# Token Ring 3000/iX for Series 900 Computers
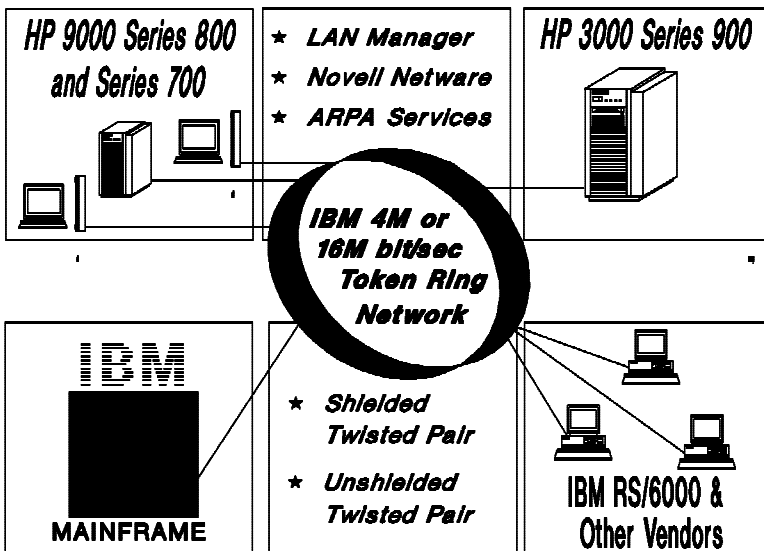
## Technical Data

**For HP 3000 Series 900
Computer Systems
Product Number
J2167A**

The Token Ring 3000/iX Link provides the hardware and software to connect an HP 3000 Series 900 system to a multivendor LAN. The Token Ring Link includes the hardware interface card and the device driver, network transport, and network management agent software.

The network transport software includes the industry standard TCP, UDP, and IP protocols, along with both the BSD sockets and HP NetIPC APIs. Users may write their own software to access the network via an API, or they may purchase one of the higher level networking services (ARPA, NS, LAN Manager, or Novell Netware) provided by HP.

## Token Ring Features

- A complete link connection to the Token Ring network, which includes the Token Ring adapter and the transport software
- Full interoperability with IBM Token Ring
- 4 Mbits/second or 16 Mbits/second burst transfer rate
- Network transport software which provides the ARPA TCP, UDP, and IP protocols
- BSD sockets API provides access to TCP and UDP
- HP NetIPC API provides access to TCP
- Integrated node management software provides online network configuration and logging
- Supports Simple Network Management Protocol (SNMP)
- Supports Source Routing to remote connections through Source Routing Bridges
- Supports VT (Virtual Terminal) access

**HP 9000 Series 800 and Series 700**

★ LAN Manager
★ Novell Netware
★ ARPA Services

**HP 3000 Series 900**

**IBM 4M or 16M bit/sec Token Ring Network**

**IBM**

**MAINFRAME**

★ Shielded Twisted Pair
★ Unshielded Twisted Pair

**IBM RS/6000 & Other Vendors**

## Hardware Components

The Token Ring adapter card manages packet buffering, processes IEEE 802.5 protocols, and uses an LED to display the Token Ring adapter status.

A 9-pin D-type connector on the Token Ring adapter card is used to connect the adapter to the Token Ring network through a cable that plugs into a Multi-station Access Unit (MsAU). On a 4 Mbit/second Token Ring network, the following IBM cable types are supported:

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

For unshielded twisted pair (UTP), the customer will need to use a media filter which attaches to the DB9 connector. This is done for impedance matching from 150 Ohm (shielded twisted pair) to 100 Ohm UTP. Additionally, only shielded cables are supported at the 16 Mbit/second data link rate.

