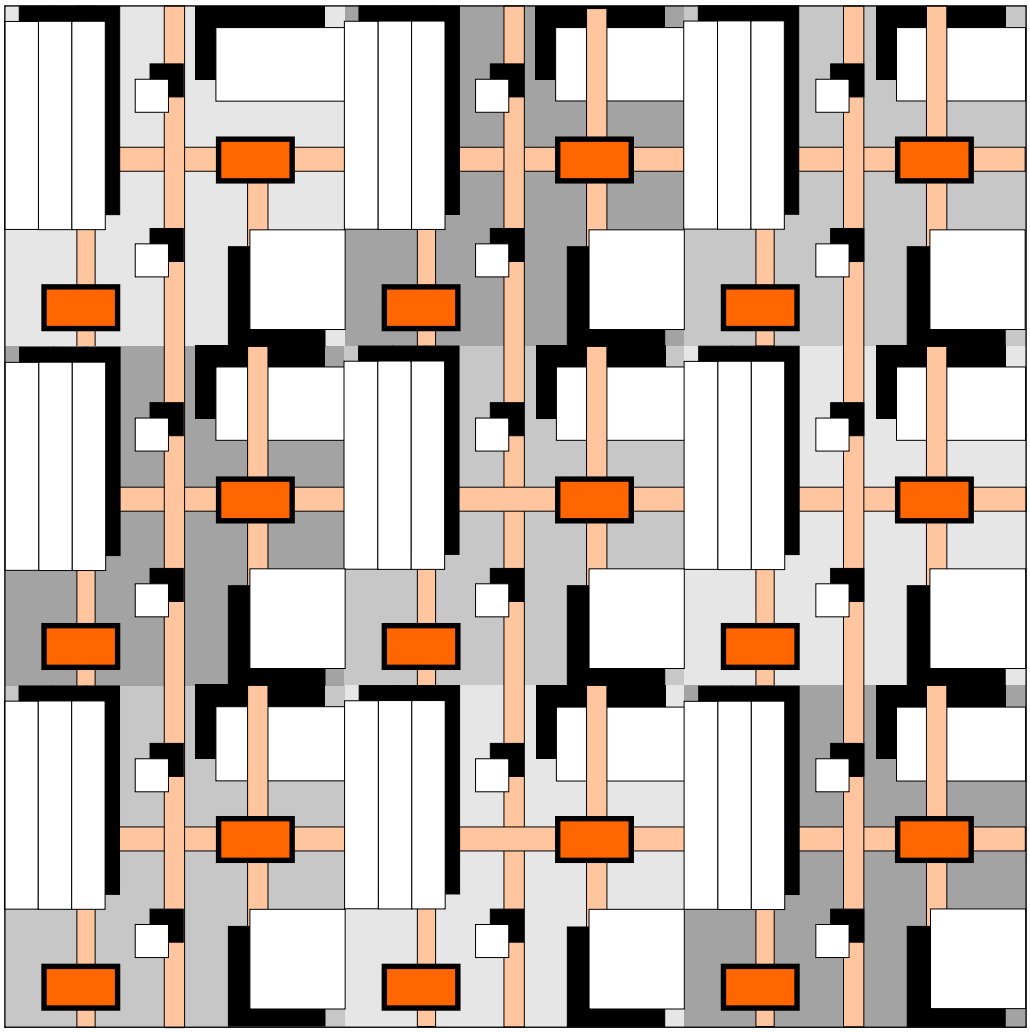
8260 Nways Multiprotocol Switching Hub

Product Description



GA33-0315-03

8260 Nways Multiprotocol Switching Hub

Product Description

GA33-0315-03

Note!

Before using this information and the product it supports, be sure to read the general information under “Notices” on page xi.

Fourth Edition (December 1996)

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Industry Standards Reflected in This Product

The IBM 8260 is designed according to the specifications of the following industry standards as understood and interpreted by IBM as of October 1992.

International Organization for Standardization (ISO)

- ISO 8802/1
- ISO 8802/3
- ISO 8802/5

IEEE (Institute of Electrical and Electronic Engineers)

- 802.1 Local area network (LAN) management and Internet working
- 802.3 Carrier sense multiple access and collision detection
- 802.5 Token passing ring

ANSI (American National Standard Institute)

The IBM Fiber Distribution Data Interface (FDDI) network is an implementation of the American National Standards Institute (ANSI) X3T9.5 family of standards.

The IBM base standards for the implementation of the FDDI are:

- ANSI X3.166-1990, FDDI physical layer medium-dependent (PMD), ISO 93/4-3
- ANSI X3.148-1988, FDDI token-ring physical layer protocol (PHY), ISO 93/4-1
- ANSI X3.139-1987, FDDI token-ring media access control (MAC)
- ANSI X3.T9, 5/84-49 RFC 1285 FDDI station management (SMI).

ITU-T (International Telecommunications Union - Telecommunication)

The IBM standards for the implementation of ATM are:

- Q.2110 Service Specific Connection-Oriented Protocol (SSCOP)
- Q.2130 Service Specific Coordination Function (SSCF)

ATM Forum

The ATM Forum has defined the ATM User-Network Interface Specification V3.0 and V3.1.

CE European Community Marking

The CE marking has been applied to this product, meaning its compliance to the following directives:

- EMC Directive 89/336/EEC and amendment 93/31/EEC
- Low Voltage Directive

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New Zealand Statement

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- Class A digital device pursuant to part 15 of the Federal Communications Commissions (FCC) rules
- VDE Class B, except for
  - 8250 FDDI module (Feature Code 3825)
  - 8250 Workstation Networking module (Feature Code 3174)
  - 50-pin 45° connector UTP cable (Feature Code 8033)
- VCCI Class 1
- EN 55022 requirement
- CISPR22 Class A.

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Product Information

General Safety

This product meets the following international safety standards:

Number	Date	Title
IEC 950	1986	International Standard (IBM C-B 3-0501-950)
C22.2 No. 950		Canadian deviation to IEC 950
UL 1950	1989	U.S.A. deviation to IEC 950
EN 60 950		CENELEC deviation to IEC 950
AS 3260	1988	Australian deviation to IEC 950
NZS 6661	1989	New Zealand deviation to IEC 950
IEC 825	1993	Safety of Laser Products
EN 60 825	1993	European CENELEC IEC 825 Standard

Safety Notices for United Kingdom

1. The IBM 8260 Nways Multiprotocol Switching Hubs are manufactured according to the International Safety Standard EN 60950, and as such, are approved in the UK under the General Approval Number NS/G/1234/J100003 for indirect connection to the public telecommunication network.
2. The network adapter interfaces housed within the IBM 8260 Nways Multiprotocol Switching Hubs are approved separately, each one having its own independent approval number. These interface adapters, supplied by IBM, do not use or contain excessive voltages. An excessive voltage is one that exceeds 42.4 V peak ac or 60 V dc. They interface with the IBM 8260 Nways Multiprotocol Switching Hubs using Safety Extra Low Voltages (SELV) only. In order to maintain the separate (independent) approval of the IBM adapters, it is essential that other optional cards, not supplied by IBM, do not use mains voltages or any other excessive voltages. Seek advice from a competent engineer before installing other adapters not supplied by IBM.

About This Book

This book gives a description of the IBM 8260 Nways Multiprotocol Switching Hub, its components, functions, and accessories. It describes the characteristics and specifications of 8260 modules, transceivers, and cards, and gives the power consumption for 8250 and 8260 modules and cards.

For information on how to plan and install an 8260 hub-based network, refer to the *IBM 8250 Multiprotocol Intelligent Hub, 8260 Nways Multiprotocol Switching Hub, 8285 ATM Workgroup Switch: Planning and Site Preparation Guide*, GA33-0285. This manual contains guidelines for planning Ethernet, Token Ring, FDDI, and ATM networks. It also provides instructions, hardware specifications, and examples of installing 8260-based networks for small and large user groups. In addition, it describes how to expand your network to allow for future networking needs.

Who Should Use This Book

This book is intended for the following people at your site:

- Customers
- Network Designer
- Network Administrator
- IBM Field (Sales Support) and Marketing personnel.

How to Use This Book

This book is divided into the following chapters. It essentially covers the overall description of the product from its detailed component features, to its functions in different types of network environments.

Chapter 1 describes how the 8260 hub operates, and describes the network management environment for the hub.

Chapter 2 describes the basic and optional components, functions, and accessories for the 8260 hub.

Chapter 3 describes the media modules that can be used with the 8260 hub and the procedures for receiving and loading code updates.

Chapter 4 describes the rules for configuring the 8260 hub with 8250 modules, including the restrictions on power consumption.

Appendix A gives the specifications and feature codes for Ethernet modules, I/O cards, and transceivers that can be used with the 8260 hub.

Appendix B gives the specifications and feature codes of the Token-Ring modules and I/O cards that can be used with the 8260 hub.

Appendix C gives the specifications and feature codes of the ATM modules and I/O cards that can be used with the 8260 hub.

Appendix D gives the specifications and feature codes of the LAN switching modules that can be used with the 8260 hub.

Appendix E gives the specifications and features codes of the Fault Tolerant Controller Module and Distributed Management Module.

Appendix F lists the power consumption requirements for 8250 and 8260 modules and I/O cards.

Prerequisite Knowledge

This book assumes that you are familiar with Ethernet, Token-Ring, FDDI, and ATM networks, and network management. If you do not have this background, please read the applicable documents listed in the “Bibliography” on page 185.

Where to Find More Information

Refer to the “Bibliography” on page 185 for a list of IBM manuals that contain related information and publications that define standards used by the 8260 hub.

Information is also available via the Internet, at URL:

`http://www.raleigh.ibm.com/826/826prod.html`

Chapter 1. Introduction

8260 Hub Overview

The IBM 8260 Nways Multiprotocol Switching Hubs provide robust interconnectivity and easy-to-use interface options while preserving investment in fully compatible 8250 internetworking technology. The 8260 platform supports the interconnection of Token-Ring, Ethernet, FDDI, and ATM network protocols.

Note: References in this publication to IBM products does not imply that IBM intends to make these products available in all countries in which IBM operates. Check with your IBM representative for availability.

The 8260 hub is available with 7, 10, and 17 slot chassis that support 8250 and 8260 modules. The following models are available:

- Model 8260-P07, with 7 slots for shared-media (Token-Ring, Ethernet, and FDDI) and LAN switching modules
- Model 8260-010, with 10 slots for shared-media modules
- Model 8260-A10, with 10 slots for ATM and shared-media modules
- Model 8260-P10, with 10 slots for shared-media and LAN switching modules
- Model 8260-017, with 17 slots for shared-media modules
- Model 8260-A17, with 17 slots for ATM and shared-media modules
- Model 8260-P17, with 17 slots for shared-media and LAN switching modules.
- Model 8260-G17, with 17 slots for ATM, shared-media, and LAN switching modules

Figure 1 shows a 10-slot hub with both 8250 and 8260 modules installed.

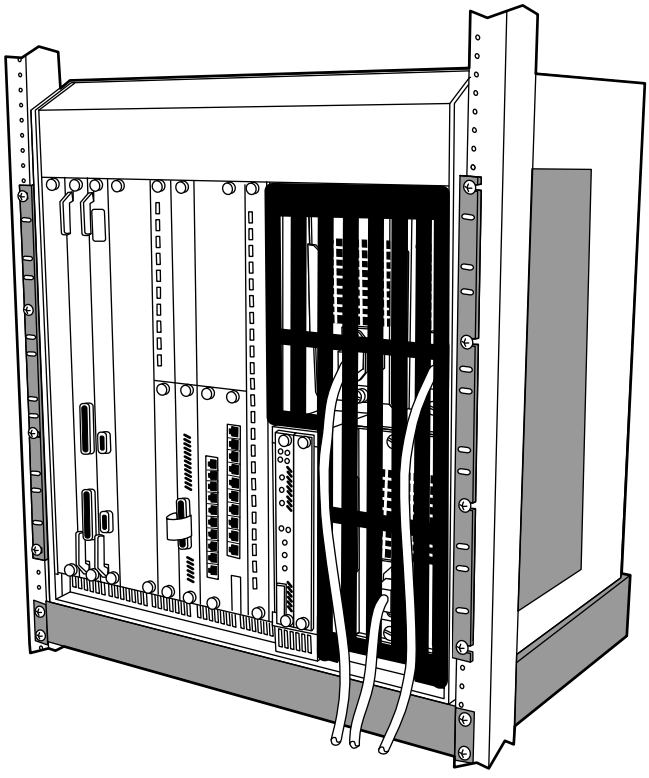

Figure 1. 10-slot 8260 Nways Multiprotocol Switching Hub

Figure 2 shows a 17-slot hub with both 8250 and 8260 modules installed.

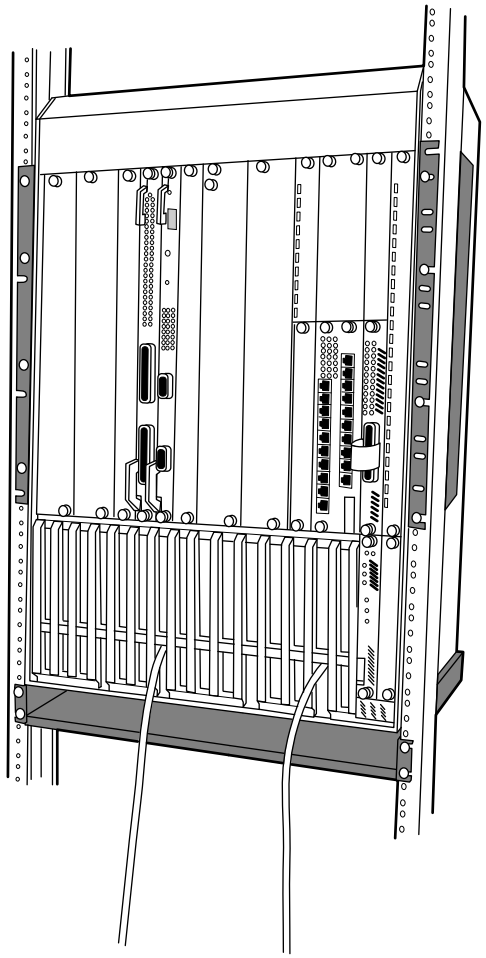

Figure 2. 17-slot 8260 Nways Multiprotocol Switching Hub

The 8260 Nways Multiprotocol Switching Hub has the following characteristics:

- **Enhanced backplane**

  The 8260 fully supports 8250 modules by means of an enhanced version of the 8250 backplane. An 8260 hub can run up to eight Ethernets, 17 Token-Ring, or eight FDDI rings concurrently. The enhanced backplane includes a ring bus for use with Token-Ring and FDDI topologies.

- **Support for 8260 and 8250 modules**

  8250 modules can be installed in the 8260 hub, by means of an adapter kit. Three different adapter kits are available to allow for the installation of up to 16 8250 modules (see page 20). Once installed, 8250 modules make full use of the 8260 hub's power supply, extended management, and improved fault tolerance capabilities.

  Because 8260 Token-Ring modules use a more efficient signaling scheme than 8250 Token-Ring modules, the two module types cannot communicate over the hub backplane. However, they can be connected using trunk ports.

- **Intelligent power subsystem**

  The 8260 power subsystem provides easy access to load-sharing power supplies, high power availability, and controller-based power verification features designed to ensure optimal performance. The power supplies are installed from the front of the hub on 10- and 17-slot models, and from the rear of the hub on 7-slot models, and are easily accessible.

  – Load-sharing power supplies

    The 8260 is powered by load-sharing power supplies. By evenly distributing power consumption among all supplies installed in the hub, the load-sharing design of the 8260 hub ensures that there is no single point of failure in the power subsystem.

  – Hot swappable power supplies

    The 8260 power supplies are hot swappable. You do not have to power off the hub to install or remove them. Rather, you just plug the new power supply in and it automatically assumes its share of the power load.

  – High power capacity

    When the 8260 hub runs in non-fault tolerant mode with full power capacity (four power supplies in a 17-slot hub, three power supplies in a 10-slot hub, two power supplies in a 7-slot hub), its power supplies deliver up to 1500 watts of power (1100 watts in the 10-slot hub, 730 watts in a 7-slot hub).

    When the 8260 hub runs in fault-tolerant mode with full power capacity, up to 1100 watts of power (730 watts for a 10-slot hub, 415 watts for a 7-slot hub) is supplied to the installed modules. If a power supply fails, the power delivered by the remaining power supplies is sufficient to keep the hub and all installed modules running.

  – Controller-managed power consumption

    The 8260 Fault Tolerant Controller Module polls each new module installed in the hub to confirm that the new module's power requirements can be fully satisfied. If enough power is available, the new module will power on. If available power is inadequate, the new module will not be permitted to power on.

  – -48 Vdc Power Supply

    In order to use the 8260 hub in an environment where only dc power is available (such as TELCO carriers), one or more -48 Vdc power supplies can be installed.

- **Intelligent cooling subsystem**

  The 8260's cooling subsystem protects the hub, installed modules, and configuration information, from damage or loss that could result from a heat-related failure of the hub or a module.

- **Distributed hub management architecture**

  The 8260 Distributed Management Modules (DMMs) provide a cost-efficient management architecture that consolidates media management in a single module, while distributing network monitoring across a series of Ethernet (E-MAC) or Token-Ring (T-MAC) medium access control cards.

  The DMM manages and controls the 8260 switching hub and all installed modules, except for ATM media modules that are controlled and managed by the ATM Control Point and Switch (A-CPSW) module.

  There are three types of DMM available:

  - Standard DMM (Feature Code 1200) that occupies one payload slot.
  - Ethernet Carrier DMM (Feature Code 1300) that occupies one payload slot and may house up to six E-MAC or three High-End Ethernet MAC (HEMAC) cards.
  - Advanced DMM/Controller (Feature Code 1700) that occupies one controller bay slot, and provides performance enhancements.

  Only one DMM may be active at given time. If the active DMM fails, the standby DMM will become operational.

  E-MAC or HEMAC cards can be physically attached to the carrier portion of an Ethernet Carrier DMM or any 8260 Ethernet media module installed in the hub. T-MAC cards attach to any 8260 Token-Ring media module. These protocol-specific cards monitor all activity on a network, gathering statistics and reporting them to the protocol-independent DMM.

  The DMM architecture supports redundancy at all levels, including that of MAC cards. MAC cards support N+1 redundancy. That means you can monitor all active networks, and have fault-tolerance for all network monitoring if you install N (the number of networks) + 1 MAC cards. A single backup MAC card will automatically take over if one of the active MAC cards fails.

- **Power management**

  The DMM works with the Controller module to protect network integrity using power management. The DMM manages power usage in the hub, allowing you to prioritize how modules power off (when there is insufficient power available), and preventing newly-installed modules from receiving power when there is no power available.

  There is, in addition, a DMM function that allows you to implement fault tolerant power. This allows the hub to reserve some of its power capacity to protect against a power supply failure.

- **High-Speed hub management**

  As you add modules and MAC cards to your 8260 hub, the total processing power of the hub increases (management module processing resources are *not* depleted by the addition of network segments). This is because each 8260 module has its own CPU (Series 68000). Each time you install an 8260 module in the hub, you increase the processing power of the module's CPU. The major benefit of this technology is that it allows you to collect statistics for each protocol, even during peak traffic.

  In addition, you can assign a power priority level to modules. A power priority level determines whether a module is to be powered off when a power supply failure causes hub power to drop below the minimum level required to run all installed modules. This function allows you to specify the modules that will continue to run in case of a power deficit in the hub.

- **Multiple front panel and backplane interface options**

  Interface options on both the front panel and the backplane of the 8260 allow you to connect a greater number of external segments than you could connect using conventional internetworking hardware.

- **8260 internetworking technology to complement 8250 functionality**

  8260 internetworking solutions provide connectivity between internal networks, and connectivity from internal networks to FDDI, ATM, and WAN backbones. The internetworking capabilities of the 8260 system combine with the flexibility of port-switching media modules to deliver bandwidth on demand for existing LANs.

Note: Except for the number of payload slots (7, 10, or 17) and the number of power supplies (2, 3, or 4), the 7-, 10-, and 17-slot chassis share the same characteristics and accessories. This allows you to build 8260-based networks using 7-, 10-, and 17-slot hubs.

8260 Backplanes

Media Backplane

The 8260 media backplane supports Ethernet, Token-Ring, and FDDI networks, and contains two separate connectors: **TriChannel**** and **ShuntBus**.

TriChannel connectors maintain compatibility with the set of signals that appear on the 8250 backplane.

ShuntBus connectors are a major upgrade to the 8250 hub, and serve as additional connectors that allow you to configure a greater number of networks.

As shown in Figure 3, an ATM or PacketChannel backplane can also be added to the 8260 backplane.

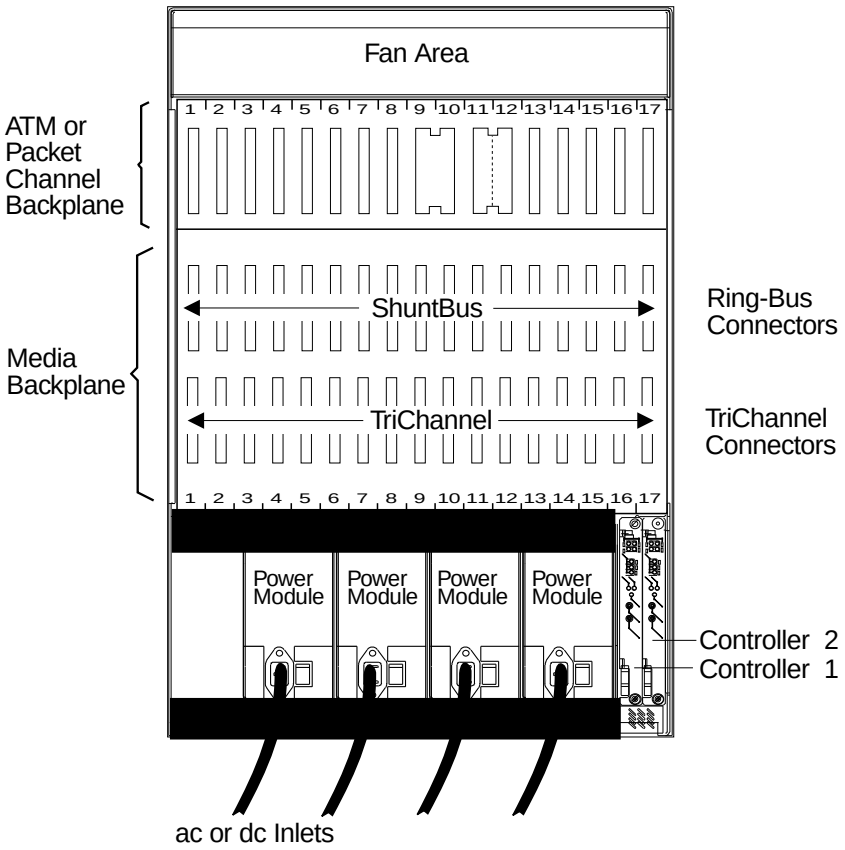

Figure 3. 17-slot 8260 Chassis Backplanes

Valid Network Configurations

In Table 1, each row shows a valid configuration of backplane networks for an 8260 hub which has only 8260 modules (no 8250 modules) installed.

Table 1. LANs on the Media Backplane

Ethernet	Token-Ring	FDDI
8	10	0
8	8	1
8	6	2
8	3	3
8	0	4

Note: Segments are distributed as follow:

- Ethernet: six networks on TriChannel, two networks on ShuntBus connectors
- Token-Ring: all networks on ShuntBus connectors
- FDDI: all networks on ShuntBus connectors.

TriChannel Connectors

The TriChannel connectors in the 8260 hub carry data and control signals for different types of modules:

- 8250 concentration:
  - Ethernet media modules
  - Token-Ring media modules
  - FDDI media modules
- 8260 Ethernet and Token-Ring media modules.

Networks and Links

There are three 8250/8260 Ethernet networks on the TriChannel connector, numbered 1, 2, and 3. Each network requires fourteen signal pins.

There are five 8260-only Ethernet networks on the TriChannel connector, numbered 4, 5, 6, 7, and 8. Each network requires four signal pins.

There can be eight FDDI-links on the TriChannel connector, numbered 1 through 8. A link is not equivalent to a network. Links are used to interconnect modules on the backplane in order to form a ring. Each ring formed represents a network. Each FDDI link requires six signal pins.

There can be 15 8250 Token-Ring links on the TriChannel connector, numbered 1 through 15. Each ring formed represents a network. Each Token-Ring link requires two signal pins. 8260 Token-Ring networks are implemented on the ShuntBus, and do not compete with other networks for resources.

Figure 4 on page 8 shows how the three hub protocols share backplane resources. Refer to this figure when you need to plan the use of the backplane resources on your 8260 hub.

TriChannel Capabilities

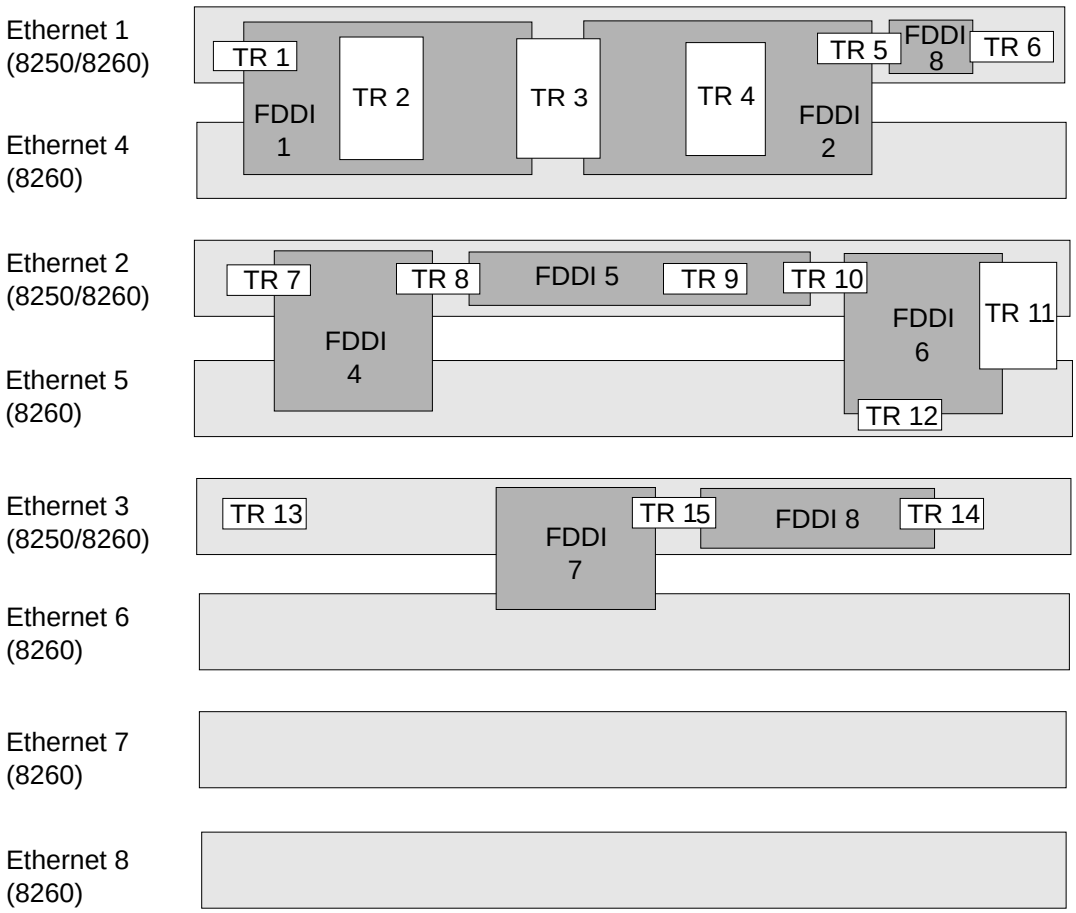

Figure 4. Backplane Path Usage

Example 1: If Ethernet 1 is in use, any networks that overlap Ethernet 1 and share the same backplane resources are not available. As shown in Figure 4, TR 1 to 6 and FDDI 1 to 3 are not available if you use Ethernet 1.

Example 2: If 8250 Token-Ring 15 is in use, any networks that overlap 8250 Token-Ring 15 and share the same backplane resources are not available. As shown in Figure 4, Ethernet 3 and FDDI 7 and 8 are not available if you use TR 15.

Network and links share a common, fixed number of backplane signals. Therefore, restrictions may apply, depending on the usage of wires required by the installed modules.

TriChannel Configurations

This section describes how TriChannel signals may also be shared. It uses tables to show the priority that one type of module has over the others.

Ethernet-based Priority

Table 2. 8260 Hub with Ethernet Networks Based on 8250 Ethernet Module
Links are lost whenever an Ethernet network is allocated.

Ethernet Network Number	8260 Ethernet Network Loss	8250 Token-Ring Link Loss	8250 FDDI Link Loss
1	None	1-6	1-3
2	None	7-11	4-6
3	None	13-15	7-8
Note: Recommended allocation order for Ethernet networks: 3, 2, 1.			

