Ethernet and Token Ring (for Series 900 Servers). There is also a 10:100 card available from HP that can be used on either a 10- or 100-MB LAN. It is important to verify the card and driver is supported by the chosen software vendor.
- A TCP/IP stack that provides the transport and network layer protocols.

The LAN driver for the NIC card usually comes with the card; however, the TCP/IP stack may need to be purchased separately.

Depending on specific applications and needs, one or more additional products is required to *get started*:

- A Terminal Emulator product
- A TELNET product
- Network Operating System Client Software

* Available from several third parties such as Walker Richer & Quinn, Unison-Tymlabs, or Wall Data

A terminal emulator will allow logon and run to applications on the HP e3000 from a LAN-connected PC, so applications can be run in the same manner as when the user was serially-connected to the HP e3000.

Either telnet or VT can be used to access the HP e3000. However, using VT will provide better performance. Using the “Virtual Terminal (VT) Protocol” with a terminal emulator will often provide better performance and functionality than using the TELNET protocol. However, if user log-on access to other non-HP e3000 systems from the PC is desired, a TELNET product (and perhaps FTP for file transfer) is required. Optionally, if a server (HP e3000 or other) with a Network Operating System will be used for resource sharing, then the PC must have “client” software.

Figure 8.1 Components Example Using 10 Mb/s ThinLAN

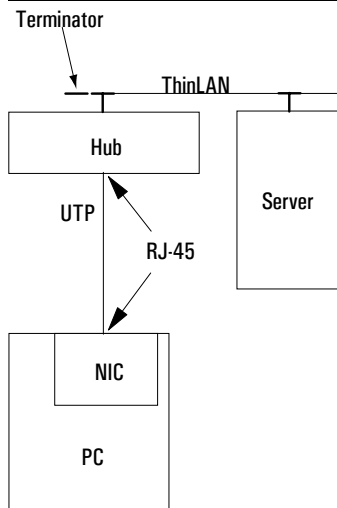
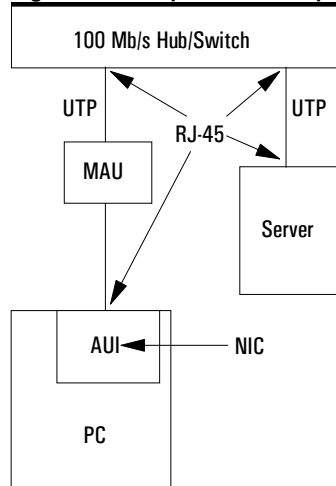


Figure 8.2 Components Example Using 100VG or 100Base-T



ISDN Communication

Connection Alternatives

1. The HP ISDN product family includes the HP ISDN Server and HP ISDN Link products. It allows HP e3000s and non-HP systems located in widely dispersed locations to transfer data over ISDN as if they were on the same LAN.

The HP ISDN Server allows for interconnection of remote LANs over an ISDN network, in a transparent way, for any application running on top of the standard TCP/IP protocol. The HP ISDN Server can host up to three Basic Rate Interface cards for a maximum total throughput of 384 kbps.

The HP ISDN Server is based on HP 900 S700 workstations, SCSI Basic Rate Interface cards and TCP/IP to ISDN gateway software.

The telephone-like tariff structure of ISDN services makes the HP ISDN products very attractive for TCP/IP based applications that require LAN-to-LAN large file transfers, such as batch file transfers.

Typical customer environment includes at least 2 or 3 of the following characteristics:

- Multiple, geographically dispersed sites with LAN-to-LAN connectivity needs
- Standalone, remote workstations needing access to central hosts or servers for file/database transfers
- On-demand, high transmission bandwidth requirements for infrequent file transfers
- TCP/IP, multivendor based computing environments

2. The HP Routers product can be used to connect to ISDN.

Figure 8.3