## Features

- Uses TMS380C16/04 TI Token Ring communication processor
- Uses 512K bytes of DRAM space for MAC code and data storage
- Uses frame size up to 2048 bytes
- Supports early token release at 16 Mbits/second
- Supports up to 250 link stations
- Environmental: Class B2
- EMC: complies to FCC A and VDE Level B

## Environmental Characteristics

### Temperature
Non-operating: -40°C to +75°C (-40°F to +167°F)
Operating 0°C to +70°C (0°F to 158°F)
Humidity 5% to 95% relative humidity

### Electrical Specifications
Maximum power consumption is 10 watts at 5 volts.

## Software Components

The Token Ring Link includes software corresponding to layers 2 through 4 of the Open Systems Interconnection (OSI) Reference Model (see Figure 3). It also includes node management and network management agent software (SNMP).

The Data Link Layer, corresponding to OSI layer 2, consists of the link level IEEE 802.5 protocol. Transmission consists of sending addressed frames of data on the cable at a signaling rate of either 4 megabits per second or 16 megabits per second.

The Network Layer, corresponding to OSI layer 3, is based on the ARPA Internet Protocol (IP). IP provides packet fragmentation/ reassembly and internetting capability.

The Transport Layer, corresponding to OSI layer 4, is based on the ARPA Transmission Control Protocol (TCP) and User Datagram Protocol (UDP).

TCP provides end-to-end reliable, connection-oriented services over IP with flow control and multiplexing. TCP also has mechanisms for detecting duplicate, lost, or out-of-sequence packets. UDP provides an unacknowledged connection-less delivery service over IP.

The Token Ring Link provides two application programmatic interfaces (APIs) to the network transport, Berkeley (BSD) sockets and HP's Network Inter-Proccess Communication (NetIPC). Both APIs support the rapid exchange of data using peer-to-peer communications between processes. The processes may be on a single system or on different systems on the network.

BSD sockets provides a C language interface to TCP and UDP. BSD sockets is available on HP 1000s, 9000s, and PCs and on a wide range of computers from other vendors. BSD sockets is part of the MPE/iX FOS beginning with release 4.0 and is supported over the Token Ring Link. The following sockets calls are supported:

– accept()
– bind()
– close()
– connect()
– fcntl()
– gethostby xxxx
– getnetby xxxx
– getprotoby xxxx
– getservby xxxx
– listen()
– recv()
– recvfrom()
– select()
– send()
– sendto()
– shutdown()
– socket()
– socketpair()

Additional sockets calls are planned for later releases.

NetIPC is a set of 18 programmatic calls, appropriate for implementing efficient distributed applications over TCP only. NetIPC supports communications to various HP systems, including the HP 1000, 3000, and 9000 computer systems, as well as HP PC networking. Applications written to NetIPC can also interoperate with other applications written to BSD sockets.

Node management software is included in the Token Ring Link and provides a user interface for configuration, tracing, and logging. An on-line user configurator supports easy initial configuration and reconfiguration of the Token Ring Link software without bringing down the HP 3000. The node management software also delivers flexible event logging and the ability to selectively trace several levels of network software. Also included is NetTool, a set of tools to monitor, analyze, and diagnose the network transport software.

The Token Ring Link also includes a network management agent. The agent supports the Simple Network Management Protocol (SNMP) and collects information regarding the state of the link and transport. This information is used and displayed by remote management stations, such as the HP OpenView Network Node Manager (see related products below). Standards

The protocols utilized by the Token Ring Link software closely adhere to the following IEEE 802.5 standards:

- RFC 768 UDP
- RFC 791 IP
- RFC 792 ICMP
- RFC 793 TCP
- RFC 826 ARP
- RFC 919 IP Broadcast Datagrams
- RFC 922 IP Broadcast Datagrams with Subnets
- RFC 950 IP Subnet Extension
- RFC 1155 Management Information (SNMP)
- RFC 1157 SNMP
- RFC 1213 MIB II (SNMP)

## Support for Networking Services

The Token Ring Link supports the multivendor ARPA network services, Network File Services (NFS), HP's NS network services, Novell Netware, and LAN Manager. The products provide interactive and programmatic facilities, such as file transfer, remote database, file, and peripheral access.