Table 3. 8260 Hub with Ethernet Networks Based on 8260 Ethernet Module
Links are lost whenever an Ethernet network is allocated.

Ethernet Network Number	8260 Ethernet Network Loss	8250 Token-Ring Link Loss	8250 FDDI Link Loss
4	None	2-4	1-2
5	None	11-12	4, 6
6	None	None	7
Note: Recommended allocation order for Ethernet networks: 6, 5, 4.			

Token-Ring-based Priority

Table 4. 8260 Hub with Token-Ring Networks Based on 8250 Token-Ring Module
Links and networks are lost whenever a Token-Ring is allocated.

Token-Ring Link Number	8250 Ethernet Network Loss	8260 Ethernet Network Loss	8250 FDDI Link Loss
1	1	None	1
2	1	4	1
3	1	4	1-2
4	1	4	2
5	1	None	2-3
6	1	None	3
7	2	None	4
8	2	None	4-5
9	2	None	5
10	2	None	5-6
11	2	5	6
12	None	5	6
13	3	None	None
14	3	None	8
15	3	None	7-8

Note: Recommended allocation order for Token-Ring links: 15, 14, 13, 10, 9, 8, 7, 11, 12, 6, 5, 1, 4, 3, 2.

FDDI-based Priority

Table 5. 8260 Hub with FDDI Networks Based on 8250 FDDI Media Module
Links and networks are lost whenever an FDDI link is allocated.

FDDI Link Number	8250 Ethernet Network Loss	8260 Ethernet Network Loss	8250 Token-Ring Link Loss
1	1	1, 4	1-3
2	1	1, 4	3-5
3	1	1	5-6
4	2	2, 5	7-8
5	2	2	8-10
6	2	2, 5	10-12
7	3	3, 6	15
8	3	3	14-15

Note: Recommended allocation order for FDDI links: 8, 7, 5, 4, 6, 3, 1, 2.

ShuntBus Connectors

The major difference between 8250 and 8260 media backplanes is that the 8260 backplane has a second connector for access to the ShuntBus. The ShuntBus is a set of point-to-point links between adjacent slots. This structure is optimized for creating backplane based rings.

ShuntBus signals have been allocated to provide two Ethernet networks (numbers 7 and 8). The remainder of signals are available for use by 8260 Token-Ring modules.

Module Backplane Addressing

There are three ways to address the channels from the modules to the backplane. The first is by using the DIP switches actually located on the modules themselves. The other two methods use xMM addressing capabilities, either through an external ASCII terminal or through the network using management stations. The latter two methods may be preferable as they minimize the assignment of modules on the backplane.

Notes:

1. 8250 FDDI media modules have no DIP switches. Therefore, you can only assign modules on the backplane using xMM addressing.
2. In an unmanaged environment (without xMM), you cannot use Ethernet, Token-Ring, and FDDI modules in the same hub.
3. If 8250 FDDI media modules are selected without an xMM, the configuration is **invalid**. An xMM is required to make these modules operational.

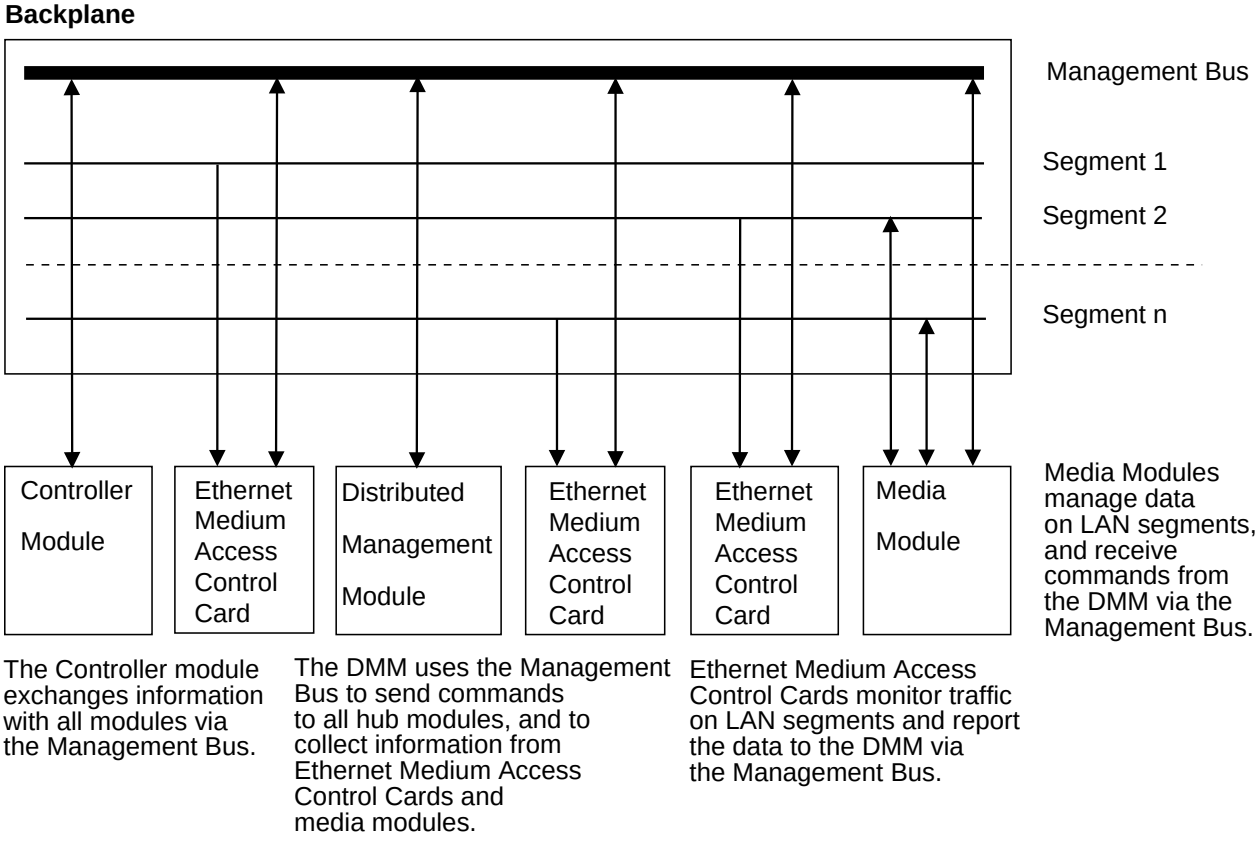

Figure 5. 8260 Network Management Architecture (Ethernet Based)

ATM Backplane

All data transmitted between modules in the ATM subsystem passes through the ATM backplane. Data is switched between ATM concentration modules (for example, A4-FB100 and A2-MB155) in the ATM subsystem by an ATM Control Point and Switch (A-CPSW) module. A-CPSW modules are installed in slot positions 9 and 10 or 11 and 12 in the 8260 Hub (see Figure 6 on page 12).

The major difference between the ATM backplane and other 8260 hub LAN backplanes is that each concentration module has a dedicated set of connections to the A-CPSW module. This set of dedicated connections constitutes a star-wiring topology in which the ATM media modules are at the tips of the star and the A-CPSW module at the center. The wiring topology used in the ATM backplane is shown in Figure 6.

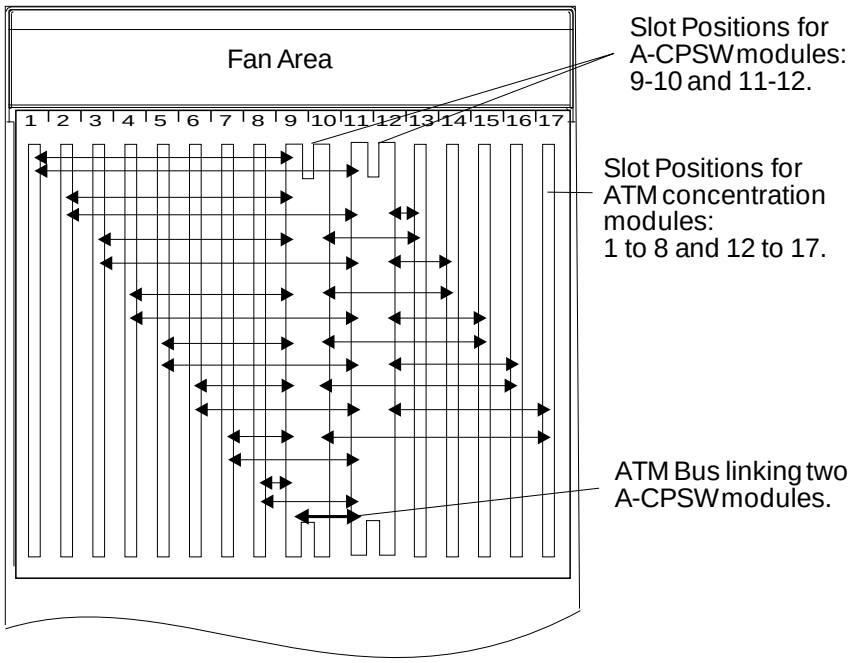

Figure 6. Star-Wiring Topology in ATM Backplane

The main characteristics of the ATM backplane are as follows:

- Modular structure
- Full floating ATM media modules
- Support of two A-CPSW switch modules for reliability and redundancy
- Full coexistence with legacy LAN modules.

You can install an ATM media module in slots 1 to 8 and 12 to 17, but not in slots 9 to 11 (slots 9-12 are reserved for A-CPSW modules[1].) After installing the module, you must configure it for operation by entering a series of commands from the A-CPSW console.

1. You cannot install an ATM media module in slot 12 if an A-CPSW module is installed in slots 11-12.

PacketChannel Backplane

The third (upper) backplane slot of the 8260 backplane can be occupied by either:

- an ATM backplane, for cell-switching or
- a PacketChannel backplane, for packet switching.

The PacketChannel backplane supports LAN switching, and is designed for use by the Switching Module Series of modules (refer to page 99).

There are two types of PacketChannel backplane:

- Standard PacketChannel, that supports packet switching, implemented in 8260 models P07, P10, and P17.
- PacketChannel plus ATM (also called Switch Channel) that supports both ATM modules and the Switching Module Series, implemented in the 8260 model G17 only.

The PacketChannel is designed as a passive bus, so that no active component can break the signal. This increases reliability.

The Switching Modules can be installed in any slot of the hub. However, when the Switch Channel backplane is installed, the same slot restrictions apply as for ATM modules (slots 9-11 are reserved for A-CPSW modules, slot 12 is available only if an A-CPSW module is not installed in slot 11).

Understanding 8260 Management

The 8260 Nways Multiprotocol Switching Hub's approach to hub management allows you to scale your network management configuration (and therefore its cost) to suit the needs of your environment. The system's management architecture does this by separating configuration and control from network connectivity and monitoring rather than integrating connectivity hardware into the basic system (see Figure 7). This is analogous to the way that a personal computer uses multiple adapter cards to connect to various networks.

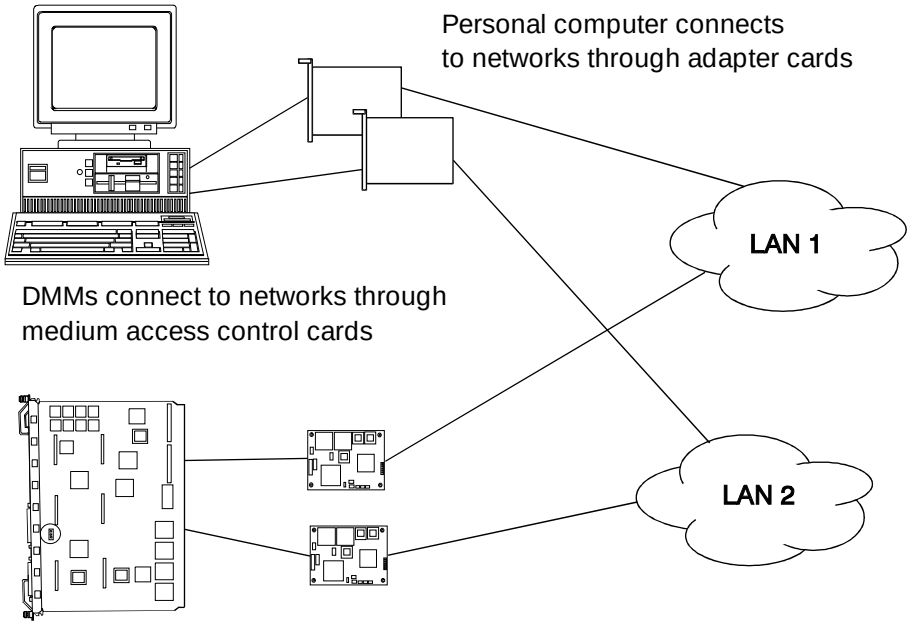

Figure 7. How the DMM Achieves Network Connectivity

Regardless of how many networks you implement in the hub, you only pay for the agent once. You can, consequently, purchase as many or as few medium access control (MAC) cards as you need to monitor the networks you have implemented.

Note: If you want to use in-band management, you must have at least one MAC card. The DMM needs a MAC card to connect to a network segment.

Building a Management System

Management facilities for the 8260 hubs are both flexible and scalable. This section describes the different ways you can build a management system for your 8260 hub.

The building blocks of the management system are:

- Distributed Management Modules (DMMs), which contain the IBM SNMP agent in the hub and provide management and control of the hub. The DMM is the “brain” of the system.
- Ethernet or Token-Ring medium access cards (E-MACs or T-MACs), which gather statistics on the network to which they are assigned. They also provide the DMM with IP connectivity to hub network segments (is the same way that an adapter card provides connectivity for a personal computer) and provide RMON support. The MACs are the “eyes” and “ears” of the system.

  Ethernet medium access control (E-MAC or HEMAC) cards are located on EC-DMM and/or each 8260 Ethernet media modules. Token-Ring medium access control (T-MAC or HTMAC) cards are only located on Token-Ring media modules.

The DMM is used to make configuration changes, receive status information, and, when an x-MAC is present, to report the information to an SNMP manager. Therefore, when you are using an 8260 hub with multiple Token-Ring segments, there is no need for one T-MAC per segment. T-MACs are used only for monitoring.

8250 hub Network Management modules (EMM, TRMM, and FMM) can also be used in an 8260 Hub. The role they play in the hub depends on how you have implemented 8260 management. Instructions on using 8250 management in an 8260 hub is given in Table 6 on page 16.

Network Monitoring

There are several ways to configure network monitoring in an 8260 hub. The approach you take depends on the following factors:

- The level of monitoring you require
- Whether or not you want network monitoring to be fault tolerant
- Whether you want to incorporate 8250 Multiprotocol Intelligent Hub management modules in the system.

This section gives a brief overview of the type of network monitoring provided by each approach.

One MAC Card for Multiple Networks

Using one MAC for several networks is a low-cost approach that allows you to monitor only one of your installed networks at a time. The advantage is that you only need to buy one MAC card per hub.

Note: If you use one MAC card, you must switch the connection from network to network manually. This means that, at a given time, there may be one or more networks that are not being monitored.

This approach may make monitoring network via SNMP more difficult because each time you move the MAC card to a different network, you risk losing remote connectivity with the DMM.

One MAC Card per Network

If you use one MAC card per network, you can monitor all network segments, including isolated (non-backplane) networks, simultaneously.

N + 1 MAC Cards for Fault Tolerance

If you want to implement fault tolerant network monitoring in your hub, install an additional (N + 1) MAC card. This card is used to monitor the networks you have set up. When properly configured, the additional MAC card takes over operation for a failed MAC card.

Using 8250 Management Modules in an 8260 Hub

To protect your investment in 8250 management modules, you can use them to monitor the 8250-compatible networks in the 8260 hub.

Table 6 shows the various ways you can use 8250 management modules in an 8260 hub.

Table 6. 8250 Management Modules in an 8260 Hub

Scenario	**Resulting Role of 8250 Management Module**
No DMM Present	Same functions as in an 8260 hub: • Configures and monitors all 8250 modules. • Reports hub status if a Token-Ring Management Module (TRMM 2.1 or later) or an Ethernet Management Module (EMM 4.0 or later) is used. • Cannot manage 8260 modules.
DMM Present	Monitors traffic on the network segment to which it is assigned. Because an 8250 management module does not report information to the DMM, you must connect to it via a console port or SNMP.

Hub Management Programs

Based on several platforms (AIX, HP Openview, and Windows) the IBM Nways Campus Manager programs help you manage your campus network in a multiprotocol environment.

From a management station, the main tasks include:

- Box management
- LAN or ATM resource management
- Provide resource status
- View or change the network configuration
- Detect and locate faults in the network
- Collect and display statistics
- Monitor resources and events.

A typical Campus Manager Suite is composed of:

- Campus Manager - LAN
- Campus Manager - ATM
- Campus Manager - LAN Remote Monitor.

Figure 8 shows a typical example of campus management, based on an AIX platform.

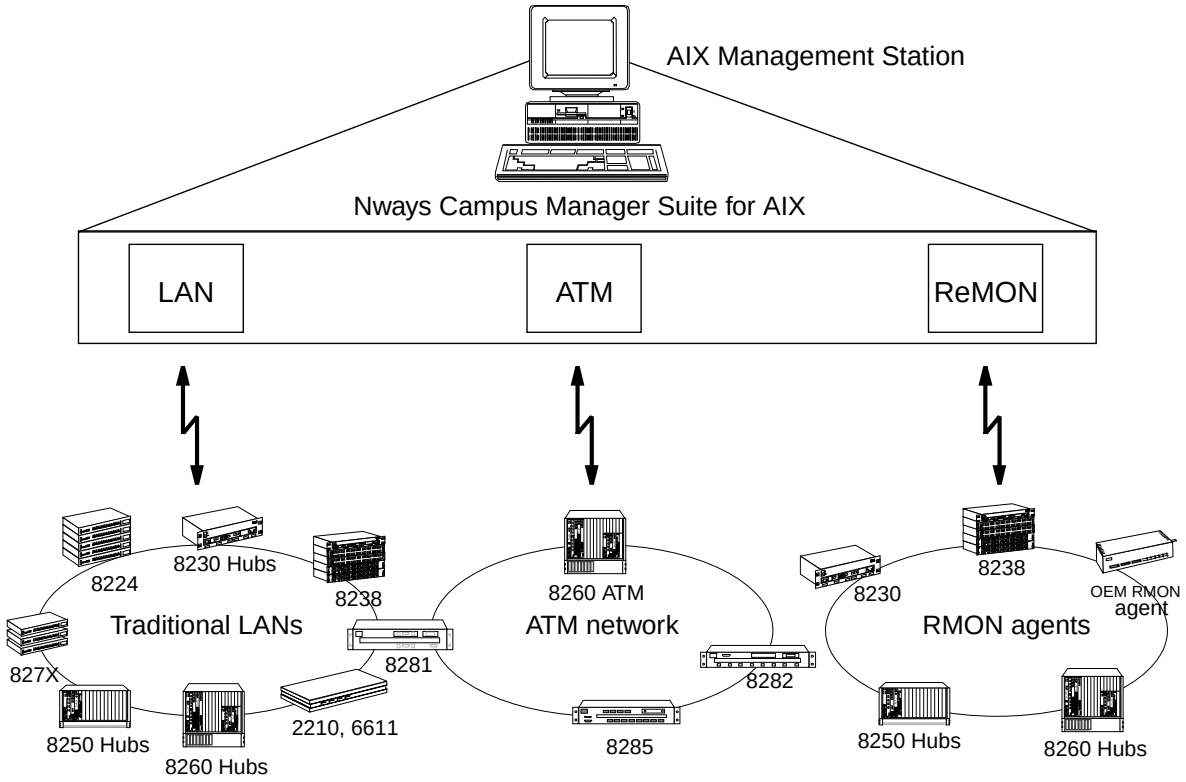

Figure 8. Campus Management Using Nways Campus Manager Suite

Campus Manager - LAN

For traditional LAN networks (such as Ethernet, Token-Ring, and FDDI), the Campus Manager - LAN allows you to manage the following devices:

- Multiprotocol hubs (8250, 8260)
- LAN concentrators (8230)
- LAN switches (827x)
- non-IBM or IBM Routers and Bridges (6611, 8281).

Campus Manager - ATM

Campus Manager - ATM can manage ATM physical and logical resources in the following devices:

- 8260 switching hubs
- 8285 workgroup switches
- ATM bridges (8281)
- ATM concentrators (8282).

Campus Manager - LAN ReMON

The Campus Manager - LAN ReMON, associated with RMON agents in LAN remote devices, allows:

- Analysis of LAN performance
- Full RMON support of Ethernet (9 groups) and Token-Ring (13 groups)
- Use of the following advanced features (downloadable modules in RMON agents):
  - Traffic Transmission Management Module (TTMM)
  - Enterprise Communications Analysis Module (ECAM).

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Chapter 2. 8260 Hub Features and Accessories

8260 Hub: Base Product

The base product of the 8260 hubs consists of a chassis and the following components:

- Three fan units (two for the 7-slot hubs)
- Blank dual-slot filler plates; six for the 17-slot hubs; three for the 10-slot hubs, two for the 7-slot hubs
- Blank single-slot filler plates; three for the 17-slot hubs, two for the 10-slot hubs, one for the 7-slot hubs
- One power supply bay cover panel (10- and 17-slot hubs only)
- One rubber feet kit
- One cable tray
- One rack mount kit.

Note: The load sharing power supply with its power cord and the controller module are ordered using their specific Feature Code number.

Physical Characteristics

The 8260 is designed to be either rack mounted or placed on a table, stand, or shelf.

Table 7. 8260 Weight and Dimensions

Model	Weight[1]	Width	Length	Height
8260-017	21.9 kg (48.4 lb)	44 cm (17.36 in.)	38.5 cm (15.06 in.)	67.3 cm (26.52 in.)
8260-A17	23.2 kg (51.1 lb)	44 cm (17.36 in.)	38.5 cm (15.06 in.)	67.3 cm (26.52 in.)
8260-G17	23.2 kg (51.1 lb)	44 cm (17.36 in.)	38.5 cm (15.06 in.)	67.3 cm (26.52 in.)
8260-P17	22.3 kg (49.1 lb)	44 cm (17.36 in.)	38.5 cm (15.06 in.)	67.3 cm (26.52 in.)
8260-010	19.8 kg (43 lb)	44.4 cm (17.5 in.)	38.6 cm (15.2 in.)	49.8 cm (19.6 in.)
8260-A10	20.6 kg (45.3 lb)	44.4 cm (17.5 in.)	38.6 cm (15.2 in.)	49.8 cm (19.6 in.)
8260-P10	20.2 kg (44.5 lb)	44.4 cm (17.5 in.)	38.6 cm (15.2 in.)	49.8 cm (19.6 in.)
8260-P07	15.8 kg (34.8 lb)	44.4 cm (17.5 in.)	52.2 cm (20.55 in.)	22.2 cm (8.74 in.)

[1] Unloaded, with blank filler plates, three fan units (2 for 7-slot hub), and no power supply installed.

8260 Hub: Accessories

In addition to the base components supplied with the hub, the following components are also available:

- 8250 Module Adapter Kit
- Power Supplies
- 8260 Controller Module
- Rack Mount Kit
- Cable Management Tray
- DCE Cable and Interposers
- 50-Pin UTP Cable.

8250 Module Adapter Kit

You must use an 8250 adapter kit whenever you install one or more 8250 modules in the 8260 hub.

The contents of an adapter kit are shown in Figure 9 on page 21. The following table shows the quantity of each component included in the adapter kits for 4-slot, 9-slot, and 16-slot 8250 hubs.

Note: Feature Code 8016 cannot be used in 7-slot 8260 hubs.

Feature Code 8017 cannot be used in 7-slot or 10-slot 8260 hubs.

Table 8. 8250 Module Adapter Kit Components

Adapter Kit Component	**Quantity by IBM FC 8011 (4-Slot 8250)**	**Quantity by IBM FC 8016 (9-Slot 8250)**	**Quantity by IBM FC 8017 (16-Slot 8250)**
Left Boundary Adapter	1	1	1
Right Boundary Adapter	1	1	1
Dual-Slot Top Filler	1	3	7
Single-Slot Top Filler	1	2	1
Dual-Slot Module Ejector Blocks	10	10	10

An 8250 Adapter Kit allows to install up to 4, 9, or 16 single-slot 8250 modules, or a mixture of single-slot and dual-slot 8250 modules.

Note: Each subsystem *accommodates* either 4, 9, or 16 8250 modules, but *occupies* up to 5, 10, or 17 slots; that is, the number of modules (4, 9, or 16), plus one. This is because the right boundary adapter used in an 8250 subsystem occupies one additional slot.

8250 Adapter Kit components are shown in Figure 9.

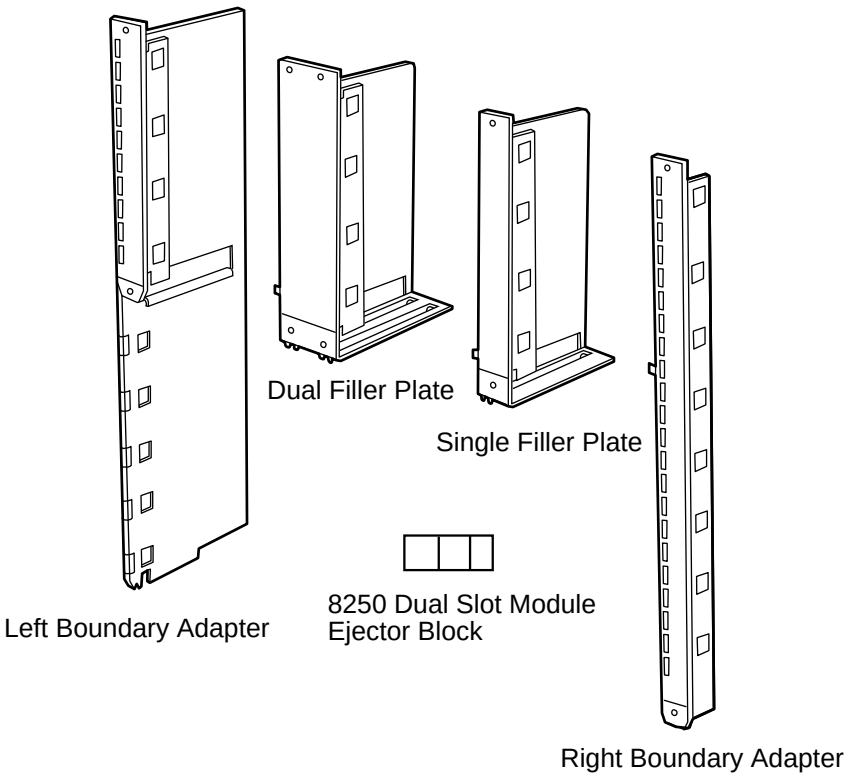

Figure 9. 8250 Adapter Kit Components

Power Supplies

You can use up to four power supplies in a 17-slot 8260, three supplies in a 10-slot 8260, and two in a 7-slot 8260. As a rule, it is recommended that you run the hub with at least one power supply more than the minimum number needed to operate it.

The availability of extra power can help prevent the hub from shutting down when 8250 and 8260 modules demand more power than the hub can provide. An additional power supply minimizes the chance that power supply redundancy will be lost without warning.

For example, if the total power requirement of all installed modules is 470 watts, the hub can operate with only two power supplies. A third power supply, however, is needed to achieve power fault tolerance. If you use three power supplies and one power supply fails, the remaining two supplies can support the load.

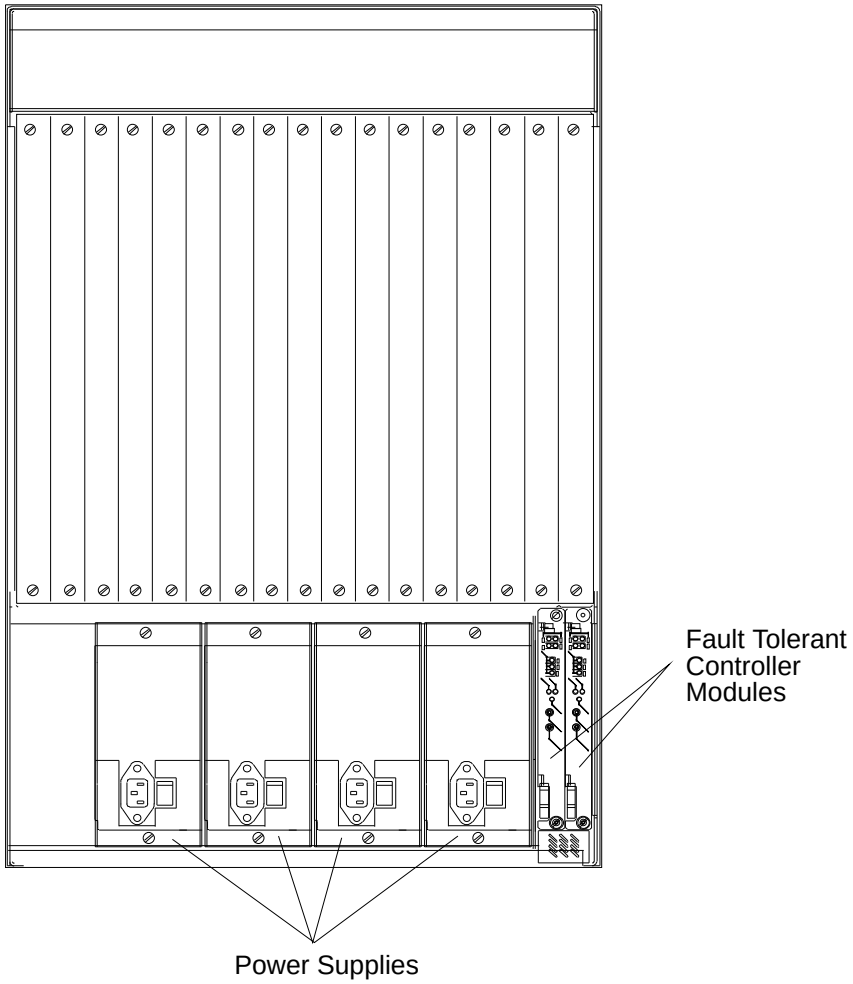

Figure 10. Front Panel of 17-Slot 8260 Hub with Power Supplies Installed

AC Power Supply

Two types of AC power supplies are available:

- 295 watt - (Feature Code 8001)
- 415 watt - (Feature Code 8027) for configurations requiring a high amount of power (ATM modules or 8250 FDDI modules for example).

Although both types can be installed in the same hub, this should be avoided when running in power fault tolerant mode, because the 415 watt supply will be treated as having the same output as the 295 watt supplies.

-48 Vdc Power Supply

The load-sharing -48 Vdc power supply (Feature Code 8026) delivers the same output voltages as the 295 watt AC power supply (Feature Code 8001) for operating environments in which a dc power source is used (such as in telephone company offices).

Caution: Only trained service personnel should connect the power cord to the -48 Vdc power source.

8260 Controller Module

Note: 8250 controller modules cannot be used in an 8260 hub.

The 8260 Controller Module synchronizes the operation of all installed Media, Management, and Interconnect modules by providing clocking and timing to the backplane of the 8260 hub. The Controller module monitors hub conditions and, in a managed hub, reports failures to the appropriate management module.

You can add a backup controller module to the hub for increased fault tolerance.

Two types of Controller module are available:

- Fault-tolerant Controller Module (Feature code 8000)
- Advanced DMM/Controller Module (Feature code 1700). Both DMM and Controller functions are included in a single module located in the Controller bay, thus saving one payload slot in the 8260 hub.

Rack Mount Kit

A rack mount kit (Feature Code 8015) is delivered with the 8260 hub. For information on how to assemble the kit, refer to the *8260 Nways Multiprotocol Switching Hub Installation Guide* (SA33-0251).

Either of the following racks may be used, providing they can support at least 170 kg (375 lbs) and allow enough space for the 8260 chassis:

- TELCO rack: 15U required (12U for the 10-Slot hub)

  1U (unit of measure) is 45 mm or 1.75 in.
- Metric rack: 26SU (20SU for the 10-Slot hub)

  1SU (system unit of measure) is 25 mm or 1 in.

Cable Management Tray

The cable management tray (Feature Code 3792) delivered with the 8260 hub is the same as the management tray used with the 8250 and can be ordered separately.

This tray provides a simple way to route all cabling connected to the front panels and to the back of the hub. The cable management tray weighs 3.6 kg (8 lbs) and is available in one size for both the 8250 and 8260 hubs.

Width	Depth	Height
444 mm (17.5 in.)	465 mm (18.3 in.)	45 mm (1.75 in.)

DCE Cable and Interposers

The following components are delivered with the 8260 hub and are used to connect a console, locally or remotely, to the DMM serial port:

- RS-232 DTE/DCE cable (Feature Code 8022)
- Null modem interposer (Feature Code 8861)
- Gender changer interposer (Feature Code 8021).

50-Pin UTP Cable

To more easily install cables on Ethernet modules with two or three TELCO-type connectors, you can use a UTP cable with a 50-pin 45º connector (Feature Code 8033; Part Number 80G3405).

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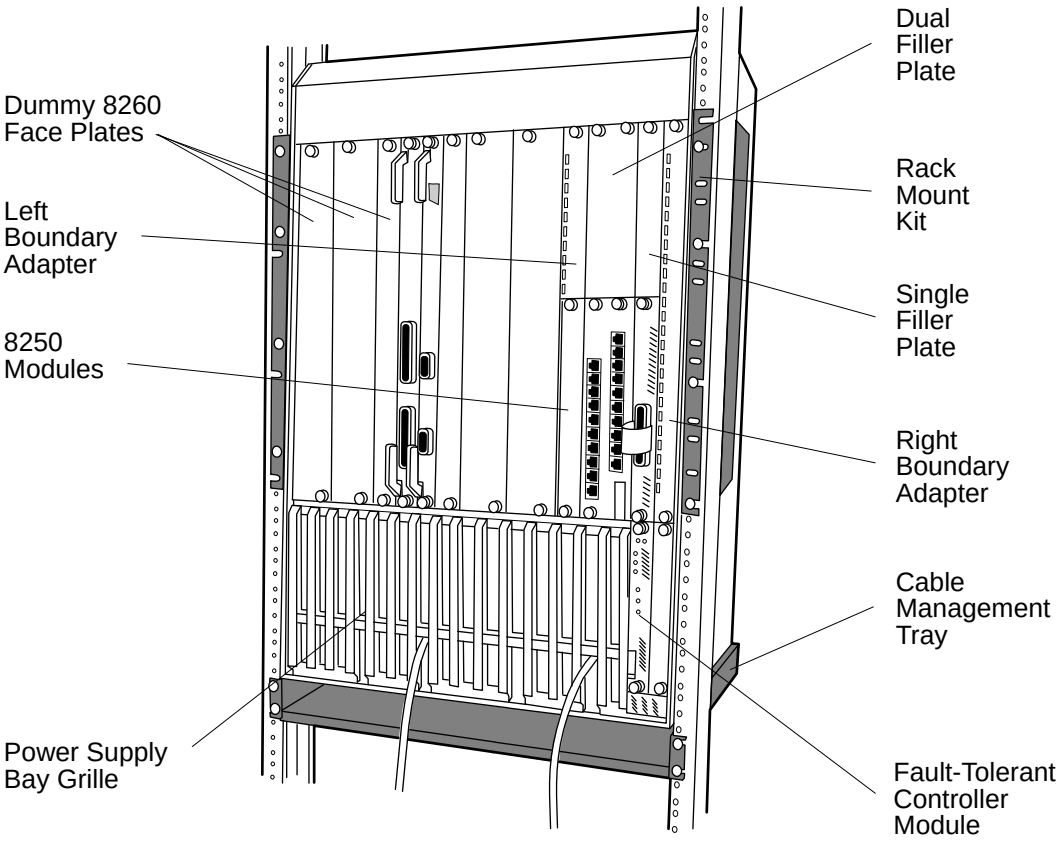

Figure 11. 17-Slot 8260 With All Components Installed

Faceplate and Generic Name Codes for 8260 Modules

The codes used on the faceplates and in the generic names of 8250 modules are described in the “Summary Information” tables of the *IBM 8250 Multiprotocol Intelligent Hub Product Description*, GA33-0317.

The codes used for 8260 media modules describe their functionality and are explained in this section. When ordering 8260 modules, do not use the faceplate or generic name code. Be sure to use the module’s Feature Code, which can be found in one of the appendixes in this book.

Faceplate Codes for Media Modules

XAABBB-CCC, where: **X**, **AA**, **BBB**, and **CCC** represent the following values:

X = Media type: A for ATM
E for Ethernet
T for Token-Ring
SW for the Switching Module Series

AA = Number of ports

BBB = Port or card characteristics:

CS Connector switching
FB Fiber
MB Motherboard
MS Module switching
MSA Module switching active
PS Port switching
PSA Port switching active
R Repeater
TP Twisted Pair
XR Multiport router

CCC = Complementary information (media, connector, speed, for example)

Generic Name Codes

The generic name codes for 8260 modules consists of the faceplate codes preceded by a number that indicates the number of slots in the hub occupied by the module.

Example: **1 - E24PS - 6**

1 signifies that the module occupies one slot.

E24PS signifies that the module is an Ethernet module, with 24-ports and per-port switching.

6 signifies that the module can be connected on the backplane to six of the eight possible Ethernet networks.

Modules, Daughter Cards, and Transceivers

The modules and daughter cards available for use with the 8260 hubs are described in the following chapter.

The transceivers available are described in Appendix B.

For detailed specifications of each component, refer to one of the following appendixes:

- Appendix A for Ethernet products
- Appendix B for Token-Ring products
- Appendix C for ATM products
- Appendix D for LAN Switch products
- Appendix E for Management products.

For detailed power requirements for each component, refer to Appendix F.

Chapter 3. 8260 Modules

The chapter describes the modules and daughter cards that are available for the 8260 hubs. A section is provided at the end of this chapter detailing how to obtain code updates.

Redundant Controller Module

The 8260 Redundant Controller Module synchronizes the operation of all installed media, management, and interconnect modules by providing clocking and timing to the 8260's backplane. The controller module monitors hub conditions such as power and temperature and, in a managed hub, it reports failures to the appropriate master management module.

The controller module bay can accommodate two 8260 Controller Modules. One controller module is required for normal hub operation, and only one controller module can be active at any given time. A second controller module can be installed to achieve controller module fault tolerance (that is, if one controller module fails, the other controller module automatically takes over). Controller-based fault tolerance is highly recommended.

For detailed specifications, refer to page 176.

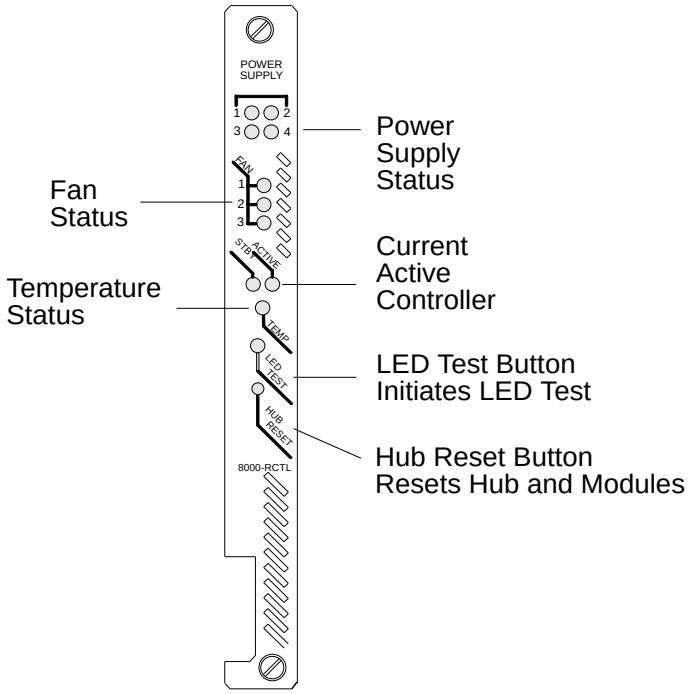

Figure 12. Redundant Controller Module

Distributed Management Modules

The 8260 hub Distributed Management Modules (DMMs) are network management modules designed to work in IBM's 8260 switching hubs. The DMMs enable you to fully manage and control your hub, down to the port level. In addition, the DMMs contain monitoring and control capabilities (when used with MAC cards) which allow you to configure and check the status on all Token-Ring, Ethernet, and FDDI modules in an 8260 hub.

There are three types of DMM available:

- Standard DMM:

  Which occupies one payload slot.

- Ethernet Carrier DMM:

  The Ethernet Carrier DMM (EC-DMM) occupies one payload slot and supports up to six Ethernet medium access control cards (E-MACs) or three High-end Ethernet MAC cards (HEMACs).

- Advanced DMM/Controller:

  Which occupies one controller bay slot, and has performance enhancements over the standard DMM (additional memory for example).

Only one DMM may be active at a given time. The other module remains in standby mode until a failure of the active module.

For detailed DMM specifications, refer to Appendix E.

DMM Functions

The DMM provides all the functions you need to configure, monitor, and control your network at the network console, saving costly and time-consuming trips to the wiring closet. Using DMM network management commands to manage hub modules, you can configure your entire network. DMM gives you the flexibility to handle multiple protocols and media types in a single, managed hub.

The DMM has the following capabilities that maximize security and minimize the risk of losing module and port configuration settings:

- All known modules installed in an 8260 hub *after* a DMM has been installed have all ports disabled (to prevent unapproved connections) and their network setting in Isolated mode. The following exceptions should be noted:
  - when an installed module is not supported by the DMM. In this case, you must configure the module with its DIP switch settings.
  - when a Switching Module Series module is installed, by default all ports are automatically connected to the PacketChannel backplane, enabled, and assigned to virtual bridge 1.
- If you remove any module from the hub and then reinstall it (or install another module of the same type) in the same slot, the DMM automatically configures the module to the last settings saved for that module.
- If you replace a DMM with another DMM, the newly installed DMM automatically learns all module and port configurations. (However, you will need to re-enter terminal and device configuration information.)
- If hub power fails, the DMM “remembers” the configuration last saved. Therefore, when power is restored, none of the pre-failure configuration information is lost.

The administrator assigns a mastership priority level between 1 and 10 to each DMM. Since all DMMs are factory set with the priority level 10, the first DMM you install will automatically become the master for that hub. If you install a second DMM as a backup, you must set it to a lower mastership priority level to ensure that the appropriate DMM is elected master.

DMM Characteristics

DMMs have the following characteristics:

- Compliance with industry standards such as IEEE 802.x, RMON, TCP/IP, Telnet, SNMP, and TFTP
- Continuous monitoring and reporting of key network fault statistics
- Inband and out-of-band network management
- Dynamic network monitoring and control to the module and port level
- Automatic detection of faults and failures
- MAC address-to-port security against intrusion attempts
- Support of 8250 modules and TriChannel Architecture, and fault tolerance capabilities.

Note: The Advanced DMM/Controller module has the same functions as a DMM, with performance enhancements. It is installed in one of the controller bay slots, and thus, saves a payload slot.

Network Management and Control

DMMs provide management and control functions in the following areas:

- **Configuration:** When you log in with the administrator or super user password, you can configure the DMM, as well as the network, module, port, and terminal settings.
- **Staging:** Both the DMM and the media cards save configuration information. This allows the DMM to automatically configure a new module that replaces an existing module of the same type. It also allows a media card to retain its configuration when moved to a different slot or hub. This allows you to configure modules at a central location.
- **Full DMM Redundancy:** DMM v2.3 or later can trade configuration information, so that standby DMMs have the same configuration as the active DMM. This allows standby DMMs to become fully functional in the event of a failure of the active DMM.
- **Port Grouping:** DMM v2.0 or later supports Port Grouping, which allows you to assign a set of ports to a group. You can then use the group name to manage the sets of ports. (8260 modules only)
- **Inventory:** The DMM provides a complete inventory of the hub's contents, including fans and power supplies. The Inventory system also supports a scratchpad feature that allows you to add customized information to what the DMM normally displays. (8260 modules only)
- **Fault, Performance, and Traffic Monitoring:** Many terminal management systems report statistics only when you request them. You can set the DMM to continuously monitor and report key statistics by invoking the Monitor command. The statistics on the screen are updated periodically to give a snapshot of the network. DMM v2.0 or later also supports Ethernet repeater statistics without requiring a MAC card.

- **Scripting and Scheduling:** DMM v2.1 or later allows you to create command scripts that execute a series of user-specified DMM commands. You can also schedule these scripts to run at predetermined times using the DMM scheduling feature. The autoscript feature of DMM v3.0 or later executes scripts triggered by RMON events.
- **Power Management:** The DMM provides tools that allow you to preset the hub for managing low power situations and for using fault tolerant power to seamlessly protect against power supply failures. (8260 modules only)
- **Inband and Out-of-Band Download:** The DMM provides for both inband and out-of-band download operations. An inband download is performed via Trivial File Transfer Protocol (TFTP). The out-of-band download is performed using software provided with the update kit and a connection to the EIA-232 serial port on the front panel of the DMM.
- **SNMP Support:** Simple Network Management Protocol (SNMP) is a protocol defined by the Internet Task Force. The DMM acts as an agent in an SNMP-managed environment responding to SNMP requests and generating SNMP traps.
- **Configuration File Upload/Download:** DMM v2.3 or later allows you to save a DMM configuration on a TFTP server.
- **Telnet Support:** The Telnet command enables you to log in remotely to any DMM on the network and manage it from a remote DMM. You can also manage a DMM from a workstation that supports Telnet.
- **SLIP Protocol Support:** Serial Line Interface Protocol (SLIP) provides a secondary means of connecting the DMM agent to a a hub or network management platform, such as the IBM Campus Manager LAN program.
- **BOOTP Protocol Support:** BOOTP allows DMM v2.3 or later to request and download files at startup that configure both new and restarted DMMs automatically.
- **REM, CRS, and RMON Support:** Ring Error Monitor (REM) observes, collects and analyzes hardware and software error conditions. The Configuration Report Server (CRS) accepts commands from the IBM LAN manager to record station information, to set station parameters, and to remove stations from the ring. Remote network monitoring (RMON) provides standards-based SNMP network monitoring functions for use with management consoles and remote monitors.
- **MAC Address-to-Port Security:** The DMM v2.2 or later implements MAC address-to-port security by checking MAC addresses on station adapter cards against a table that you create. The DMM monitors traffic on each port and performs the action you specify when it detects a station whose MAC address is not in the table. MAC address-to-port security is supported for Ethernet and Token-Ring modules.
- **Dynamically Loadable Modules (DLMs):** DMM v3.0 or later supports DLMs. You must have IBM LAN ReMON application and the HEMAC or HTMAC to take advantage of the DLM feature.

Network Management Access

The DMM provides several ways to access network management. For inband management, the DMM provides a built-in Simple Network Management Protocol (SNMP) agent, the *de facto* industry standard for network management.

The agent lets you manage DMMs through SNMP-based network management solutions. You also have the flexibility of using Telnet for in-band management through the use of DMM's extensive command-line interface.

For out-of-band management, you can connect an ASCII terminal to the EIA-232 console port on the front panel of the DMM. The DMM also has an EIA-232 or EIA-423 auxiliary port on the front panel to facilitate out-of-band connections via modem.

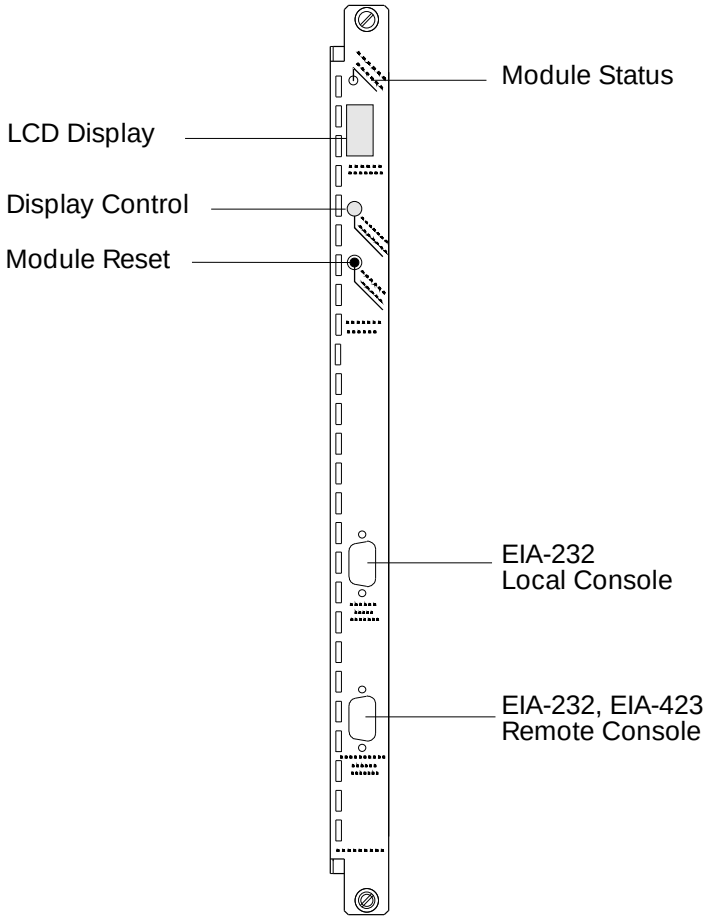

Figure 13. Distributed Management Module

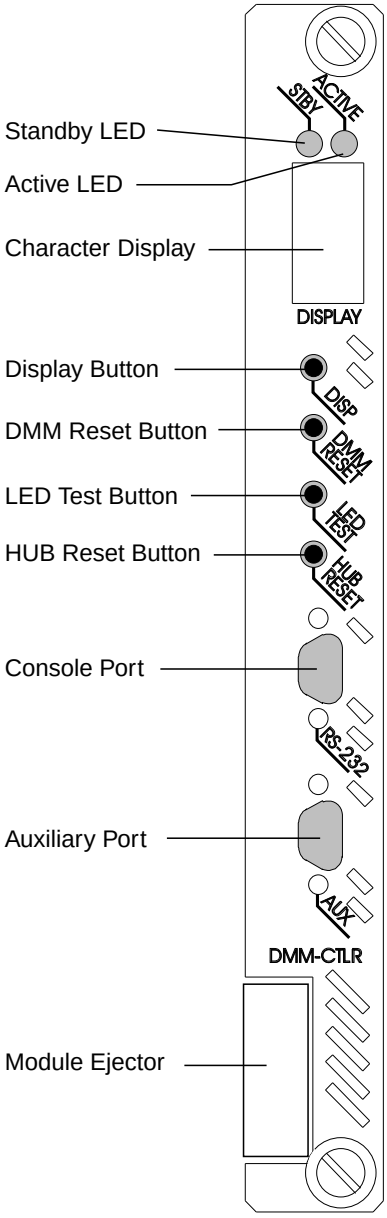

Figure 14. Advanced DMM/Controller Module

Ethernet Carrier Distributed Management Module

The EC-DMM consolidates media management for all media modules, independent of network communications protocol, onto a single module. The carrier portion of the module supports up to six Ethernet medium access control cards (E-MACs) or three High-end Ethernet MAC cards (HEMACs).

For detailed specifications of the EC-DMM module, refer to page 177.

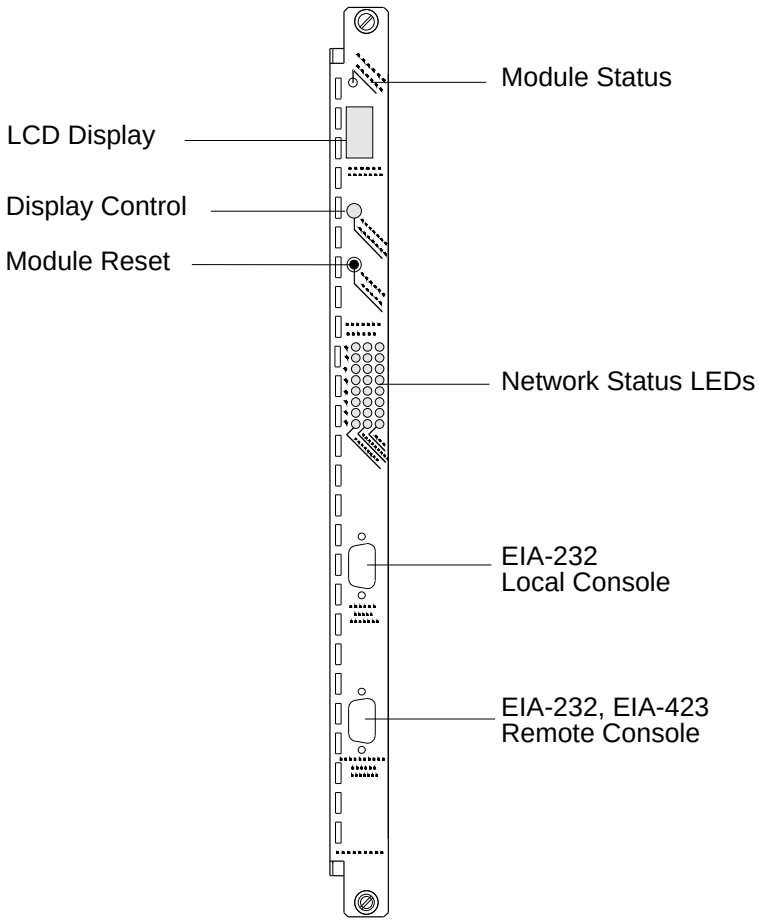

Figure 15. Ethernet Carrier Distributed Management Module

Medium Access Control Cards

The 8260 management system distributes network monitoring across a series of Medium Access Control (MAC) cards, that communicate with the DMM. In the management system, the DMM is the “brain” while the MACs are the “eyes and ears”. Several types of MAC cards are available, and are described in the following sections.

Ethernet Cards

8260 Ethernet Medium Access Control (E-MAC) cards can be physically attached to either an EC-DMM (which supports up to six E-MACs) or an 8260 Ethernet media module (which supports one or two E-MACs). These E-MAC cards monitor all activity on a network, gathering statistics and reporting them to the management module. The E-MACs also provide network connectivity for the DMM.

For example, if a hub has five Ethernet segments and you want to monitor all five networks simultaneously, the hub would need the following cards:

- One EC-DMM (two if you want a backup for fault tolerance)
- Five E-MACs.

The E-MAC cards would be located either on an EC-DMM equipped with a carrier option, or on 8260 Ethernet media modules (each media module can *carry* one or two E-MAC cards).

For detailed specifications, refer to page 128.

High-End Ethernet Cards

The 8260 High-End Ethernet Medium Access Control (HEMAC) cards have the same functions as E-MAC cards, with more processing capabilities and more memory to:

- Monitor two network interfaces
- Allow larger RMON statistic table entries
- Store RMON applications (ECAMs).

The HEMAC cards use two daughter card connectors on the EC-DMM or on any Ethernet media module.

For detailed specifications, refer to page 128.

Token-Ring Cards

Like E-MAC cards, the 8260 Token-Ring Medium Access Control (T-MAC) cards control activity on Token-Ring networks and report this information to the protocol-independent DMM. Each T-MAC card manages one Token-Ring segment.

Unlike E-MAC cards, T-MAC cards reside only on 8260 Token-Ring media modules.

Each T-MAC card:

- Uses the high-speed management bus of the 8260 hub to communicate network management information from a Token-Ring segment to the DMM
- Complies with the industry-standard IEEE 802.5 MIB (Internet RFC 1231) for Token-Ring networks
- Complies with the industry-standard RMON-MIB (Internet RFC 1513) to gather RMON-based statistics for Token-Ring modules in the 8260 hub

- Includes configuration report server and ring error monitor functionality to automatically alert you to changes in ring status, configuration, and performance
- Supports N+1 redundancy for fault tolerance, which automatically alerts you to changes in network operation.

The T-MAC card provides Configuration Report Server (CRS) functionality. The system uses CRS when the DMM notifies a station to remove itself from a ring. CRS is also used to notify the DMM where active Ring Error Monitor (REM) functionality resides. The T-MAC uses REM functionality to track hardware and software errors on the ring.

For detailed specifications, refer to page 146.

High-End Token-Ring Cards

The High-End Token-Ring Medium Access Control (HTMAC) cards have the same functions as T-MAC cards, with the full support of 13 Token-Ring RMON groups, as well as performance enhancements for superior network monitoring and traffic analysis. The card has a single network interface and can be assigned to any Token-ring backplane or isolated segment.

The card may be installed on any existing 8260 Token-Ring module, and uses a powerful RISC engine (PowerPC 603) to enable high level performance monitoring, provide statistics data collection, data capture, and filtering at media speed for all frame sizes.

The card incorporates Token-Ring LAN agents, Configuration Ring Server and Ring Error Monitor for superior network management from LNM for AIX (part of the Nways Campus Manager product).

The card downloads, either dynamically or on-demand, advanced functionalities such as collection of statistics for Layer 3 and above protocols as part of RMON II evolution or traffic generation.

The card is a stand-alone RMON probe as the RMON agent is not distributed between the DMM and the card, but resides only in the card. The HTMAC agent can only communicate to the Token-Ring segment for which it is configured.

The card is supplied without memory, and may be equipped with either 8MB or 16MB memory depending on the size of the network to be monitored.

The following MIBs are supported:

- IBM 8260 MIB
- RMON MIB plus Token-Ring extensions (RFC 1271 and 1513)
- IEEE 802.5 Token-Ring (RFC 1231)
- IBM Token-Ring Surrogate MIB (REM and CRS))
- MIB II (RFC 1213)
- ASPEN Config MIB
- Enterprise-specific MIB extensions.

For detailed specifications, refer to page 147.