## Network Capacity and Performance

Although the signaling rate of the line may be 4 or 16 megabits/s, the throughput achieved at a node may be lower. This is primarily due to the overhead of the software providing network services and the user's application programs. Among the factors affecting user throughput are 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.

Because of the number and complexity of these factors, it is difficult to make useful generalizations about the performance or capacity of the network in a particular application. Hewlett-Packard network specialists are available to consult in network design. They have data on the system and network parameters that affect network operation. With this information and an accurate understanding of the target environment, they can assist in designing an effective network.

## Installation and Configuration Policy

The customer is responsible for loading the Token Ring Link software onto the system. HP will install the Token Ring card and perform minimum configuration of the Token Ring Link to verify minimum product functionality. This activity is included in the product's purchase price.

### Customer Responsibility

Prior to having HP personnel on-site to verify the installation and perform minimum configuration of the Token Ring Link, the customer is responsible for the following:

- Installing the appropriate wiring.
- Complying with all applicable building codes in the installation of the Token Ring cabling and components.
- Obtaining a valid IP address prior to the configuration of the Token Ring Link.
- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
- System configurations.
- Logical network map identifying relevant traffic flow.
- Physical network map identifying relevant network hardware components.
- Updating the HP 3000 system to the proper release level and installing the Token Ring Link software using AUTOINST. Refer to the HP 3000 MPE/ix Installation and Update Manual (36123-90001).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups (as necessary) and ensuring that the HP 3000 system and personnel with HP 3000 system management experience and LAN management experience are available when HP is on-site to complete the installation and minimum configuration of the Token Ring Link.

After HP has completed the minimum configuration of the Token Ring Link, the customer is also responsible for completing the configuration in order to fully integrate the Token Ring Link into the existing customer network.

### HP Responsibility

Following the installation of the Token Ring Link software, HP is responsible for the following:

- Verifying the operation of the Token Ring card.
- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the Token Ring Link product to the minimum default configuration necessary to verify software and hardware functionality. This default configuration includes configuring the link and network interface in the network configuration file (NMCONFIG) using the NMMGR Utility.

These steps complete HP's portion of the installation and minimum configuration of the Token Ring/ix Network Link.

## Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support or can purchase additional services form HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

### System Environment

The Token Ring/ix Network Link is supported on the following HP 3000 HP-Precision Bus Series 900 systems:

- 9X7LX, 9X7
- 922LX, 922RX, 922
- 932
- 948, 958
- CS 990/992

Only one Token Ring adapter is supported per system.

## Ordering Information

This product consists of the Token Ring HP-PB adapter card, the Token Ring software driver, the TCP/IP transport, and hardware and software customer documentation. The SNMP (Simple Network Management Protocol) Agent and Basic Incoming VT (Virtual Terminal) services are also included with this product.

To receive the Token Ring/ix Network Link, order the base product (part number J2167A), and specify the hardware option (AL4) and an appropriate processor option (Option 3XX). MPE/ix release 4.0 or later is required for the product to be operational.

**J2167A** Token Ring 3000/iX Network Link

Hardware Option Opt. **AL4**

## Token Ring HP-PB Adapter Card Processor Options

**310** For Tier 1 SPUs, one RTU Sublicense
**315** For Tier 2 SPUs, one RTU Sublicense
**320** For Tier 3 SPUs, one RTU Sublicense
**330** For Tier 4 SPUs, one RTU Sublicense
**335** For Tier 5 SPUs, one RTU Sublicense
**340** For Tier 6 SPUs, one RTU Sublicense
**350** For Tier 7 SPUs, one RTU Sublicense
**0CD** S/W upgrade credit for Opt. 310
**0GJ** S/W upgrade credit for Opt. 315
**0CE** S/W upgrade credit for Opt. 320
**0CF** S/W upgrade credit for Opt. 330
**0GL** S/W upgrade credit for Opt. 335
**0GM** S/W upgrade credit for Opt. 340