Ethernet Modules and Cards

This section describes features of the following modules and I/O cards:

- 8260 Ethernet 24-Port 10BASE-T module (E24PS-6)
- 8260 Ethernet 36-Port 10BASE-T module (E36CS-TP)
- 8260 Ethernet 20-Port 10BASE-T module (E20PS-TP)
- 8260 Ethernet 40-Port 10BASE-T module (E40PS-TP)
- 8260 Ethernet Flexible Concentration module (E04M-MOD)
- 8260 Ethernet 10BASE-FB module (E10PS-FB)
- 8260 Ethernet Security card (E-SEC)
- 8260 Ethernet Interconnect module (E06XR).

For detailed specifications, refer to Appendix A.

For more information on the 8260 hub, refer to the *8260 Nways Multiprotocol Switching Hub Installation and Operation Guide,* SA33-0251.

24-Port 10BASE-T Module

The 8260 Ethernet 24-Port 10BASE-T (E24PS-6) module is an IEEE 802.3 repeater module that complies with the 10BASE-T standard. The 24-port module connects devices (personal computers, terminals, printers, modems, and so on) to the 8260 hub. Two 50-pin TELCO-type connectors connect to 10BASE-T-compliant ports via 25-pair 10BASE-T cables.

The 24-port module has the following characteristics:

- Provides per-port switching on all eight backplane segments and all eight isolated segments (supports up to six segments simultaneously).
- Offers high port density at a low cost per port.
- Supports up to 100 meters (330 feet) on 10BASE-T-compliant unshielded twisted pair (UTP) wiring.
- Features hot swap capability so that you can install or remove the module without having to power off the hub.
- Supports scalable network management architecture through one Ethernet Medium Access Control (E-MAC) card per E24PS-6 module.
- Provides system-configured auto-partition threshold, for flexibility in dealing with collision-related network slowdowns.
- Includes *increased workgroup capability* that allows administrators to create more networks on the module than on the backplane.
- Maintains inventory information for the module in non-volatile RAM (NVRAM), including the module's serial number, power requirements, power class settings (such as power-on priority) and date of manufacture.
- Gathers Ethernet, Remote Monitor network, and IEEE Repeater statistics.
- Supports the 8260 power management system which enables administrators to prioritize power allocation to modules.

All ports on the Ethernet 24-Port module are internally crossed over in conformance with the 10BASE-T standard. This allows the module to be connected to a 10BASE-T transceiver without an external crossover adapter.

In addition to complying with the 10BASE-T standard, the Ethernet 24-port module allows you to disable Link Integrity. By disabling Link Integrity, you can connect equipment that does not conform to the 10BASE-T standard).

For detailed specifications, refer to page 121.

Figure 16 shows the Ethernet 24-port module.

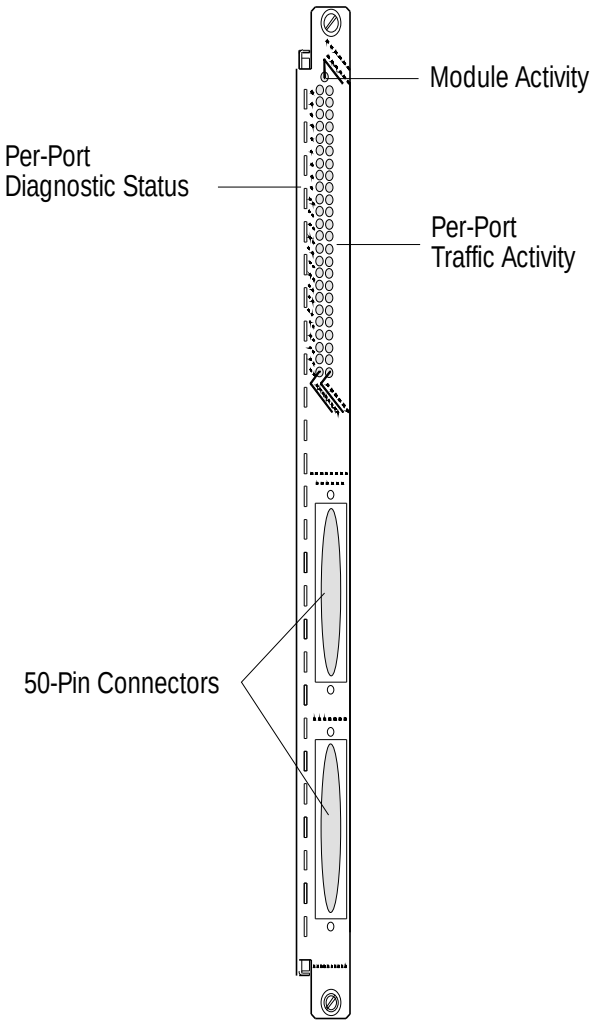

Figure 16. Ethernet 24-Port 10BASE-T Module

Sample Configuration

One way to use the Ethernet 24-port module is to attach it by means of bundled 25-pair cables to a patch panel or to a punch-down block, as shown in Figure 17. This configuration provides you with connections for up to 24 twisted pair ports.

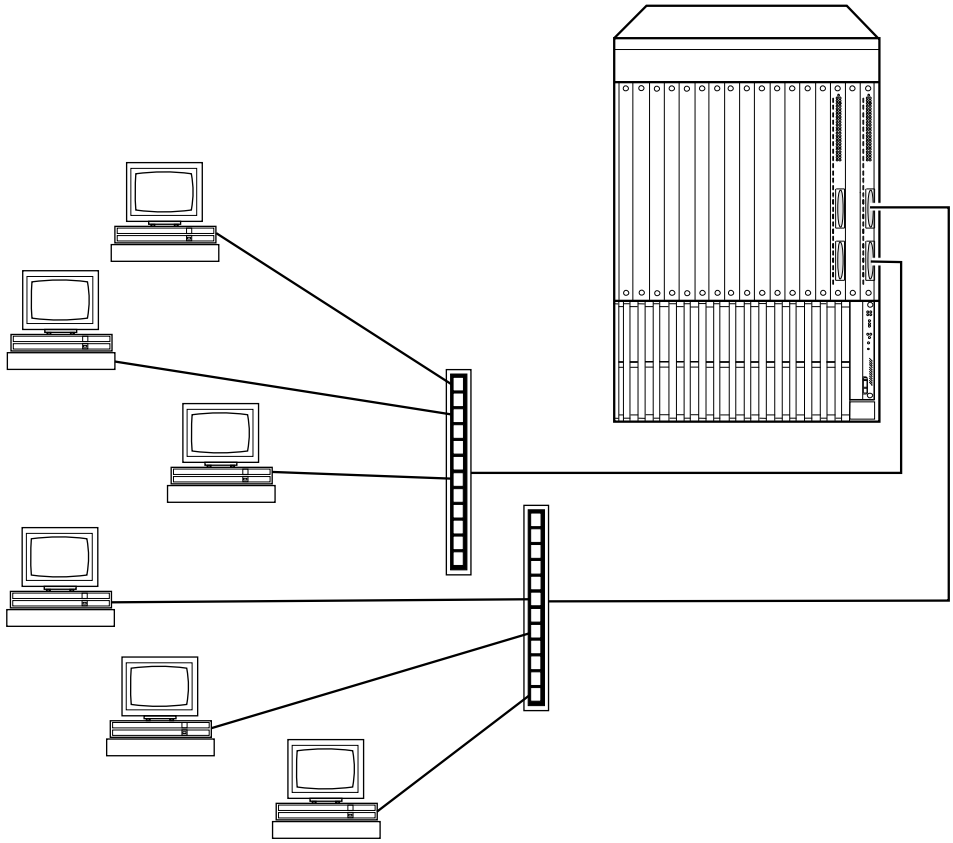

Figure 17. Ethernet 24-Port 10BASE-T Module: Sample Configuration

Theory of Operation

The 24-port module uses repeaters and twisted pair transceivers in its hardware. Repeaters restore phase and frequency. Transceivers receive and restore amplitude to incoming signals.

Repeated signals synchronize with the system clock and enter the 8260 hub on its backplane. Outgoing signals from the backplane are sent directly to transceivers and transmitted to twisted pair link segments.

36-Port 10BASE-T Module

The 8260 Ethernet 36-port 10BASE-T (E36CS-TP) module has the same characteristics as the Ethernet 24-port 10BASE-T module, except for the following:

- Connects up to 36 devices to the 8260 hub.
- Provides connections to the 8260 backplane at the connector level. All twelve ports assigned to a TELCO connector can be switched to any of the eight Ethernet segments on the backplane or to any of the eight extended (isolated) segments.
- Supports either one HEMAC card, or up to two of the following daughter cards in any combination:
  - E-MAC cards for in-depth monitoring of Ethernet networks
  - E-SEC cards for ensuring the security of Ethernet networks.

For detailed specifications, refer to page 122.

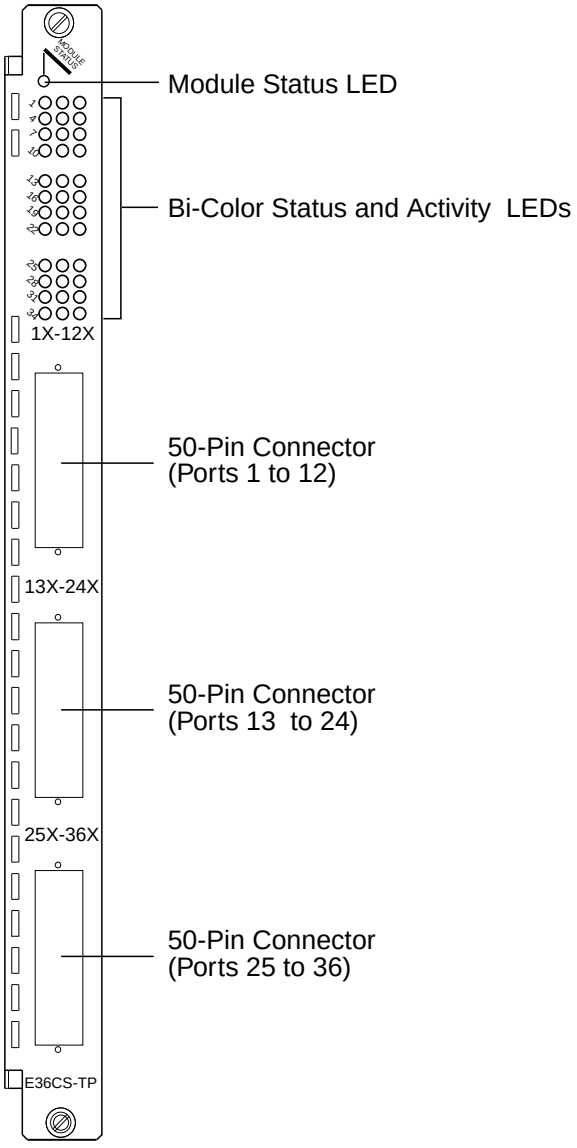

Figure 18. Ethernet 36-Port 10BASE-T Module

20-Port and 40-Port 10BASE-T Modules

The 8260 Ethernet 20-port (E20PS-TP) and 40-port (E40PS-TP) 10BASE-T modules are port-switching modules that support RJ-45 based 10BASE-T wiring. The modules allow you to assign a backplane segment at port level.

The 20-port module offers a single-slot solution for networks using RJ-45 connectors in their 10BASE-T installation. The 40-port module offers a two-slot solution of 40 ports.

The 20-port and 40-port modules provide either 20 or 40 twisted pair Ethernet ports for connecting up to either 20 or 40 devices (PCs, terminals, printers, modems) to the 8260 hub. The Ethernet ports may be switched individually to any of the 8260 backplane channels or extended (isolated) segments.

The 20-port and 40-port modules have the following characteristics:

- Remote Diagnostics Mode - Checks driver and receiver integrity.
- Security - The Ethernet Security (E-SEC) card provides continuous eavesdropping and intrusion protection without impacting network performance.
- Two daughter cards - Provide connections for two E-MAC cards or one HEMAC card for network management, and for E-SEC cards.
- Hot swap capability - You can install or remove the module without having to power off the hub.
- Scalable network management architecture - Includes up to two E-MAC cards or one HEMAC card per module for in-depth network monitoring. Enables you to gather Ethernet and Remote Network Monitoring (RMON) network statistics for any of the 8260 backplane segments. In addition, both modules support Repeater Management Information Base (MIB) statistics without requiring an E-MAC card.

The 20-port and 40-port modules provide the following benefits:

- Per-port switching to all eight of the 8260 backplane segments and extended (isolated) segments. Simultaneously supports up to eight segments, in any combination.
- Collects IEEE Repeater statistics for monitoring hub security and network management architecture.
- Offers high port density at a low cost per port.
- Supports up to 100 meters (330 feet) on 10BASE-T-compliant unshielded twisted pair (UTP) wiring as well as on shielded twisted pair (STP) wiring.
- Maintains inventory information in non-volatile RAM (NVRAM), including the module's serial number, power requirements, power class settings (such as power-on priority), date of manufacture, and a user notepad for entering installation-specific information.
- Supports 8260 power management architecture, allowing administrators to prioritize power allocation to modules.

For detailed specifications, refer to pages 123 and 124.

The Ethernet 20-port 10BASE-T module in shown in Figure 19.

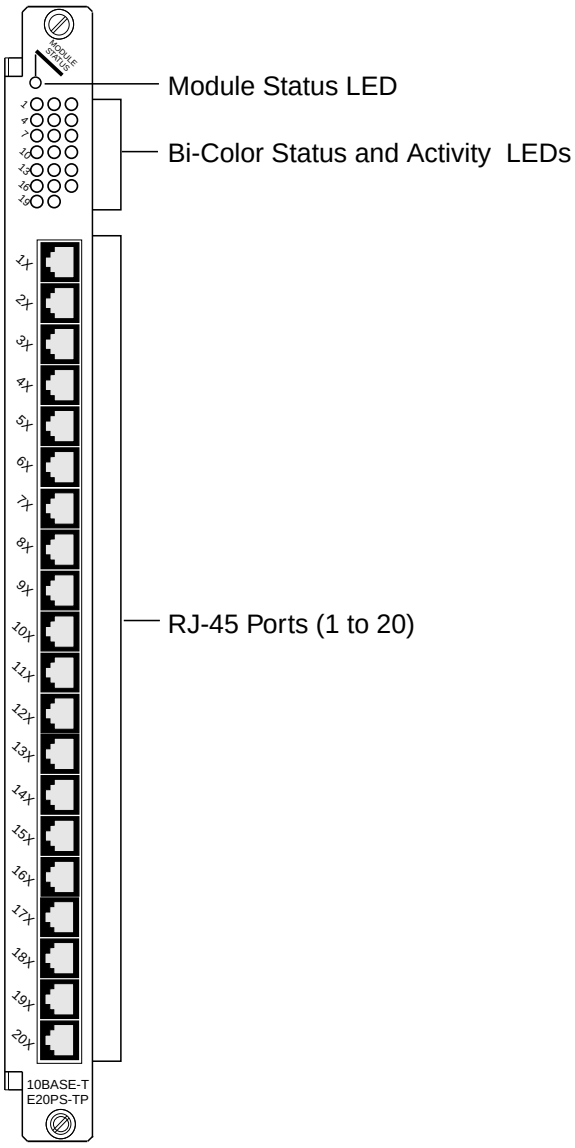

Figure 19. Ethernet 20-Port 10BASE-T Module

The Ethernet 40-port 10BASE-T module in shown in Figure 20.

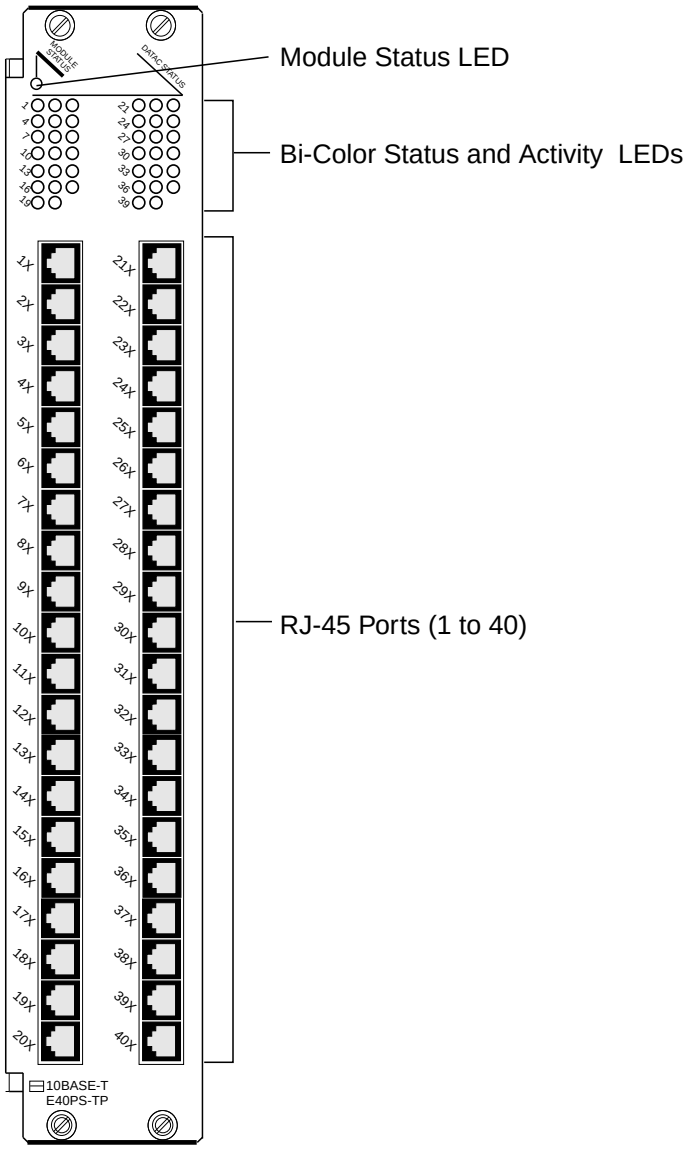

Figure 20. Ethernet 40-Port 10BASE-T Module

Flexible Concentration Module

The Ethernet Flexible Concentration module is also referred to as the EtherFlex or E04M-MOD module. It is a single-slot media module with a flexible architecture that allows you to use five different types of I/O cards. By combining several I/O cards in the module, you can create customized mixed-media solutions to meet your individual needs.

The EtherFlex module has the following characteristics:

- Provides per-port switching on any combination of eight Ethernet backplane and isolated segments.
- Provides security through the Ethernet Security (E-SEC) card. The E-SEC card provides continuous eavesdropping and intrusion protection without affecting network performance. You can install up to two E-SEC cards.
- Allows you to install up to two 8260 Ethernet Medium Access Control (E-MAC) cards or one High-end Ethernet Medium Access Control (HEMAC) card for network management.
- Provides scalable network management architecture that allows you to gather Ethernet and Remote Monitor (RMON) network statistics for any of the 8260 backplane segments.
- Supports the gathering of Repeater Management Information Base (MIB) statistics on all I/O cards without need for an E-MAC card.
- Provides Remote Diagnostics mode by checking driver and receiver integrity.
- Supports the gathering of IEEE Repeater statistics for basic network monitoring tasks by using the 8260 security and network management architecture.
- Maintains its own inventory and power management information in non-volatile RAM (NVRAM).

EtherFlex I/O Cards

The front panel of the EtherFlex module has four openings (bays) and two removable brackets. The bays can be occupied by two types of field-installable I/O cards:

- Single-height, occupying one bay (RJ-45 10BASE-T, BNC 10BASE-2, 10BASE-FB/FL)
- Double-height, occupying bays 1 and 2, or bays 3 and 4 (male and female AUI).

The EtherFlex module supports the following I/O cards:

- BNC 10BASE-2 (E3-BNC)
- RJ-45 10BASE-T (E4-TPP)
- Male AUI (E3-AUIM)
- Female AUI (E3-AUIF)
- 10BASE-FB/FL (E2-F).

Figure 21 shows an EtherFlex module with several I/O cards installed.

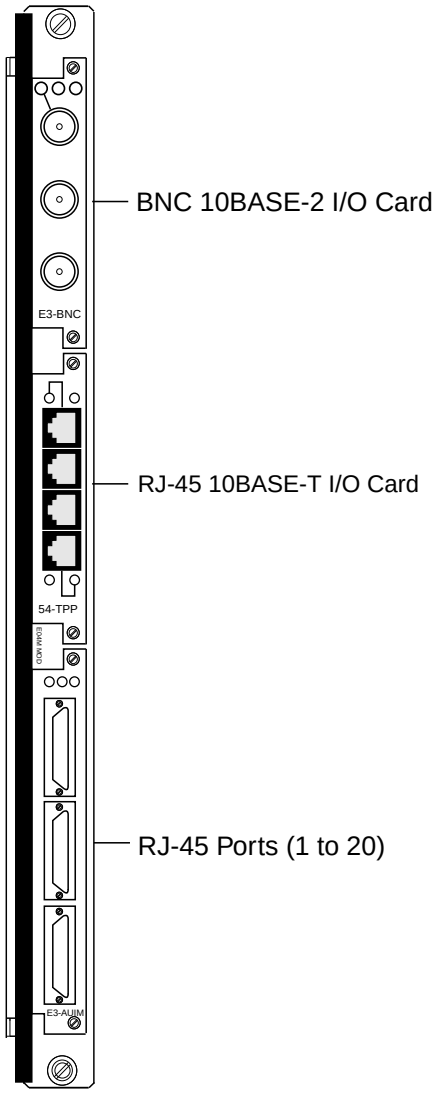

Figure 21. EtherFlex Module with I/O Cards Installed

RJ-45 10BASE-T I/O Card

The 8260 RJ-45 10BASE-T (E4-TPP) I/O card is a single-height, 4-port I/O card which supports networks that use RJ-45 connectors in 10BASE-T installations.

The I/O card connects up to four devices (PCs, terminals, printers, or modems) to the 8260 hub. The I/O card provides four twisted pair Ethernet ports which may be switched individually to any of the 8260 backplane networks or extended (isolated) segments.

The ports on the I/O card have the following characteristics, in conformance with the Ethernet 10BASE-T standard:

- Remote diagnostic mode
- Port redundancy
- Squelch mode
- Auto polarity reversal
- Link integrity.

For detailed specifications, and an illustration of the faceplate, refer to page 129.

BNC 10BASE-2 I/O Card

The 8260 BNC 10BASE-2 (E3-BNC) I/O card is a single-height, 3-port repeater card with built-in media attachment units (MAUs). Each port attaches directly to a thin-wire (10BASE-2) coax cable. The card is compatible with IEEE 802.3 specifications and provides full repeater functionality, allowing you to connect up to three thin-wire Ethernet segments to the network.

For detailed specifications, and an illustration of the faceplate, refer to page 130.

Male AUI I/O Card

The 8260 Male AUI (E3-AUIM) I/O card is a double-height, 3-port, transceiver I/O card. The I/O card is compatible with IEEE 802.3 specifications and is designed to directly attach computers, bridges, routers, and repeaters to the 8260 hub by means of an AUI cable.

The AUI I/O card supports port redundancy. This allows you to define a backup port to prevent network failure.

For detailed specifications, and an illustration of the faceplate, refer to page 131.

Female AUI I/O Card

The 8260 Female AUI (E3-AUIF) I/O card is a double-height, 3-port, I/O card that attaches Ethernet segments directly to the 8260 hub using an AUI cable and external transceivers. The I/O card is compatible with IEEE 802.3 specifications and provides a way to connect any Ethernet segment running on a 10BASE-5 transceiver cable to your network.

For detailed specifications, and an illustration of the faceplate, refer to page 131.

10BASE-FB/FL I/O Card

The 8260 10BASE-FB/FL (E2-F) I/O card is a single-height, 2-port, autosensing card that complies with the IEEE 802.3 standard. The autosensing capability allows you to connect fiber to the desktop (10BASE-FL) or to fault-tolerant backbones (10BASE-FB or 10BASE-FL). The module determines if one end of the fiber link is 10BASE-FB or 10BASE-FL. The module uses ST, FC, and SMA connectors with fiber cables.

Note: You can mix FB and FL networks on the same 10BASE-FB/FL I/O card.

For detailed specifications, and an illustration of the faceplate, refer to page 133.

Sample Configuration

Figure 22 shows one way to configure the EtherFlex module using:

- RJ-45 10BASE-T I/O card installed in bay 2 and two of four ports in use
- BNC 10BASE-2 I/O card installed in bay 4 and 3 ports in use.

In the sample configuration:

- Two PCs are connected directly to ports 2 and 4 on the RJ-45 10BASE-T I/O card in bay 2 using a twisted pair RJ-45 cable.
- Three 10BASE-2 segments are connected to the BNC 10BASE-2 I/O card in bay 4. Each segment is grounded and terminated with a 50-ohm termination on both ends.

Note that the first and third segments (ports 1 and 3) on the BNC 10BASE-2 I/O card are externally terminated. You do not set the BNC jumpers.

The second segment (port 2) on the BNC 10BASE-2 I/O card is terminated at the port. When the BNC port serves as an end point to the segments, use the jumper settings on the BNC 10BASE-2 I/O card to install the termination.

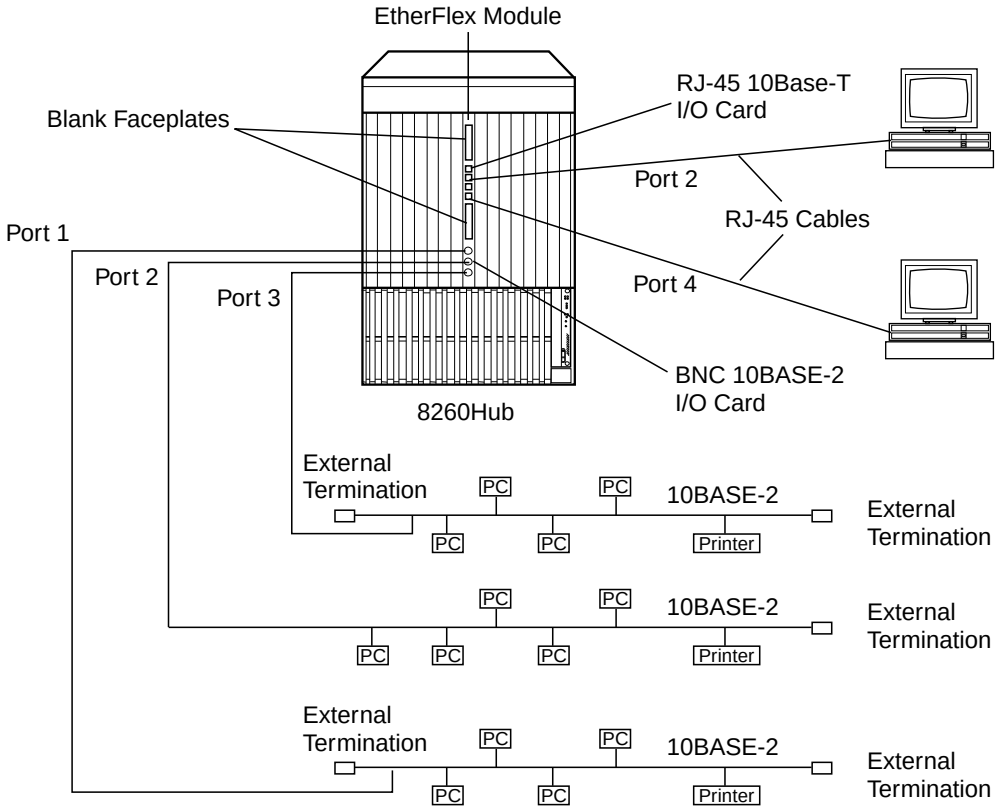

Figure 22. EtherFlex Module: Sample Configuration

10-port 10BASE-FB Module

The 8260 Ethernet 10BASE-FB (E10PS-FB) module is a 10-port module that is fully compliant with the IEEE802.3 10BASE-FB fiber standard. It connects up to ten devices (personal computers, 8250 hubs, terminals, printers, modems, and so on) to the 8260 hub. This module also provides both backbone connectivity for Ethernet LANs and fiber-to-the-desk connectivity.

Compliance with the 10BASE-FB standard enables IBM fiber modules to be compatible with the 10BASE-FB compliant products of other vendors.

The Ethernet 10-port module has the following characteristics:

- Provides per-port switching on all eight backplane segments and on four of the isolated segments (supports up to 10 segments simultaneously).
- Offers high port density at low cost per port.
- Supports a network diameter of up to four kilometers on 10BASE-FB compliant cabling (in high power mode).
- Provides hot swap capability so that you can install or remove the module without powering off the hub.
- Supports scalable network management architecture that includes one E-MAC card per module.
- Provides a system-configured auto-partition threshold, for flexibility in dealing with collision-related network slowdowns.
- Includes *increased workgroup capability* that allows administrators to create more networks on the module than on the backplane.
- Maintains inventory information in non-volatile RAM (NVRAM), including the module's serial number, power requirements, power class settings (such as power-up priority) and date of manufacture.
- Supports the 8260 power management system that allows administrators to prioritize power allocation to modules.
- Contains built-in link redundancy for fault tolerance.
- Provides 10Mbps performance with 100% collision detection using CSMA/CD.

Note: You can connect the 8260 Ethernet 10-port module to any 8250 fiber module and to all IBM products in the 10BASE-FB family.

For detailed specifications, refer to page 125.

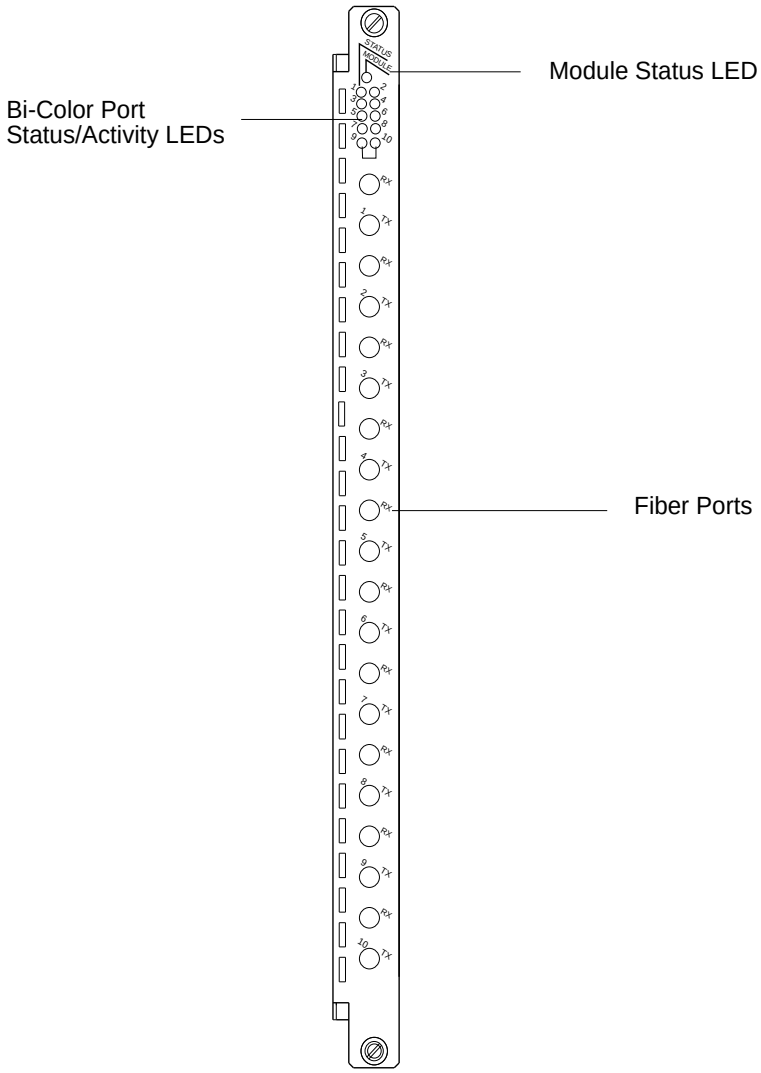

Figure 23. Ethernet 10BASE-FB Module

Theory of Operation

The Ethernet 10-port module allows you to create a collapsed backbone (fiber backbone) that connects multiple 8250 or 8260 hubs on one central network. Each 8250 or 8260 hub connects end users, servers, and other network devices to the global network. Figure 24 on page 51 provides an example of this network configuration.

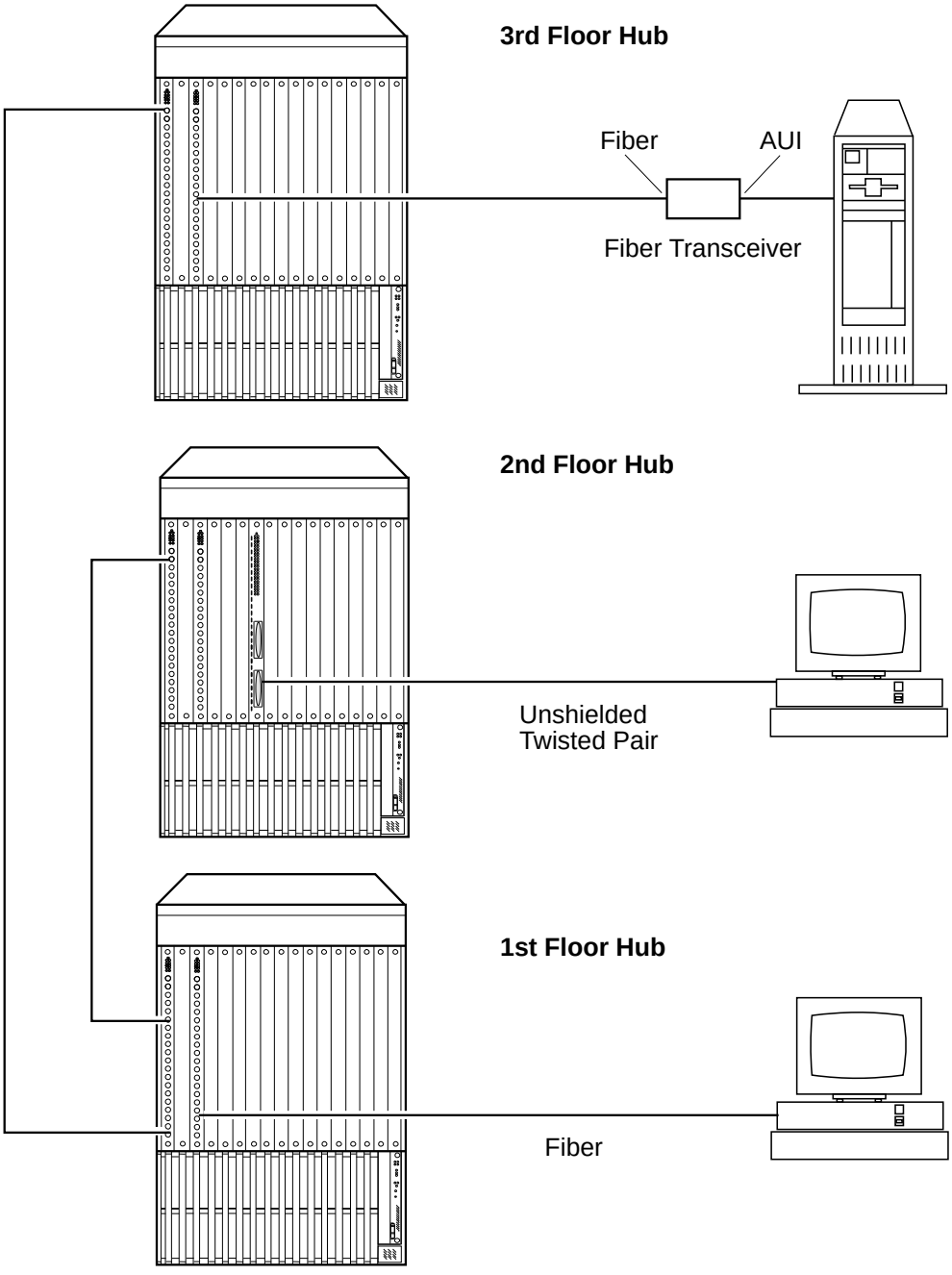

Figure 24. Ethernet 10BASE-FB Module: Sample Configuration

Note: 10BASE-FB modules are not compatible with Ethernet FOIRL and 10BASE-FL products. Although it is possible for these modules to communicate over the Ethernet backplane, they cannot communicate directly over the same fiber cable connection.

Interconnect Module

The 8260 Ethernet Interconnect module is a six- to eight-port high performance internetworking bridge/router, available in single-slot and dual-slot versions. The single-slot version can connect up to six out of the eight Ethernet segments of the 8260 backplane. The two-slot version supports six backplane Ethernet segments, and can be configured with optional I/O cards to support up to two additional ports. The two additional ports can provide connectivity to Ethernet or Token-Ring LANs.

Based on the i960CF RISC processor, the Ethernet Interconnect module provides exceptional bridging and routing performance, and can be configured for either bridging or bridge/routing.

The Ethernet Interconnect module has the following characteristics:

- Provides per-port switching on all eight Ethernet backplane segments
- Features hot swap capability so that you can install or remove the module without having to power off the 8260 hub
- Supports the 8260 power management system which enables administrators to prioritize the allocation of power to modules
- The two-slot version (Feature Code 7206), supports the following optional I/O cards that provide connectivity to Ethernet and Token-Ring LANs:
  - 10BASE-T I/O Card (Feature Code 8902)
  - 10BASE-2 I/O Card (Feature Code 8903)
  - 10BASE-5 I/O Card (Feature Code 8904)
  - Token-Ring I/O Card (Feature Code 8905).
- Interconnects different types of LAN segments, such as Ethernet and Token-Ring.
- Supports bridging capabilities such as:
  - Transparent bridging over Ethernet and Token-Ring LAN ports
  - Source Routing over Token-Ring LAN ports
  - IEEE 802.1d Spanning Tree Protocol (STP) to configure loop-free topologies with redundant links
  - Security filtering that enables network access control
  - Customized filtering.
- Supports the following routing protocols:
  - IP RIP and OSPF
  - NetWare** IPX
  - DECnet Phase IV
- Supports security access by means of customized tables for routing protocols
- Provides management capabilities: locally via the Local Management System (LMS) and remotely via an SNMP-compliant network management application.

For detailed specifications, refer to page 127 (for the module) and page 134 (for the I/O cards).

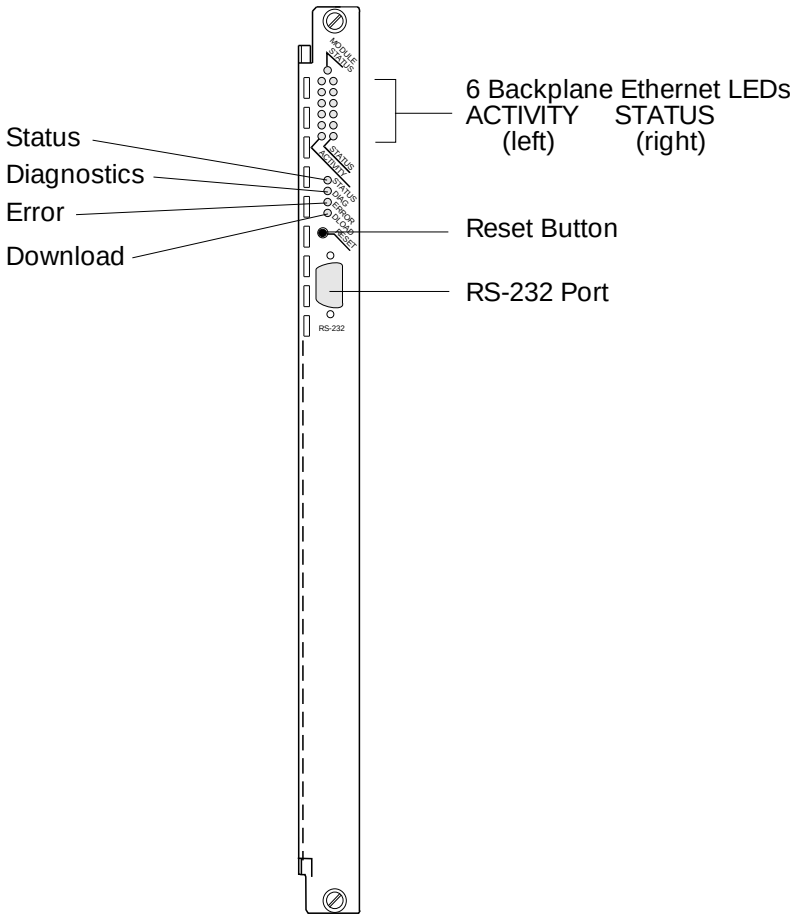

Figure 25. 8260 Ethernet Interconnect Module (One-Slot)

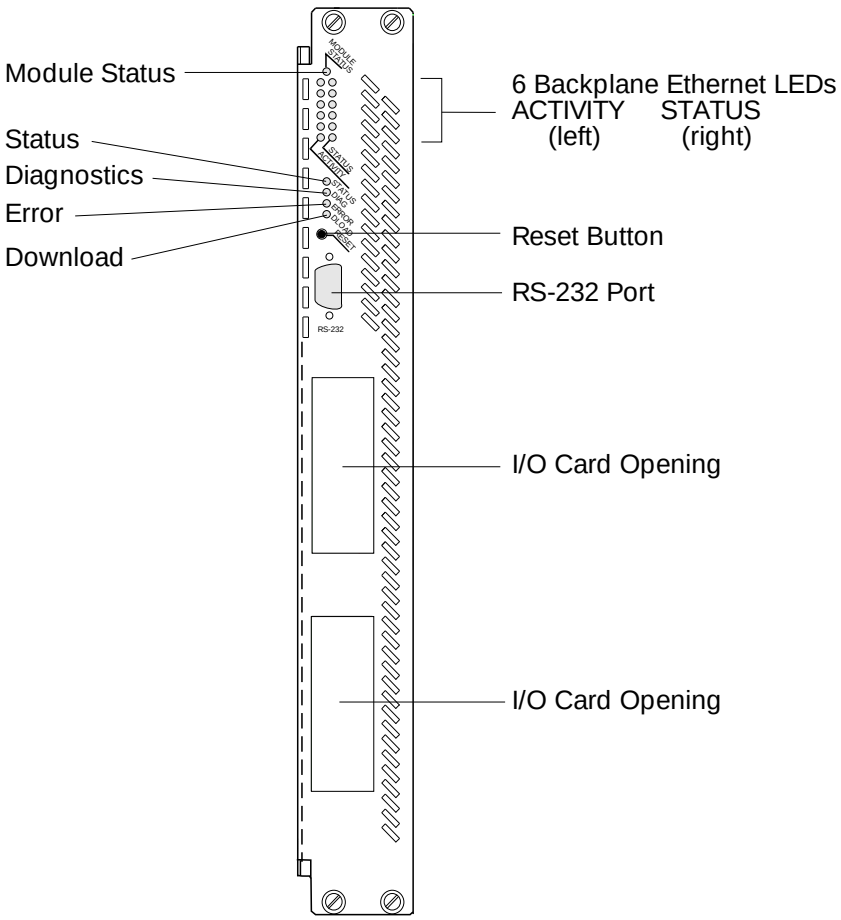

Figure 26. 8260 Ethernet Interconnect Module (Two-Slot)

Ethernet Security

Each time a packet is sent on an Ethernet network it is *broadcasted* to every node on that network. For example, in Figure 27, a message transmitted from Node A to Node B is broadcasted to every node on the network including the intended recipient. Each node examines the transmitted packet, and if the physical address of the node does not match the destination address in the packet, the packet is discarded.

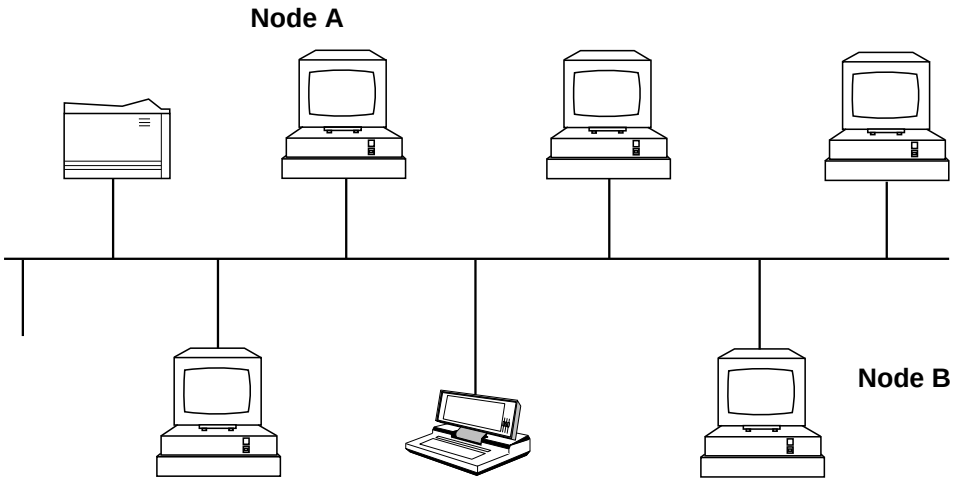

Figure 27. Transmitting Packets on an Ethernet Network

In a standard network, this type of transmission is acceptable for exchanging data between nodes. In a secure environment, however, this is not acceptable.

The 8260 Ethernet Security (E-SEC) card ensures security on the network to which the card is connected by providing the following features:

- **Eavesdropping Protection**: Prevents any user, including an intruder, from examining the contents of a packet transmitted on the backplane.
- **Intrusion Detection**: Prevents intruders from transmitting information to other Ethernet ports. Information is transmitted on the backplane, but it is jammed at all ports.

By providing both eavesdropping protection and intruder detection you:

- Prevent unwanted listeners from monitoring the transmission of Ethernet packets
- Stop intruders from transmitting packets on the network.

Ethernet Security Card

The 8260 Ethernet Security (E-SEC) card is a daughter card that you can install on any 8260 Ethernet media module or 8260 EC-DMM module. The E-SEC enables you to secure any network to which the card is connected.

After connecting the E-SEC card to an Ethernet network, you can configure for:

- Intrusion protection for all Ethernet ports
- Eavesdropping protection for all Ethernet ports
- MAC address auto-learning, including continuous self-management of address tables
- Optional port disable when the E-SEC detects intruders.

For detailed specifications, refer to page 128.

Token-Ring Modules and Cards

This section describes the following Token-Ring (T/R) modules and daughter cards, and presents a sample 8260 Token-Ring configuration to show the role of each module:

- 8260 T/R Active Port-Switching Media Module (T18PSA)
- 8260 T/R Active Module-Switching Media Module (T18MSA)
- 8260 T/R Passive Media Module (T20MS-TP)
- 8260 T/R Dual Fiber Repeater Module (T10R-F)
- 8260 T/R Jitter Attenuation Card (T-JIT)
- 8260 T/R Medium Access Control Card (T-MAC).

Active Port-Switching Media Module

The 8260 Token-Ring Active Port-Switching Media Module (T18PSA) is a single-slot module that supports 18 active retiming lobe ports, all with port-switching capability. A single port can be switched to any one of the ten backplane networks, or to any of the eleven isolated or module networks. This allows you to make additions, moves, and changes to your network from the management workstation.

The T18PSA module has the following characteristics:

- Provides 18 switchable ports for connecting devices to Token-Ring networks, using shielded or unshielded twisted-pair cabling.
- Supports up to 11 individual rings per module, with the capability of port switching among any network from the 11 module or 10 backplane networks.
- Provides all 18 lobe ports with active retiming to allow longer lobe lengths.
- Offers two ports which can be configured as fully repeated ring-in/ring-out (RI/RO) ports for connection to other RI/RO ports of 8260 hubs, 8250 Token-Ring modules, or stand-alone devices, such as the IBM 8230.
- Offers active retiming, which allows greater cable length distances over lower grade cabling, and helps ensure reliable connections (supports 16Mbps Token-Ring over Category 3 UTP cable at distances up to 100 meters or 330 feet).
- Operates with both shielded and unshielded twisted pair cabling attached at the same time.
- Supports both 4Mbps and 16Mbps Token-Ring networks *simultaneously,* as long as the ports are switched to rings operating at the appropriate speed.

For detailed specifications, refer to page 144.

Figure 28 on page 57 shows the faceplate of the T18PSA module.

Figure 28. Token-Ring Active Port-Switching Media Module

Active Module-Switching Media Module

The 8260 Token-Ring Active Module-Switching Media Module (T18MSA) is a single-slot module that supports 18 active retiming lobe ports.

The T18MSA module has the following characteristics:

- Two fully-repeated RI/RO ports optional for connection to external rings
- Active retiming on all media ports
- Simultaneous shielded and unshielded twisted pair cabling support
- Support for either 4Mbps or 16Mbps Token-Ring networks
- Can be switched on a per-module basis to any of ten 8260 backplane rings or to one isolated ring
- Accepts one optional Jitter Attenuation Card, for use with the optional RI/RO ports from or to non-8260 Token-Ring products
- Accepts a Token Ring Medium Access Control (T-MAC) card for network management
- Address-to-port mapping, including multi-station ports (fan-out) and MAC-less stations (such as a traffic analyzer)
- Module-level, hardware-based beacon recovery
- IEEE 802.5 compliant
- IEEE 802.5c trunk support
- Per-port jitter attenuation
- Fan-out support for up to eight devices per port
- Automatic port wrong speed detection.

For detailed specifications, refer to page 144.

Figure 29 on page 59 shows the faceplate of the T18MSA module.

Figure 29. Token-Ring Active Module-Switching Media Module

Passive Media Module

The 8260 Token-Ring Passive Media Module (T20MS) is a single-slot module that provides 20 lobe ports per module, or up to 320 users per hub, with as many as 250 users on the same network ring.

The T20MS module is designed with an onboard repeater that minimizes jitter accumulation. The repeater consists of both a wide band and narrow band phase-locked loop. The module's retiming capability makes installed networks equal to, or more stable than, networks that operate on active but not retimed modules.

The T20MS module has the following characteristics:

- Delivers a high-density passive media solution for connecting devices to Token-Ring networks
- Provides retiming circuitry that makes it as effective as active boards that do not provide retiming
- Supports switching of the 20 ports on a per-module basis to any of ten 8260 backplane rings or to the one isolated ring
- Provides connections using shielded or unshielded twisted pair cabling (using RJ-45 connectors)
- Uses either Types 1 and 2 shielded twisted pair (STP), or Categories 4 and 5 unshielded twisted pair (UTP) cabling
- Is hot-pluggable for easy, trouble-free maintenance
- Supports either 4Mbps or 16Mbps Token-Ring networks on a per-module basis
- Supports fan-out devices so that you can attach up to eight end stations per port.

For detailed specifications, refer to page 145.

Figure 30 on page 61 shows the faceplate of the T20MS module.

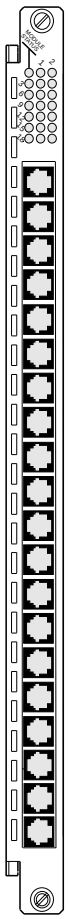

Figure 30. Token-Ring Passive Media Module

Dual Fiber Repeater Module

The 8260 Token-Ring Dual Fiber Repeater Module (T10R-F) is a 10-port module that supports two sets of fully repeated fiber ring-in/ring-out (RI/RO) ports. These ports can connect to other RI/RO ports of 8260 hubs, 8250 Token-Ring fiber modules, or to an IBM 8230 stand-alone Controlled Access Unit (CAU).

When the 8260 hub is used in a collapsed backbone, each T10R-F module can collapse two rings from remote locations into the central hub. It can also collapse one ring and provide backup via the second RI/RO port.

The T10R-F module has the following characteristics:

- Supports two sets of fully repeated fiber RI/RO ports for connection to other 8260 hubs, to fiber RI/RO ports of 8250 Token-Ring fiber repeater modules, or to an IBM 8230 stand-alone CAU.
- Provides 10 RJ-45 port-switching ports for connecting devices to Token-Ring networks using shielded or unshielded twisted pair cabling (or both types simultaneously).
- Uses industry-standard ST fiber connectors, which support multimode 62.5/125 µm fiber at distances up to 2 km (1.25 miles).
- Supports up to 11 individual rings per module, and is capable of switching ports among any of the 11 module or 10 backplane rings.
- Provides 10 lobe ports, each with active retiming to allow longer lobe lengths.
- Accepts two Jitter Attenuation cards to prevent jitter pass-along from outside rings and from products of other vendors.

The T10R-F module also incorporates active retiming Dual Phase-Locked Loop (DPLL) circuitry. This circuitry ensures trouble-free networking, and allows managers to design conservatively and still obtain longer lobe lengths (for example, up to 100 meters at 16Mbps over Category 3 UTP cable).

For detailed specifications, refer to page 145.

Figure 31 on page 63 shows the faceplate of the T10R-F module.

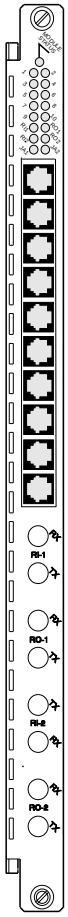

Figure 31. Token-Ring Dual Fiber Repeater Module

Jitter Attenuator Card

The optional Token-Ring Jitter Attenuator card (T-JIT) is supported by all 8260 modules that have ring-in/ring-out (RI/RO) connection capability. It filters excessive jitter that may accumulate in non-8260 equipment, protecting the 8260 networks from unwanted jitter build-up.

Using Dual Phase-Locked Loop (DPLL) circuitry on each port, the jitter attenuator sets up a “firewall” between 8260 modules and outside devices. It generates a jitter-free signal, enhancing the performance of Token-Ring networks.

By using the T-JIT card to increase the reliability of jitter-prone networks, you can expand your network up to 250 stations per ring.

The T-JIT card has the following characteristics:

- Assures the integrity of 8260 Token-Ring networks by eliminating jitter from signals coming in from non-8260 devices.
- Increases reliability to allow a previously jitter-prone network to support up to 250 stations per ring.
- Connects to any 8260 module supporting RI/RO trunk ports.
- Configures automatically by means of daughter card-resident software to the appropriate RI or RO receive trunk, in accordance with the trunk “wrap” or “unwrap” mode.

The T-JIT card is required only for modules that make direct RI/RO connections to non-8260 equipment.

The T-JIT card is installed by the user and designed with a 30-pin connector so that it cannot be accidently be placed on the T-MAC connectors.

For detailed specifications, refer to page 146.

Medium Access Control Cards

The Token-Ring Medium Access Control (T-MAC) and High-End Token-Ring Medium Access Control (HTMAC) cards can reside on any Token-Ring media module. Refer to page 34 for further information.

Token-Ring Applications

This section presents examples of how to use 8260 Token-Ring modules in the following configurations:

- Traditional backbone ring
- Collapsed backbone.

Traditional Backbone Ring

The traditional backbone ring configuration assumes that each floor or department in an organization forms its own Token-Ring LAN. A bridge connects each LAN to a backbone ring, thereby allowing communication between users on different LANs. The backbone ring extends through the riser of the building by means of the 8260 Dual Fiber Repeater modules.

In this traditional scenario, the 8260 Dual Fiber Repeater modules are interconnected through their RI/RO ports. All repeater modules are either assigned to the same backplane ring or set to Isolated mode. On each LAN, the Token-Ring bridges and Token-Ring media modules (in this case, 8260 Token-Ring Passive Media modules) are assigned to the same backplane ring. Each Token-Ring bridge connects to a repeater module through a connection from the bridge to one of the ten lobe ports on the repeater module.

Figure 32 on page 66 shows a backbone ring that connects three 8260 hubs on different floors of a building.

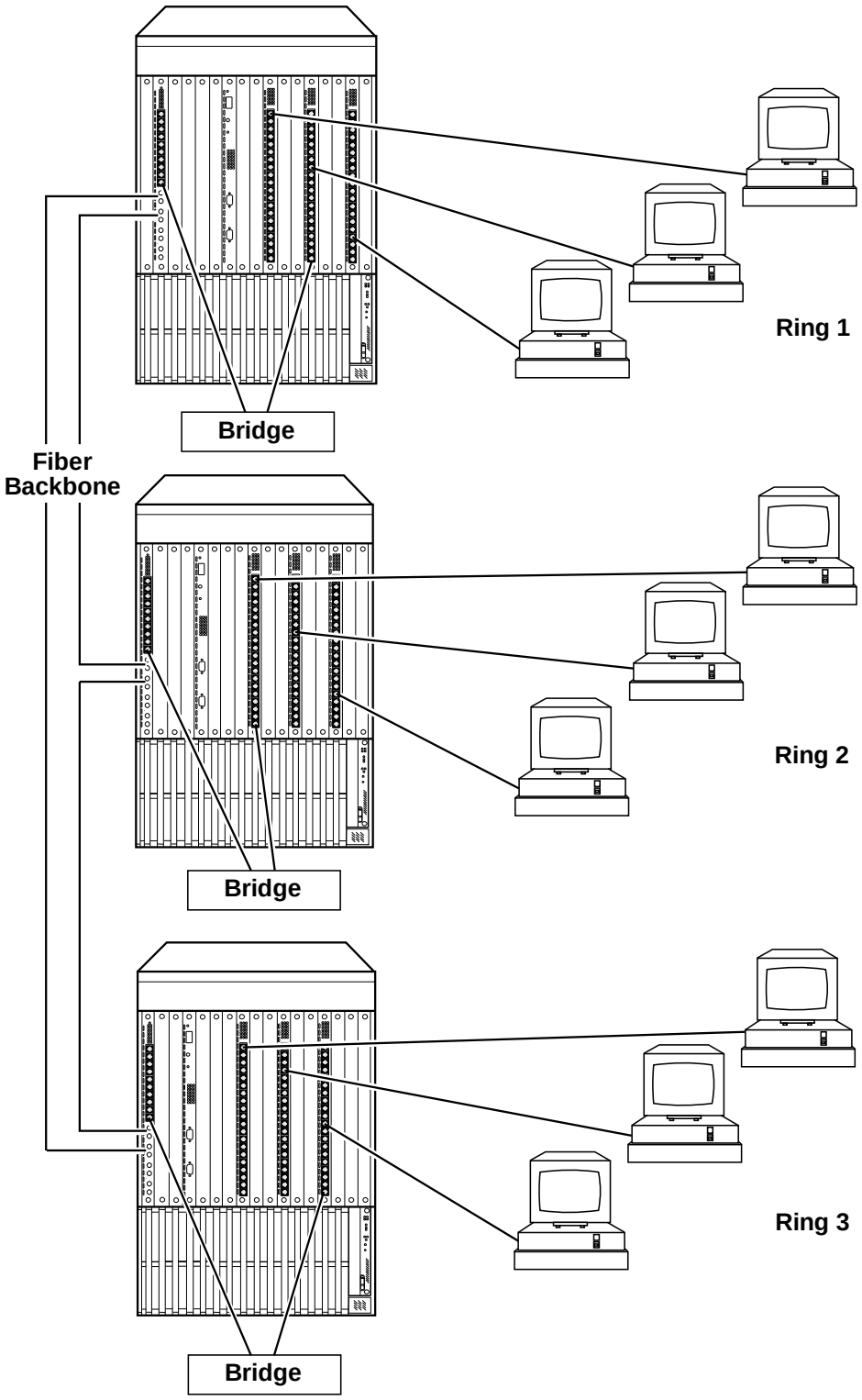

Figure 32. Traditional Token-Ring Backbone Configuration

Collapsed Backbone Configuration

Networks that use a collapsed backbone have fewer costs, enhanced security, and controlled access to networking equipment. This architecture enables a network manager to centralize major networking devices (such as file servers, protocol analyzers, bridges, and routers) in one controlled area, such as a computer room.

In a collapsed backbone environment, *monitoring* consists of a collection of MAC frames and can be performed from any hub or external device.

Monitoring operations include:

- Collection of counters at port or station level, and network level
- Counters for errors, performance, activities (broadcast versus unicast) and so on
- Identification of stations on the LAN
- Error analysis.

In Figure 33 on page 69, a master 8260 Hub is located in the central computer room on Floor 1 of a three-story building. The 8260 hubs on Floors 2 and 3 both contain 8260 Dual Fiber Repeater modules that connect through the vertical riser of the building to two 8260 Dual Fiber Repeater modules in the master hub. The traffic that is sent by the departmental LANs travels directly to the master hub.

How Ring 1 Works

The end nodes on Ring 1 attach to Active Port-Switching Media modules in the Floor 3 hub. Each port on Ring 1 is assigned to the Token-Ring 1 network on the 8260 hub backplane. A set of RI/RO ports, also assigned to the Token-Ring 1 backplane, extends the ring through the vertical riser to the master hub on Floor 1. The attached RI/RO ports on the Dual Fiber Repeater module on Floor 1 are assigned to the same backplane network as the server for Ring 1. This connects the Ring 1 file server to the Ring 1 end nodes.

How Ring 2 Works

Like Ring 1, Ring 2 uses the second set of RI/RO ports on the Dual Fiber Repeater module to extend the ring down the riser.

Notice that the Ring 2 file server is attached to the same Active Port-Switching Media module as the Ring 1 file server. This is possible because any port on either the Dual Fiber Repeater module or the Active Port-Switching module can be switched to any of ten backplane Token-Ring networks.

How Ring 3 Works

Ring 3 works in the same way as Rings 1 and 2.

Notice that the second set of RI and RO ports on the Dual Fiber Repeater module on Floor 2 attach an IBM 8230 Controlled Access Unit (CAU) to the ring. A Token-Ring Jitter Attenuator card installed on the Dual Fiber Repeater module ensures compatibility with the external 8230 CAU.

How Devices are Internetworked in the Master Hub

In the master (Floor 1) hub, port-switching lobe ports on the Dual Fiber Repeater module connect four of the hub's backplane Token-Ring networks to an external bridge/router. The external bridge/router routes traffic between the three networks that service file servers and the nodes on the building's floors. The bridge/router also communicates across the backplane to a fourth Token-Ring network that attaches to a minicomputer (a database server, for example).

Because all of the ports in this internetwork are port-switchable, the internetwork is easily organized into four subnetworks which are connected by routing traffic through a multiport external bridge/router.

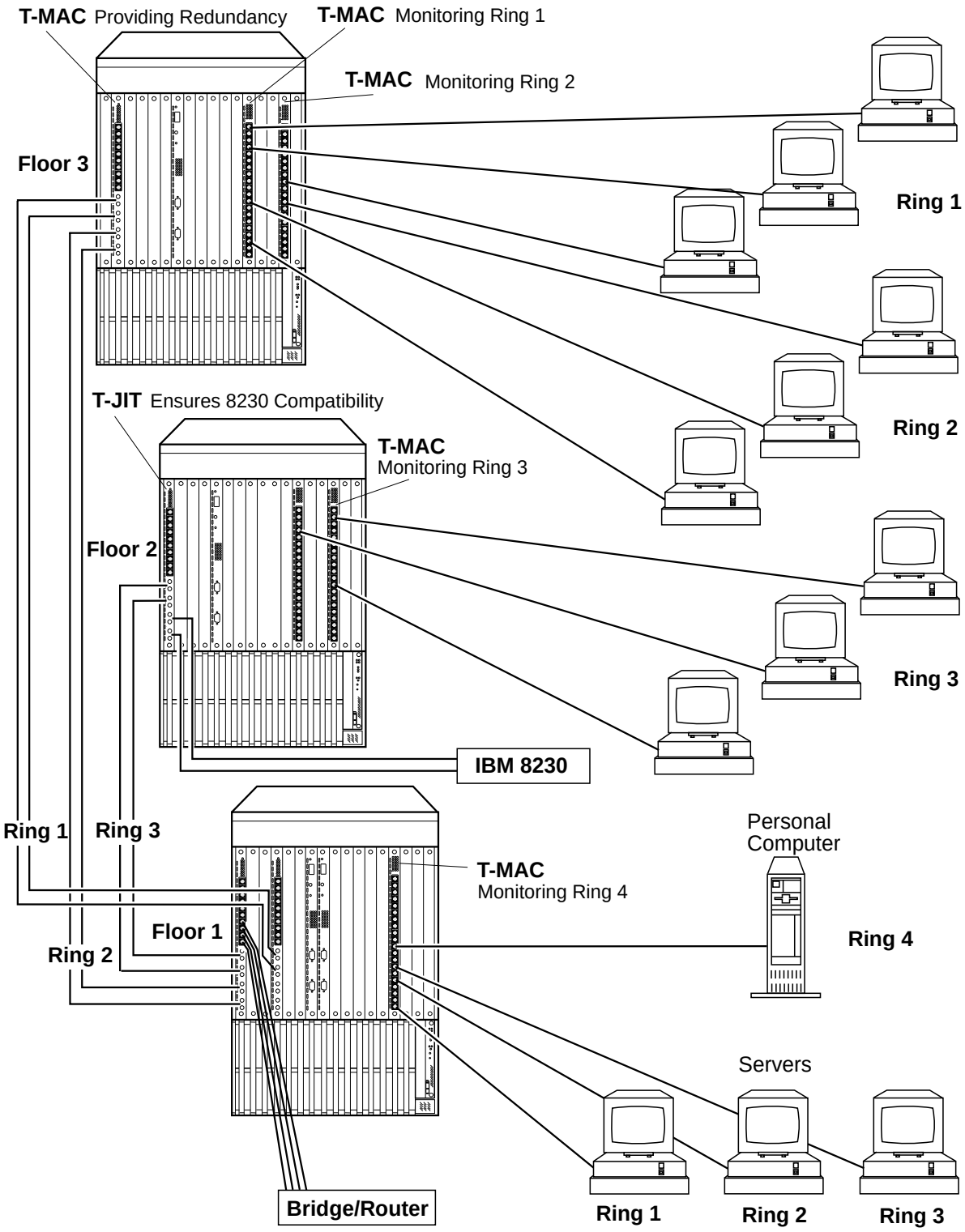

Figure 33. Collapsed Token-Ring Backbone Configuration

ATM Control Point and Switch Module

Asynchronous Transfer Mode (ATM) has been developed to answer the need for having greater bandwidth available on demand. ATM is the switching technology that satisfies the following requirements:

- Data transmission at rates up to 2.4 Gigabits
- Interoperability of services and equipment from different vendors and service providers
- Ability to switch all forms of traffic, such as voice, data, image, and multimedia
- Ability to maximize use of bandwidth.

8260-based ATM subsystems can be interconnected in order to build a local, privately owned and administered ATM network called an *ATM campus network* (Figure 34).

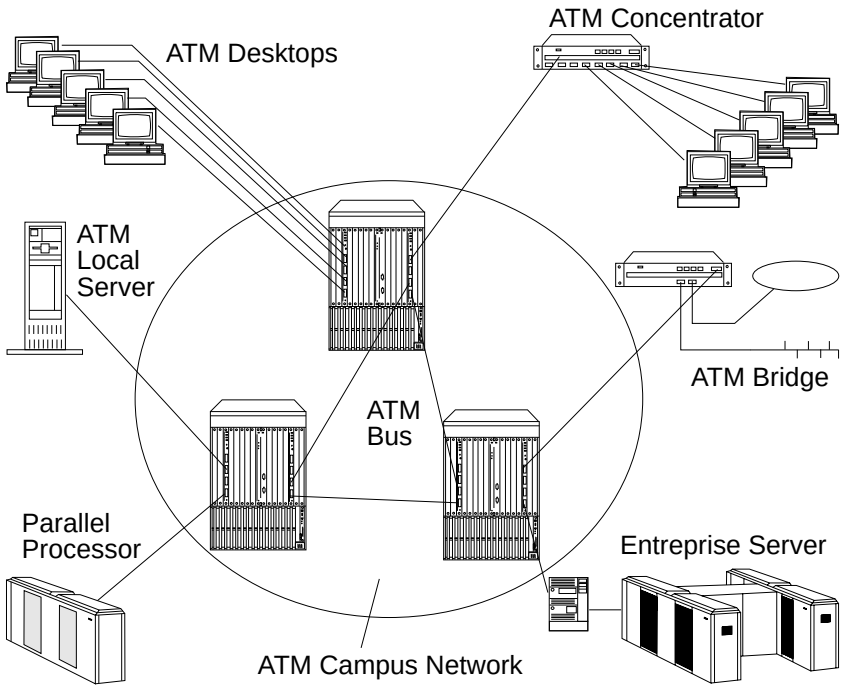

Figure 34. ATM Campus Network

The ATM Control Point and Switch module (A-CPSW) used in the 8260 hub consists of two cards packaged into a double-slot module:

- A base card (ATM Switch fabric) that switches cells from one ATM concentration port to another port or to another output link on the same module.

  ATM cell switching is carried out by means of the Switch integrated circuit, a technology used by the Nways Switch. This single chip is a non-blocking 16-by-16 times 256Mbps 8-bit parallel switch.
- A Control Point card that houses a processor where the control program resides.

The IBM 8260 ATM subsystem (like all ATM switching devices) requires a control program to perform the functions associated with the establishment and management of ATM circuits. These functions are integrated into the switching element of each A-CPSW module. As a result, the 8260 ATM subsystem uses a distributed control system which offers the following advantages:

- Each ATM module benefits from the fault-tolerant design of the IBM 8260 chassis.
- Continued ATM network operation is ensured in case of a failure at a single point in the network.

A-CPSW Module Functions

The A-CPSW module acts as an SNMP agent that implements the ATM MIB. The SNMP agent allows you to:

- Configure ATM modules
- Monitor ATM subnetworks.

The IBM 8260 imbedded Control Point provides a complete set of functions to control an ATM campus network and to interconnect local ATM networks over ATM wide area networks. The Control Point supports an extensive set of ATM connections, including:

- Permanent (PVC and PVP)
- Switched
- Point-to-point
- Point-to-multipoint.

Table 9 shows the types of ATM connections supported in 8260 hubs.

Table 9. ATM Connections Supported in 8260 Hubs

Virtual Connection Type	**ATM Connection Type**	**Connection Class**	**Connection Mode**
Virtual Path Connection (VP)	Permanent	Reserved Bandwidth and Available Bit Rate	Point-to-point, and point-to-multipoint (provided MES 5099 is installed)
Virtual Channel Connection (VC)	Switched		Point-to-point and point-to-multipoint
Virtual Channel Connection (VC)	Permanent		Point-to-point

ATM control functions are fully distributed instead of being centralized. This means that all nodes participate as peers in the control algorithms. Due to the distribution of control functions, the 8260 ATM networks provide for availability, scalability, and growth.

Each IBM 8260 Control Point provides the following functions:

- Control plane:
  - Support of ATM signaling (SVCs) according to ATM Forum V3.0 and V3.1 specifications
  - Switch-to-switch interface (SSI) based on an extension of the ATM Forum UNI V3.0 as stated in the ATM Forum P-NNI framework
  - Topology services and route computation based on TRS (extension to OSPF), with automatic bypass of failed nodes and links
  - Interconnection of local ATM networks over an ATM WAN that provides a permanent virtual path, allowing switched connections to be set up between end systems on both sides of the WAN (VP tunneling)
  - Internal SVC APIs to support node management and services over switched ATM connections
  - Support of permanent virtual path (VP) and permanent virtual channel (VC) point-to-point connections, and point-to-multipoint connections if MES 5099 is installed.
  - Support of IP over ATM (RFC 1577) for node management and services (Classical IP)
  - Support of 802.3 (Ethernet) and DIX (Ethernet V2) LAN Emulation Client
  - Support of 802.5 Token-Ring LAN Emulation Client.
- Management plane:
  - Full SNMP support (get, getnext, set, and traps)
  - MIB 2 support
  - Full ILMI (ATM Forum V3.0) support at UNI and from the network management station
  - IETF AToMIB
  - OSPF MIB support for managing topology and route computation
  - IBM extension
    - Box specific: switch, modules, and ports
    - Enhanced PVC management (automatic route computation and recovery)
    - Signaling (Q.2931 and SAAL) configurations and statistics
    - ATM statistics
  - Services for local and remote administration.
- User plane (hardware):
  - ATM layer (switching)
  - Support of Reserved Bandwidth (RB) connection
  - Support of available bit rate (ABR or “best effort”) connection.

The SNMP ATM agent is a function of the Control program in the A-CPSW module and implements the ATM MIB defined in the V3.0 UNI Specification of the ATM Forum.

The AToMIB is defined by the IETF and by the IBM extensions. It can be driven by SNMP managers, such as IBM NetView for AIX. The IBM ATM management application, Nways Campus Manager - ATM, can be used by a LAN administrator to better tune the system.

Both PVCs and SVCs are supported. The signaling is compatible with the ATM Forum V3.0 and V3.1 UNI. Control messages are encapsulated in the SAAL Adaptation Layer.

The ATM Forum ILMI is fully supported. End-systems can register their local address to the IBM 8260 and receive notification of their network address. ILMI messages are SNMP-formatted and conveyed using the AAL5 Adaptation Layer.

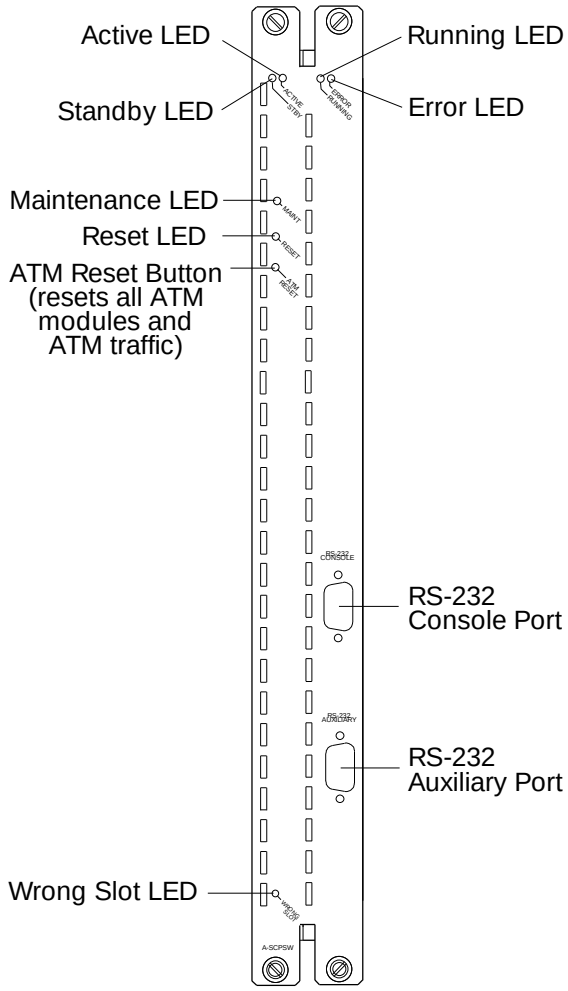

Figure 35. A-CPSW Module

Chassis Management

For power and inventory management a DMM is required in the 8260 hub. When the 8260 is running only ATM, the A-CPSW module (with code at version v2.1 or higher) has a subset of DMM functions for chassis management.

A-CPSW Redundancy

The primary A-CPSW module is located in slot 9-10. For backup purposes, a second standby A-CPSW installed in slots 11-12 can take over if the primary A-CPSW module fails. The active A-CSPW module permanently checks that the standby A-CPSW is present and up-to-date. The redundancy function is active only if the A-CPSW module is Feature Code 5100.

ATM Media Modules

ATM media modules belong to the Nways family and can be used in the 8260 hub to:

- Send and receive data from an ATM subsystem in another 8260 hub
- Attach high capacity workstations and servers that function in ATM mode.

ATM media modules interface to the 8260 hub by means of the ATM Control Point and Switch (A-CPSW) module. These modules process ATM cells of data by:

- Checking their validity
- Accessing the switching tables to locate the destination module
- Preparing the internal ATM format required by the A-CPSW module
- Sending the cells to the A-CPSW module.

ATM media modules can be installed:

- In any slot of the 17-slot 8260 hub, except for slots 9, 10, and 11 which are reserved for A-CPSW modules. Although slot 12 is also reserved, you can insert an ATM media module if no A-CPSW module is installed in slots 11-12.
- In any slot of the 10-slot 8260 hub, except for slots 9 and 10 which are reserved for the A-CPSW module.

For more information on how to install modules in the 8260 hub, see the *8260 Nways Multiprotocol Switching Hub Installation Guide*, SA33-0251.

ATM media modules support the following interfaces:

- User-to-network (UNI)
- Network-to-network (NNI)
- Switch-to-switch (SSI).

The UNI and NNI interfaces supported are defined in the following documents:

- ATM Forum UNI Specifications V3.0 and V3.1
- ITU (ex-CCITT) SG13 as defined in the following standards:
  - I.413 (B_ISDN User-Network Interface)
  - I.432 (Physical Layer)
  - Q.2931 (Signaling)
  - I.610 (OAM)
  - G.751 and G.832 for (for E3).

The SSI interface is a form of the NNI interface developed for use in IBM 8260-based ATM subnetworks.

When the 8260 hub has an ATM backplane installed, it supports the ATM media modules described in the following sections.

Important: Most of the 8260 ATM media modules can also be used in the IBM 8285 Nways ATM Workgroup Switch. The 8285 base unit contains an integrated Control Point and Switch unit and twelve 25Mbps ATM ports, and an optional 155Mbps port. The 8285 expansion unit provides three slots for supplementary ATM modules.

ATM 4-Port 100Mbps Module

The ATM 4-Port 100Mbps module is a single-slot, 4-port concentration module that uses either MIC duplex (A4-FB100 module) or SC port (A4-SC100 module) connectors.

The A4-FB100/SC100 module has the following characteristics:

- Four ports operating with up to 100Mbps to connect to stations, servers, and other hubs. Each port may connect to:
  - A concentrator with up to twelve workstation connections
  - An ATM bridge with either up to four Token-Ring (N station) connections or up to four Ethernet connections
  - An ATM or multimedia workstation that requires a high bit rate
  - A UNI, NNI, or SSI device using a supported interface.
- Physical interface: optical fiber cable with a MIC duplex connector (A4-FB100 module) or SC connector (A4-SC100 module), as specified in ISO DIS 9314-3.
- Workstation and server connections of up to two kilometers (1.24 miles) from the hub.
- A4-FB100 port-to-port MIC connections of up to three kilometers (1.86 miles) depending on the quality of the cabling used.
- A4-SC100 port-to-port SC connections of up to 2.2 kilometers (1.36 miles) depending on the quality of the cabling used.
- Up to fourteen A4-FB100 or A4-SC100 modules can be used in the 17-slot 8260 hub at the same time (8 in the 10-slot hub).

A4-FB100 and A4-SC100 modules can be hot plugged into any slot in the 8260 hubs that are not reserved for A-CPSW modules. This means that the modules can be installed or removed while the hub is in operation without disturbing data traffic on other modules.

For detailed specifications, refer to page 150.

Figure 36 on page 76 shows the faceplate of the A4-FB100 module.

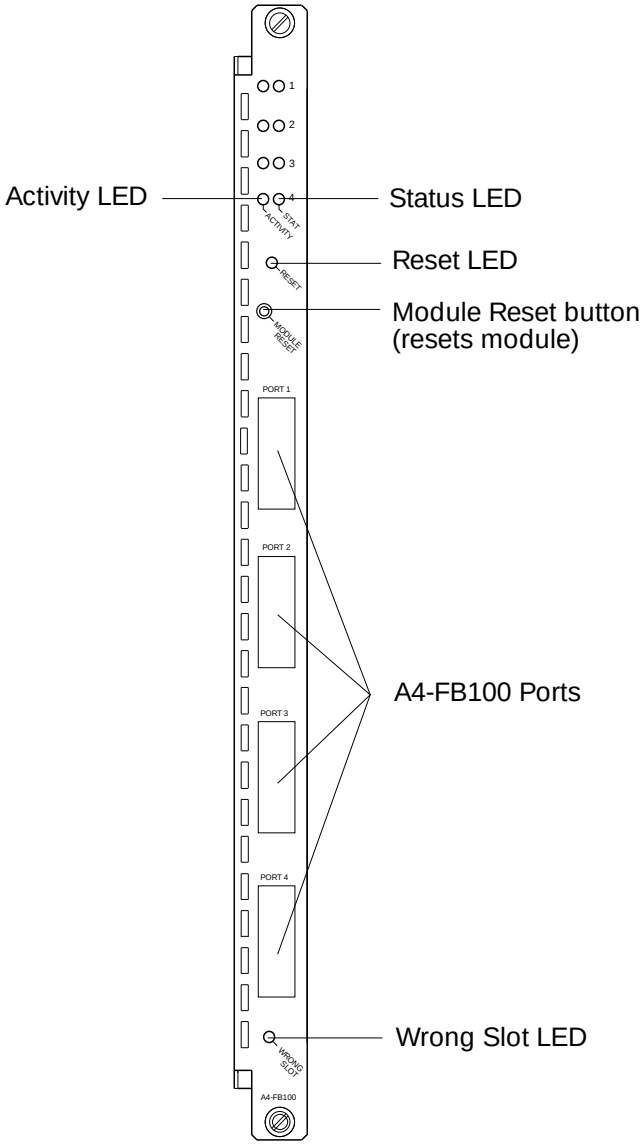

Figure 36. A4-FB100 Module

ATM 12-Port 25Mbps Concentration Module

The 12-Port 25Mbps Concentration (A12-TP25) module enables the building of large ATM workgroups or a smooth evolution from Legacy LAN to ATM networks. With the ATM 25Mbps adapter, it offers a complete IBM solution for ATM to the desktop.

The A12-TP25 module is a single-slot module providing 12 ports at 25Mbps, supporting UNI, SSI, and NNI interfaces in any combination. To connect ATM stations or servers it allows link distances, over twisted pair cables with RJ-45 connectors, of up to:

- 100 meters (329 ft.) on 100 ohm UTP Category 3 cable
- 255 meters (837 ft.) on 150 ohm STP cable.

A 1-port 155Mbps I/O card can be added as a feature. This I/O card allows the attachment of the A12-TP25 module to a server or ATM backbone, thus saving one module slot when a 155Mbps link is needed (no need for a 2- or 3-port 155Mbps module), via a multimode fiber (MMF) cable. This port supports all types of interface: UNI, NNI, and SSI.

Up to fourteen A12-TP25 modules can be used in the 17-slot 8260 hub at the same time (8 in the 10-slot 8260 hub). The modules may be installed or removed from the hub (hot-pluggable) without disturbing data traffic on other ATM modules.

For specifications, refer to page 151.

Figure 37 on page 78 shows the faceplate of the module.

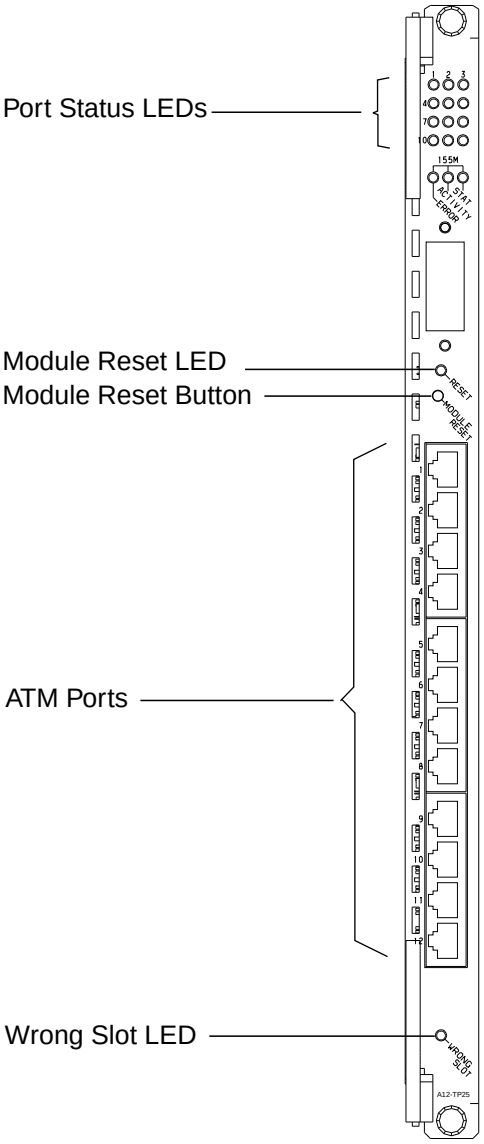

Figure 37. ATM 12-Port 25Mbps Concentration Module

ATM 155Mbps Flexible Concentration Module

The ATM 155Mbps Flexible Concentration module is also referred to as the ATMFlex or A2-MB155 module. It is a single-slot, 2-port concentration module that allows you to install different types of daughter cards according to your ATM networking needs.

The ATMflex module has the following characteristics:

- Two ports operating with up to 155Mbps to connect to stations, servers, and other hubs. Each port may connect to:
  - An ATM or multimedia workstation that requires a high bit rate
  - A UNI, NNI, or SSI device using a supported interface.
- A motherboard with up to two daughter cards for ATMflex port-to-port and ATMflex port-to-device connections. By using different daughter cards you can mix and match different media types in an 8260-based ATM subnetwork. The ATMflex module supports the following daughter cards:
  - Multimode fiber (MF)
  - Singlemode fiber (SF)
  - Shielded or unshielded twisted pair (TP).
- Physical interface: optical fiber or copper cable, depending on the type of daughter card used.
- Workstation and server connections up to:
  - 2 km (1.24 miles) using multimode fiber cable
  - 20 km (12.4 miles) using singlemode fiber cable
  - 100 m (328 ft) using 100 ohm UTP5 or 120 ohm FTP cable
  - 150 m (493 ft) using 150 ohm STP cable.
- ATMflex port-to-port connections up to:
  - 2.2 km (1.36 miles) using multimode fiber cable
  - 20 km (12.4 miles) using singlemode fiber cable
  - 100 m (328 ft) using 100 ohm UTP5 or 120 ohm FTP cable
  - 150 m (493 ft) using 150 ohm STP cable.
- Up to 14 A2-MB155 modules can be used in the 17-slot 8260 hub at the same time (8 in the 10-slot hub).

The modules may be installed or removed from the hub (hot-pluggable) without disturbing data traffic on other ATM modules.

For detailed specifications, refer to page 151.

Figure 38 on page 80 shows the faceplate of the A2-MB155 module.

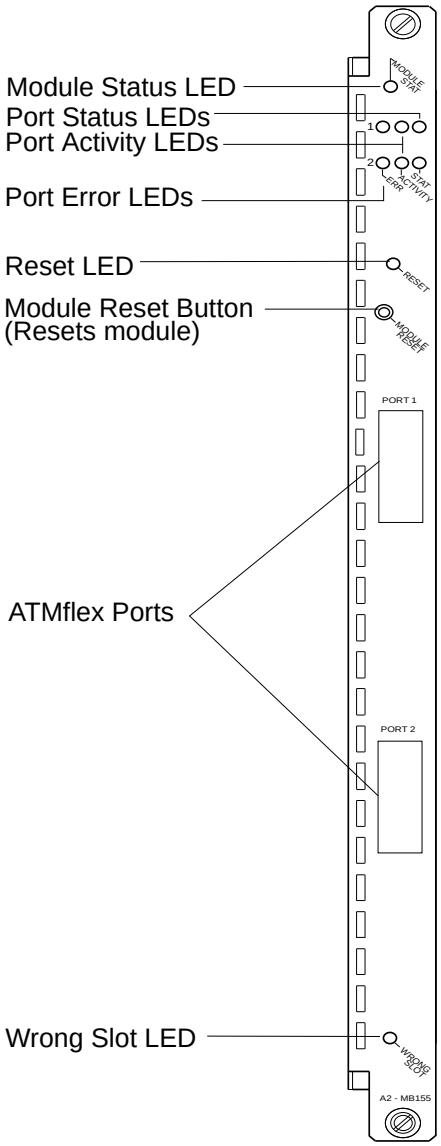

Figure 38. ATM 155Mbps Flexible Concentration Module

ATM 3-Port 155Mbps Module

The ATM 3-Port 155Mbps (A3-MB155) module is a single-slot module having the same technical specifications as the ATMflex module (see page 79). It allows you to mix and match three of the three different types of daughter card.

For detailed specifications, refer to page 151.

Figure 39 shows the faceplate of the A3-MB155 module.

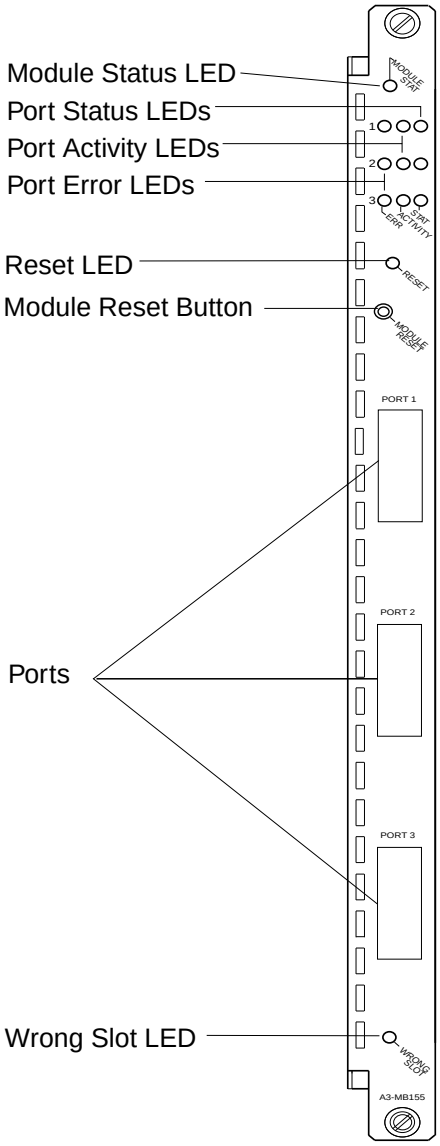

Figure 39. ATM 3-Port 155Mbps Module

ATM WAN Module

The ATM WAN (A2-WAN) module enables direct communication between ATM 8260 networks, residing in different locations, over the Wide Area Network (WAN).

The A2-WAN is a single-slot module, based on the 8260 ATM Carrier (motherboard) that can host up to two daughter cards, in any combination, of the following types:

- 1-port E3 I/O card, with BNC connector, over a coax cable at 34Mbps
- 1-port DS3 I/O card, with BNC connector, over a coax cable at 45Mbps
- 1-port STM-1 I/O card, with SC connector, over a multimode fiber (MMF) cable at 155Mbps
- 1-port STM-1 I/O card, with SC connector, over a singlemode fiber (SMF) cable at 155Mbps
- 1-port OC3 I/O card, with SC connector, over a multimode fiber (MMF) cable at 155Mbps
- 1-port OC3 I/O card, with SC connector, over a singlemode fiber (SMF) cable at 155Mbps

The A2-WAN module supports the UNI and NNI interfaces. The STM-1 interface implements full SDH support, while the OC3 interface implements SONET support.

The UTOPIA interface connects the daughter cards to the motherboard in the following way:

- ATM data cells are transferred via UTOPIA
- Daughter cards access the ATM functions via UTOPIA

Up to fourteen A2-WAN modules can be used in the 17-slot 8260 hub at the same time (8 in the 10-slot 8260 hub). The modules may be installed or removed from the hub (hot-pluggable) without disturbing data traffic on other ATM modules.

For detailed specifications, refer to page 152.

Figure 40 on page 83 shows the faceplate of the A2-WAN module.

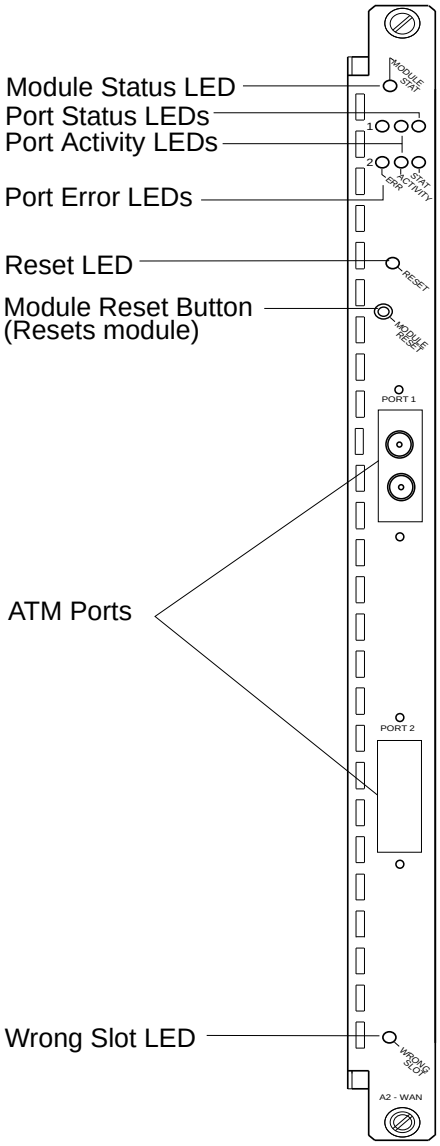

Figure 40. ATM WAN Module

8281 ATM LAN Bridge Module

The 8281 ATM LAN Bridge module is the integrated version of the IBM 8281 standalone product in the Nways family. It provides a bridging solution between classic LANs (Ethernet and Token-Ring) and ATM networks. The ATM LAN Bridge module allows you to consolidate the networks installed in your 8260 hub by permitting classical LAN users to connect over a high capacity ATM backbone.

The integration of the 8281 ATM LAN bridge in the 8260 ATM hub provides the following benefits:

- Provides a smooth migration to an ATM network
- Secures your current investments since there is no need to replace existing LAN equipment and cabling
- Allows easy installation and reconfiguration
- Provides common management
- Improves network reliability through the redundancy functions of the 8260 hub.

The ATM LAN Bridge module occupies two slots and has:

- One ATM port on the backplane
- Four LAN ports on the module faceplate for either four Token-Ring or four Ethernet connections. Note that the LANs must all be of the same type, either Token-Ring or Ethernet.

  In Figure 41 on page 85, note that LAN ports 1 and 3 are RJ-45, but that ports 2 and 4 can be configured as either RJ-45 or AUI.
- An EIA-232 port for configuring the module using a local console. The module is shipped with a PC-based configuration diskette.

With the implementation of LAN emulation, the ATM LAN Bridge module provides:

- Local LAN bridging
- LAN-to-LAN over an ATM network
- LAN-to-ATM station connections
- Source Routing (SR) protocol for Token-Ring and Transparent Bridging (TB) protocol for Ethernet LANs.
- Filtering on Token-Ring and Ethernet LANs.

Version v1.xx of the microcode supports the IBM proprietary LAN emulation.
Version v2.xx of the microcode supports the ATM Forum compliant LAN Emulation.

For detailed specifications, refer to page 152.

Figure 41 on page 85 shows the faceplate of the module.

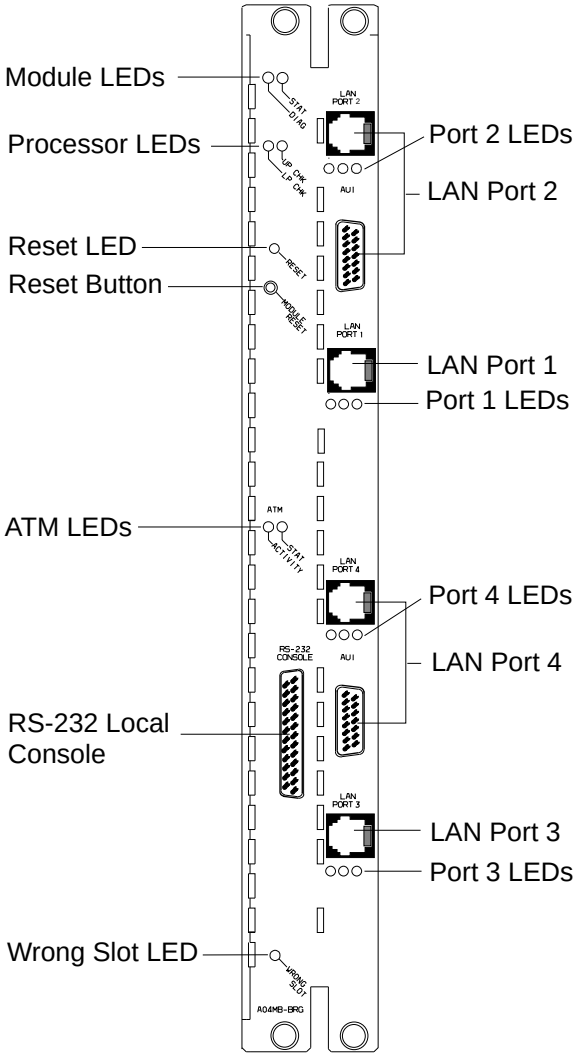

Figure 41. 8281 ATM LAN Bridge Module

ATM Kit Development Program

The ATM Kit Development Program “opens” the IBM 8260 platform by providing companies and developers with a simple and inexpensive way to add their ATM technology onto the 8260 hub. This program allows you to build ATM functions and modules for the 8260 hub, as well as develop new ATM applications.

The technology breakthrough that enabled this innovative package was the development of the IBM ATM Carrier Module. The Carrier Module inserts into the 8260 hub and acts as a generic motherboard that accepts a feature daughter board. The Carrier Module uses well-known standard interfaces (UTOPIA) for communication with 1 or 2 daughter cards that contain the developer’s function or application. Functions built on the daughter board benefit from the advanced features of the 8260 platform and the Carrier Module.

ATM Carrier Module Architecture

By using the UTOPIA interface in the ATM Carrier Module, the PHY-specific functions are separated from the standard ATM functions that are common to all ATM applications.

- Standard ATM functions are located in the Carrier Module
- All PHY-specific functions are concentrated on custom-designed daughter cards that are mounted on the Carrier Module.

  The daughter cards access all necessary ATM functions via the UTOPIA interface, as shown Figure 42.

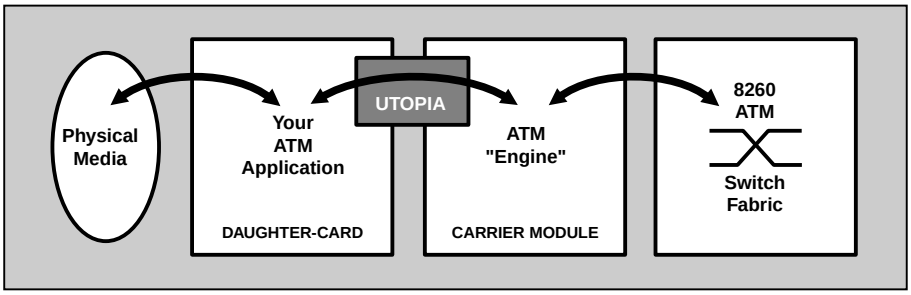

Figure 42. Data Flow in the ATM Carrier Module

Thus, the architecture of the ATM Carrier Module allows you to focus your creativity on the internal functionality of your ATM application and minimize your involvement with the details of ATM switching and module management.

Module Versions

To accommodate various daughter card applications, the ATM Carrier Module is available in single-slot or 2-slot versions.

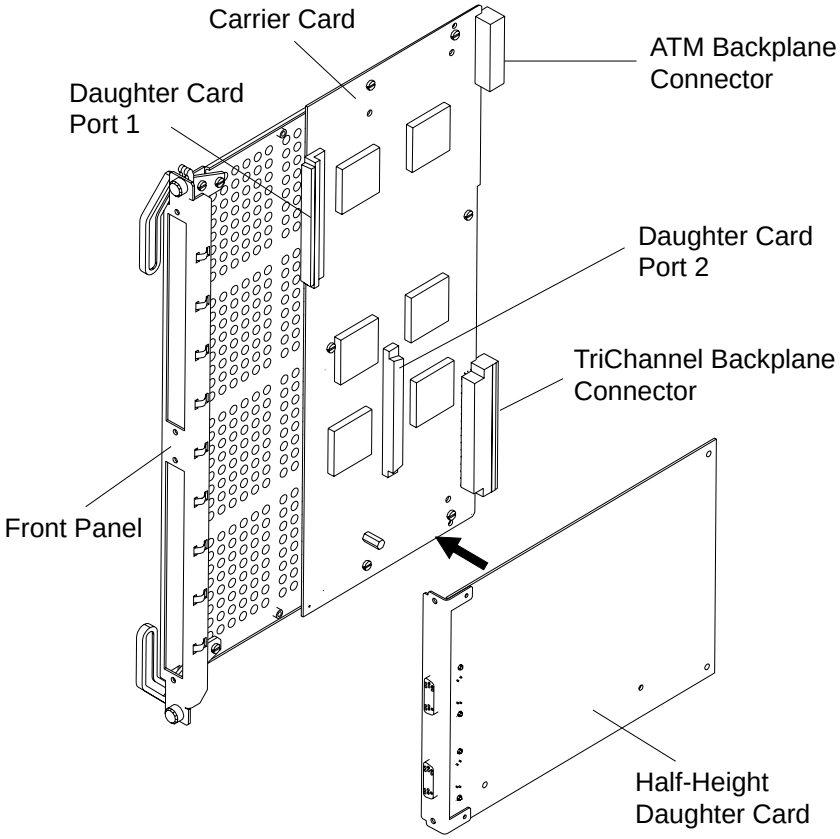

Figure 43. Single-slot ATM Carrier Module

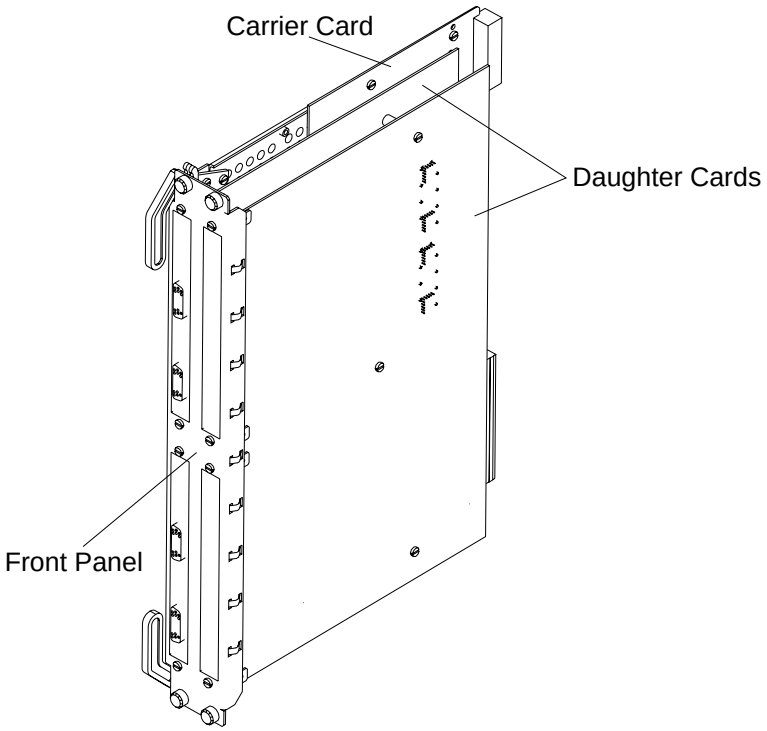

Figure 44. 2-Slot ATM Carrier Module

Application Example

The first application of the ATM Carrier Module is the ATM LAN Bridge Module that is the integrated version of the IBM 8281 ATM/LAN Bridge (see page 84).

Multiprotocol Switched Services (MSS) Server Module

The Multiprotocol Switched Services (MSS) Server Module (Feature Code 5300) is the integrated version of the IBM 8210 Nways MSS Server stand-alone box, except for the ATM uplink. There is no need for an ATM uplink because the MSS module, based on the 8260 ATM Carrier, attaches to the 8260 ATM backplane.

The MSS Server module provides a multiprotocol networking solution for the ATM environment and allows a smooth migration from shared LANs to high speed ATM backbones.

The MSS Server module provides the LAN Emulation and Classical IP network functions, as well as various bridging and routing functions through the following features:

- ATM Forum compliant LAN emulation. The MSS supports:
  - Ethernet and Token-Ring emulated LANs
  - LAN Emulation Client (LEC)
  - LAN Emulation Server (LES)
  - LAN Emulation Configuration Server (LECS)
  - Broadcast and Unknown Server (BUS).
- Virtual LAN support: logical groups of end stations
- Enhanced availability of LAN emulation: an IBM extension to LAN emulation that supports multiple LAN Emulation Servers for backup purposes.
- Enhanced LAN emulation broadcast management: an IBM extension to the BUS that reduces the broadcast traffic to improve network performance.
- Standard bridging and routing support:
  - Source route (SR) bridging
  - Transparent bridging (TB)
  - SR and TB
  - Source route transparent bridging (SRT)
  - Source route to transparent bridging (SR-TB)
  - Adaptive source route transparent bridging (ASRT).
- IP routing over ATM
- Novell IPX routing on emulated LANs.

Hardware Structure

The MSS Server module has the following hardware specifications:

- 2-slot module based on the 8260 ATM Carrier Module (see page 86)
- Two PCMCIA adapter slots (for type 3 cards)
- One PCMCIA hard disk for operational code, configuration data, and service information (logs, traces, and so on) The PCMCIA disk is a required hardware feature.
- One PCMCIA modem for remote access. Depending on to country homologation rules, it is either a PCMCIA data/fax modem or a PCMCIA voice/data/fax modem.
- A service port conforming to EIA-232.

Network Management

There are several options for operating and managing the MSS Server module:

- Local console (ASCII terminal) on the service port
- Remote login via a Telnet session
- Remote connection via an HTML Web browser
- SNMP management station.

Configuration Requirements

In order to configure the MSS Server module, you need either:

- An ASCII terminal locally or remotely attached to the service port
- An IP workstation connected with Telnet, through ATM, or a modem (SLIP protocol)
- An IP workstation connected with an HTML Web browser, through ATM, or a modem (SLIP protocol)
- The MSS Server Configuration program, operating on a:
  - PS/2 workstation running DOS or OS/2
  - RS/6000 running AIX.

In addition to the remote attachment, via a modem connected to the service port, the integrated PCMCIA modem can also be used.

For detailed specifications, refer to page 153.

Figure 45 shows the faceplate of the MSS module.

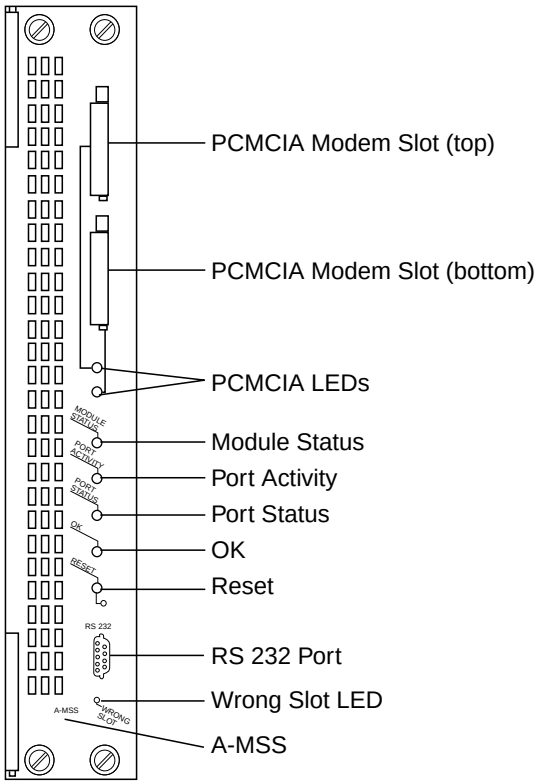

Figure 45. MSS Server Module

Video Distribution Module

The Video Distribution Module (A8-MPEG) is a two-slot module providing 8 independent ports to decode MPEG-2 video streams. A video source, such as the IBM Media Streamer or the Video Access Node (IBM 8300), can establish a connection with one or more of the A8-MPEG module ports and transmit MPEG-2 video streams through the ATM network, and into the A8-MPEG module.

The A8-MPEG module receives the cells, reassembles the MPEG-2 video and audio packets, decompresses and decodes the digitized video information, and converts it into separate analog audio and video signals. External ports on the module provide baseband NTSC-compliant (US standard) and PAL (worldwide standard) video, and CD-quality audio.

The A8-MPEG module also has the capability to receive Closed Caption information in the MPEG-2 transport stream and reinsert that information into the Vertical Banking Interval of the outgoing analog video signal. Figure 46 shows the faceplate of the A8-MPEG module.

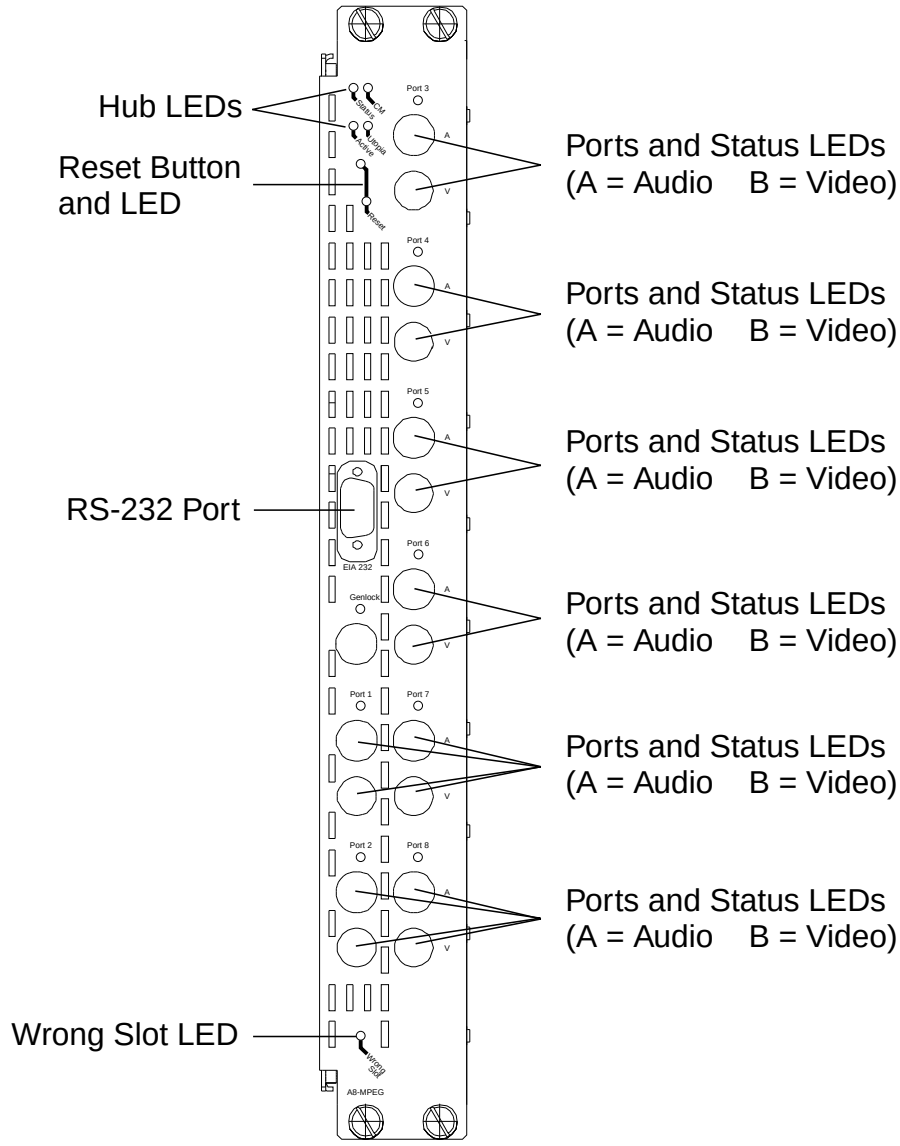

Figure 46. Video Distribution Module

LAN Switch Modules

The following modules are available for LAN switching in the 8260 hub:

- 8271 Ethernet LAN Switching Modules

  The 8271 Ethernet LAN Switch module is the integrated version of the stand-alone IBM 8271 Nways LAN Switch. By using Ethernet MAC addresses to forward Ethernet frames between ports, the 8271 module can accommodate any type of LAN segments to provide a high-performance switching solution.

  The 8271 ATM/Ethernet LAN Switch module includes all the functions of the 8271 Ethernet LAN Switch module, but also provides direct ATM backplane connectivity allowing segments of Ethernet LAN users to be interconnected to other Ethernet LAN segments via LAN switching or high-speed ATM switching.

- 8272 Token-Ring LAN Switching Modules

  The 8272 Token-Ring LAN Switch module is the integrated version of the stand-alone IBM 8272 Nways LAN Switch. By using Token-Ring MAC addresses and source route descriptors to forward Token-Ring frames between ports, the 8272 module provides a high-performance switching solution.

  The 8272 ATM/Token-Ring LAN Switch module includes all the functions of the 8272 Token-Ring LAN Switch module, but also provides direct ATM backplane connectivity allowing segments of Token-Ring LAN users to be interconnected to other Token-Ring LAN segments via LAN switching or high-speed ATM switching.

- Switching Module Series

  A new family of modules has been developed providing a scalable IBM solution for migration from shared LANs to switched LANs. This family of modules allows a high performance switch between Ethernet and FDDI LANs, with a future migration to ATM.

  This new family of modules requires a new high speed backplane in the 8260 hub: the PacketChannel backplane, available on 8260 models P07, P10, P17, and G17. With the 8260 model G17, all module types can co-exist in the same 8260 hub: Ethernet, Token-Ring, ATM, and Switching modules.

  The PacketChannel is a high speed, high performance backplane able to deliver 2Gbps or 3.4Mpps (mega packets per second) between Switching modules. A Switching module may also be plugged into an 8260 chassis without a PacketChannel backplane, and in such a case, will operate as a stand-alone switch unit.

8271 Ethernet LAN Switch Modules

There are two 8271 modules available for Ethernet LAN switching:

- 8271 Ethernet LAN Switch module
- 8271 ATM/Ethernet LAN Switch module

Feature Code 5009 allows you to upgrade an 8271 Ethernet LAN Switch module into an 8271 ATM/Ethernet LAN Switch module.

The modules are offered in two- and three-slot versions, and have the following characteristics:

- 12 frontal 10BASE-T Ethernet ports with RJ-45 UTP/STP connectors (UTP cabling Category 3, 4, or 5 is supported)
- Up to four UFCs supported on the three-slot version (two on the two-slot version)

  The following UFCs are available and may be installed in any combination:

  – 4-port 10BASE-T UFC for UTP or STP cabling
  – 3-port 10BASE-FL UFC for fiber cabling
  – 1-port 100BASE-Tx UFC for UTP or STP cabling
  – 1-port 100BASE-Fx UFC for fiber cabling
  – 1-port ATM/Ethernet UFC for fiber cabling.

  UFCs working with fiber optic cables allow the connection of LAN segments up to two kilometers from the 8260 hub using multimode fiber cabling.
- Full compliance with IEEE 802.3 standard
- Variable switching mode:
  – Cut-through mode, where the frames are forwarded as soon as the address has been received
  – Store-and-forward mode, where frames are checked before they are forwarded
  – Adaptive mode, which offers the benefits of both cut-through and store-and-forward modes.
- Virtual switch capability - which allows a single physical LAN to be divided into two or eight virtual switches.
- Full duplex support - provides 2 independent paths, each at 10Mbps, per port.
- Etherpipe support - allows multiple ports (up to four) to be connected together between two 8271 modules.
- MAC addresses - up to 1790 Ethernet MAC addresses per port and 10 000 per module are supported.
- Transparent bridging and filtering.
- Statistics - the 8271 modules keeps statistics on a per-port, per-station, or entire module basis.
- Management - either via the service port or inband from an SNMP management station.

The ATM/Ethernet UFC has the following characteristics:

- Provides an uplink connection to an ATM network at 155Mbps
- Is ATM Forum compliant
- Provides LAN Emulation Client (LEC) functions
- Supports switched virtual connections (SVCs)
- Assembles/disassembles Ethernet frames from/to ATM cells
- Supports up to eight Ethernet/IEEE 802.3 emulated LANs.

Like other 8260 modules, the 8271 can be inserted without disturbing the data traffic on other modules.

For detailed specifications, refer to pages 161 and 162.

Figure 47 on page 95 shows the faceplates of the 2- and 3-slot 8271 modules.

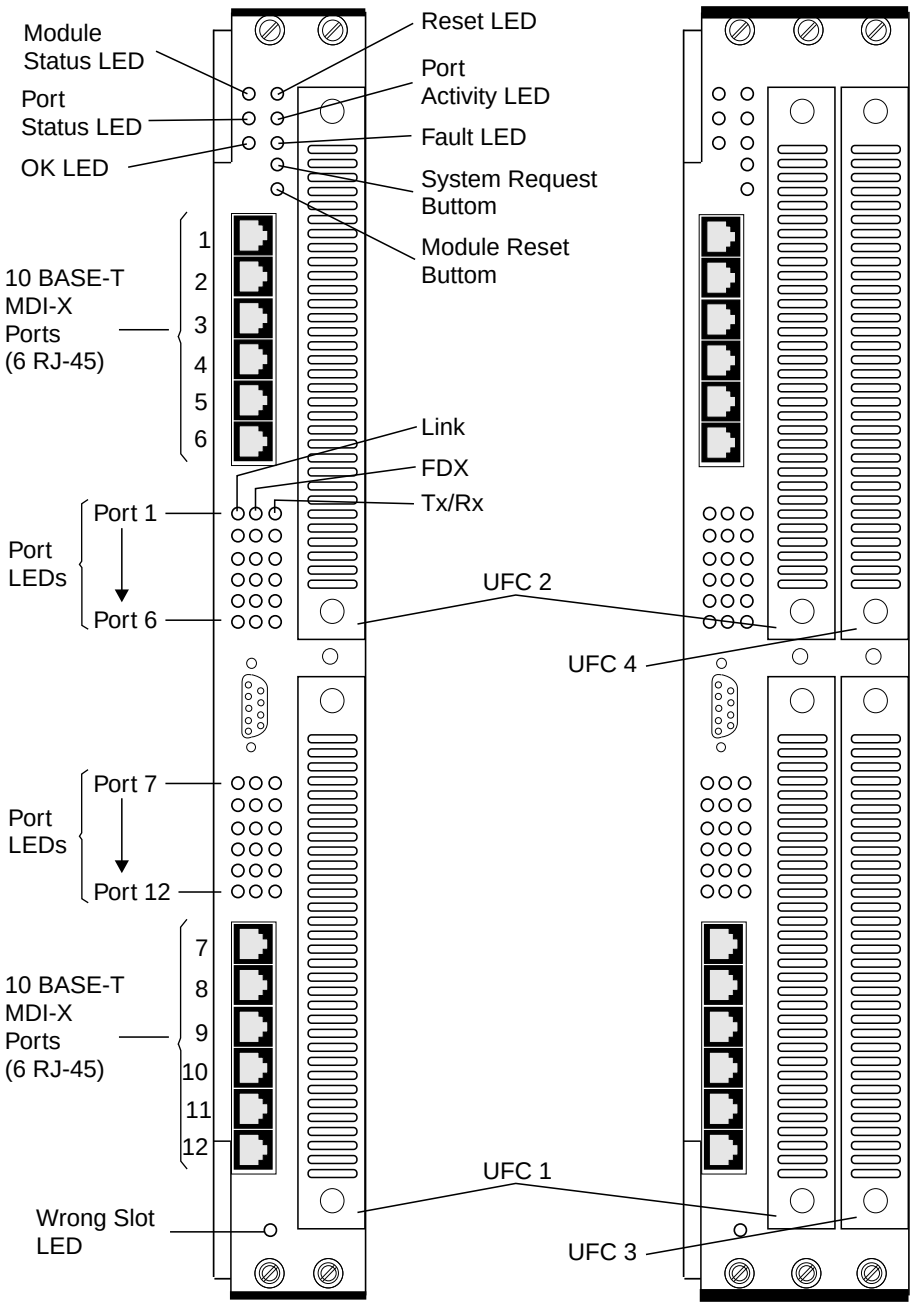

Figure 47. 8271 Ethernet LAN Switching Modules

8272 Token-Ring LAN Switch Modules

There are two 8272 modules available for Token-Ring LAN switching:

- 8272 Token-Ring LAN Switch module
- 8272 ATM/Token-Ring LAN Switch module

Feature Code 5010 allows you to upgrade an 8272 Token-Ring LAN Switch module into an 8272 ATM/Token-Ring LAN Switch module.

The modules are offered in two- and three-slot versions, and have the following characteristics:

- 8 frontal Token-Ring (4Mbps or 16Mbps) ports with RJ-45 UTP/STP connectors (UTP cabling Category 3, 4, or 5 is supported)
- Up to four UFCs supported on the three-slot version (two on the two-slot version)

  The following UFCs are available and may be installed in any combination:

  – 4-port UFC for UTP or STP cabling

  – 2-port UFC for fiber cabling

  – 1-port ATM/Token-Ring UFC for fiber cabling.

  UFCs working with fiber optic cables allow the connection of LAN segments up to two kilometers (1.25 miles) from the 8260 hub using multimode fiber cabling. The ports can be used as ring-in/ring-out connections.
- Full compliance with IEEE 802.5 standard
- Variable switching mode:

  – Cut-through mode, where the frames are forwarded as soon as the address has been received

  – Store-and-forward mode, where frames are checked before they are forwarded

  – Adaptive mode, which offers the benefits of both cut-through and store-and-forward modes.
- Virtual switch capability - which allows a single physical LAN to be divided into two or eight virtual switches.
- Full duplex support - provides 2 independent paths, each with a bandwidth of 16Mbps per port.
- Tokenpipe support - allows multiple ports (up to four) to be connected together between two 8272 modules.
- MAC addresses - up to a maximum of 1790 Token-Ring MAC addresses per port and 10 000 per module are supported.
- Transparent bridging and filtering.
- Source route switching - based on source route descriptors rather than MAC addresses.
- Source route bridging - allows frame transport between Token-Ring segments with different ring numbers.
- Auto-sense/auto-configure capabilities - to automatically configure the port to the network characteristics.
- Statistics - the 8272 modules keeps statistics on a per-port, per-station, or entire module basis.
- Token Probe - a port can be defined to monitor other ports.

- Management - either via the service port or inband from an SNMP management station.

The ATM/Token-Ring UFC has the following characteristics:

- Provides an uplink connection to an ATM network at 155Mbps
- Is ATM Forum compliant
- Provides LAN Emulation Client (LEC) functions
- Supports switched virtual connections (SVCs)
- Assembles/disassembles Token-Ring frames from/to ATM cells
- Supports up to eight Token-Ring/IEEE 802.5 emulated LANs.

Like other 8260 modules, the 8272 can be inserted without disturbing the traffic on other modules.

For detailed specifications, refer to pages 163 and 164.

Figure 48 on page 98 shows the faceplates of the 8272 modules.

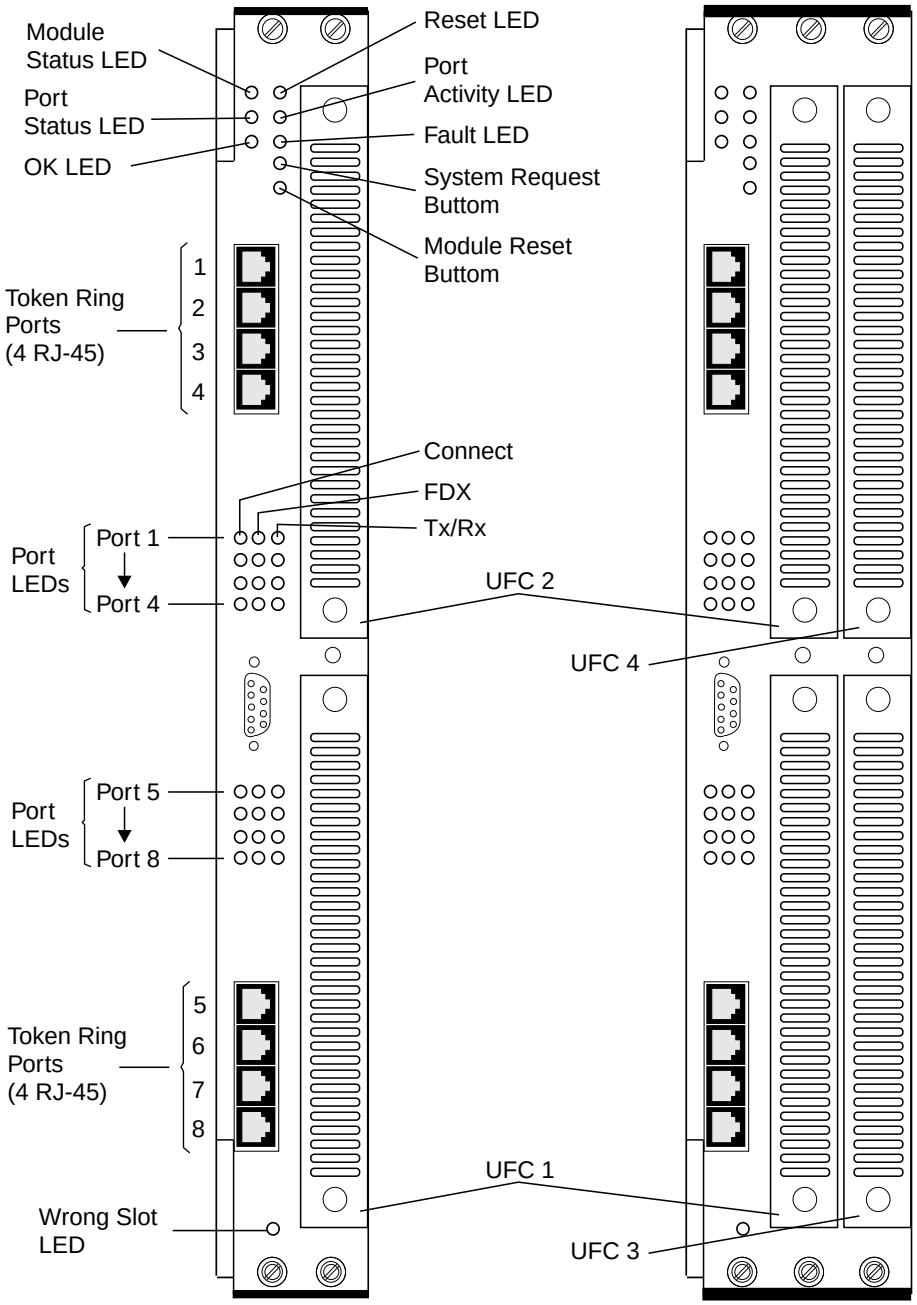

Figure 48. 8272 Token-Ring LAN Switching Modules

Switching Module Series

The Switching Module Series is a family of nine modules, that when associated with the PacketChannel backplane in an 8260 hub provide the following features:

- Scalable bandwidth and performance:
  - Each module has its own switching engine or Application Specific Integrated Circuit (ASIC) allowing a 650 000 pps (packets per second) throughput.
  - Each module has its own processor and storage for the following basic switching functions:
    - Address learning
    - Spanning Tree calculations
    - RMON support
    - Packet fragmentation (for FDDI to and from Ethernet)
  - PacketChannel backplane performance: 2Gbps or 3.4 Mpps (mega packets per second)
  - Multiprotocol environment support: 10Mbps and 100Mbps Ethernet, FDDI, and ATM
- High function backbone features:
  - 32 000 MAC addresses per module
  - User defined MAC address filters
  - 64 protocol filters per module
  - Traffic prioritization on the protocol type.
- Virtual networking:

  The Switching modules allow a user to perform “Virtual Switches”, that are user-defined groups of ports. Each virtual switch is a logical group of ports from different modules and different interface types, with the following:
  - Up to 256 virtual switches in each 8260 hub
  - Each virtual switch has its own set of switch capabilities
  - Each virtual switch is configurable and managed by a DMM (at software version 4.11 or later).
- High Fault Tolerance and Reliability
  - The Switching modules take advantage of the 8260 hub reliability features:
    - Load-sharing power supplies
    - Redundant power supply, controller, DMM
    - Power management.
  - PacketChannel backplane architecture: a passive bus without active components that can fail
  - Switching engine at module level
  - Dynamic side switching: detection of inter-module device moves
  - Hot-pluggable modules with configuration learning.

- System Management
  - RMON support: an embedded RMON agent (or RMON probe) in each module provides:
    - All 9 RMON group support
    - Statistics collection at port level.
  - Integrated inventory management data
  - Roving port analysis: a method for monitoring network traffic. The traffic on a port is mirrored to another port or the embedded RMON probe on the same Switching module or to another module.
  - Inband and out-of-band management from the DMM.

10BASE-T Solutions

Two modules provide a solution for the 802.3 twisted pair LAN with the following characteristics:

- 1-slot 12-port or 2-slot 24-port 10BASE-T module
- RJ-45 connectors
- UTP/STP cabling
- 10Mbps bandwidth per port
- Maximum of 204 ports in a 17-slot hub.

For detailed specifications, refer to page 165.

Figure 49 shows the faceplate of the 24-port 10BASE-T module.

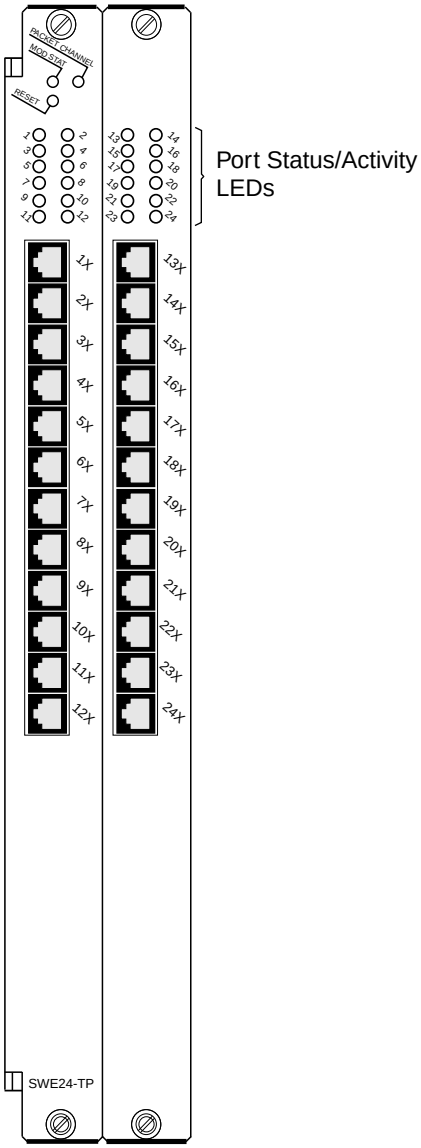

Figure 49. 24-Port 10BASE-T Switching Module

10BASE-FB/FL Solutions

Two modules provide a solution for the 802.3 fiber LAN with the following characteristics:

- 1-slot 10-port or 2-slot 20-port 10BASE-FB/FL module
- ST connectors
- Multimode fiber cabling
- 10Mbps bandwidth per port
- Auto-sense/auto-configuration for fiber backbone (FB) or fiber link (FL)
- Maximum of 170 ports in a 17-slot hub.

For detailed specifications, refer to page 166.

Figure 50 shows the faceplate of the 20-port 10BASE-FB/FLmodule.

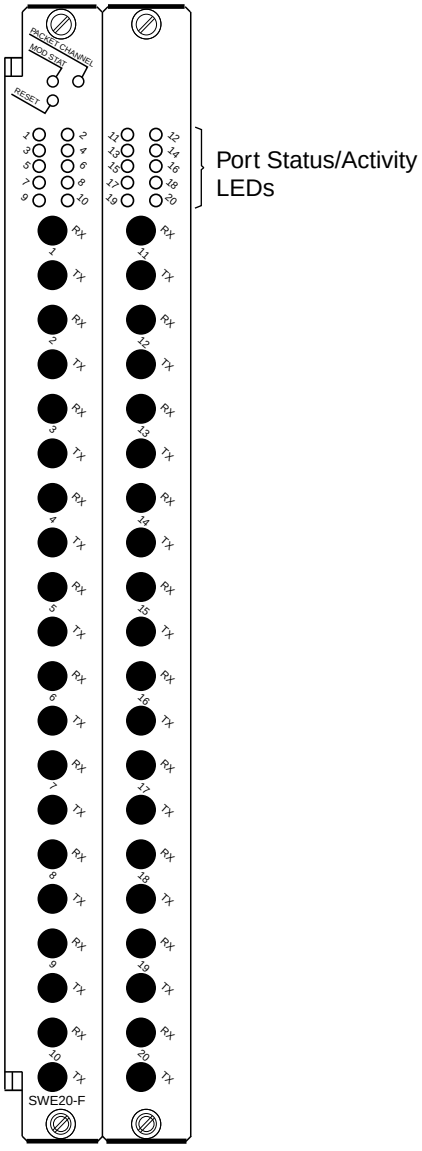

Figure 50. 20-Port 10BASE-FB/FL Switching Module

FDDI Solutions

Three modules provide a solution for connecting to an FDDI backbone or server, with the following characteristics:

- 1-slot 2-port DAS FDDI module to build collapsed FDDI backbones
- 2-slot module with 1 DAS FDDI port and twelve 10BASE-T ports to connect copper Ethernet stations
- 2-slot module with 1 DAS FDDI port and ten 10BASE-FB/FL ports to connect fiber Ethernet stations
- MIC connectors on FDDI ports
- Support of SMT v7.3 Agent for FDDI ports
- Optical bypass connector for fault tolerance on a dual FDDI ring
- Maximum of 34 FDDI ports in a 17-slot hub.

For detailed specifications, refer to page 167 and 168.

Figure 51 on page 104 shows the faceplate of the 2-port DAS FDDI module.

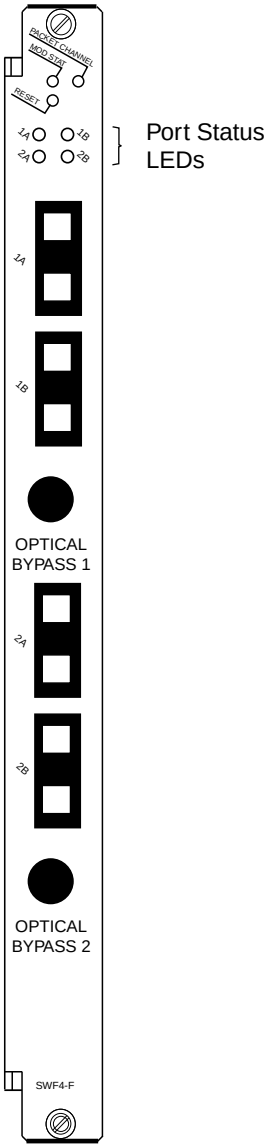

Figure 51. 2-port DAS FDDI Switching Module

Figure 52 shows the faceplate of the 12-port 10BASE-T and DAS FDDI module.

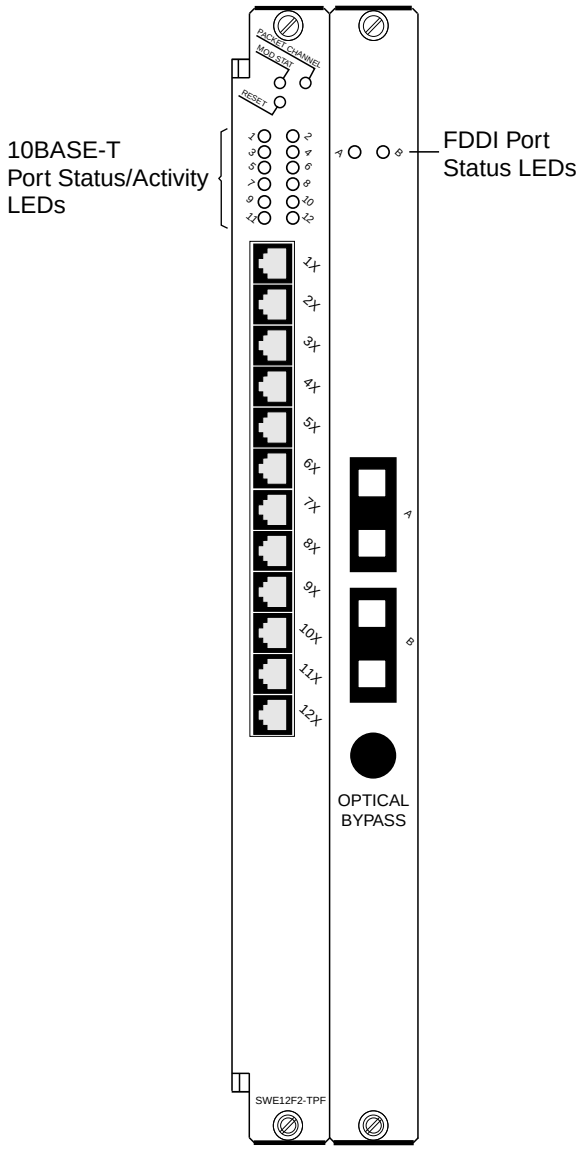

Figure 52. 12-Port 10BASE-T and DAS FDDI Switching Module

Figure 53 shows the faceplate of the 10-port 10BASE-FB/FL and DAS FDDI module.

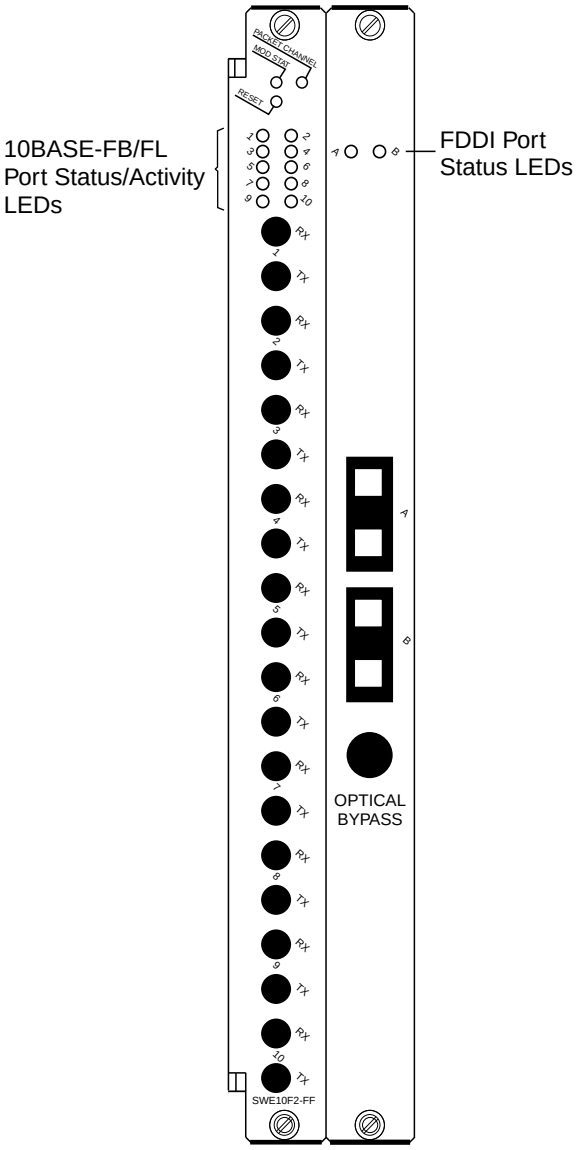

Figure 53. 10-Port 10BASE-FB/FL and DAS FDDI Switching Module

100BASE Solutions

Two modules provide a solution for Fast Ethernet LANs with the following characteristics:

- 1-slot 4-port 100BASE-Tx module with RJ-45 connectors on UTP5/STP cabling
- 1-slot 4-port 100BASE-Fx module with SC connectors on multimode fiber cabling
- 100Mbps bandwidth per port
- Half or full duplex mode of operation
- Auto-negotiation for 100BASE-Tx: detection of information about the remote device it is attached to
- Maximum of 68 ports in a 17-slot hub.

Figure 54 shows the faceplate of the 4-port 100BASE-Tx module.

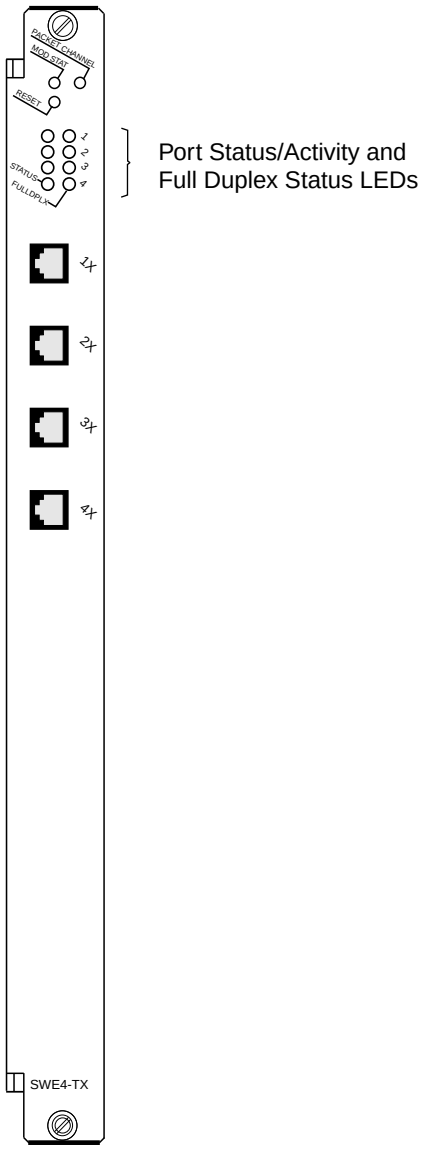

Figure 54. 4-port 100BASE-Tx Switching Module

Figure 55 shows the faceplate of the 4-port 100BASE-Fx module.

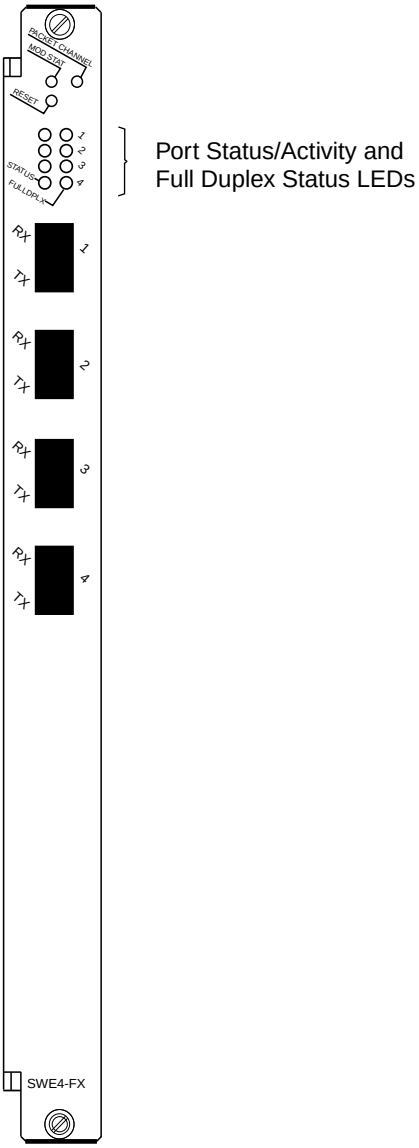

Figure 55. 4-Port 100BASE-Fx Switching Module

Receiving Code Updates

New version of code for 8260 modules that are already in operation are available through the following two channels:

1. Automatic Update Service (AUS)
2. Internet

Automatic Update Service (AUS)

The Automatic Update Service (AUS) is a free service for automatically receiving the latest code updates for 8260 modules.

Important: In some countries, you need to inform IBM of where you want the code upgrades to be sent. To do so, fill out the form that comes in the 8260 module shipping group.

The AUS is not a free service for 8250 code updates. For information on the 8250 AUS, please refer to the *8250 Multiprotocol Switching Hub Product Description,* (GA33-0317).

Asset Protection

The automatic distribution of the latest code ensures that your 8260 hardware is always up-to-date with the latest set of functions. This extends the life of your network and reduces compatibility problems.

Connectivity Improvements

With the latest code version in place, 8260 Management and Media modules are automatically updated with the latest performance and configuration improvements.

Internet

You may access updated versions of the 8260 module software through FTP or the World Wide Web:

FTP: `lansupport.raleigh.ibm.com`

WWW: `http://www.raleigh.ibm.com/826/826fix.html`

This is the “8260 Microcode Upgrades” home page. From here, you can select the right 8260 module.

Downloading the Code Upgrades

The new code is shipped on a 3.5” diskette for the DOS operating system. To download the code to the appropriate 8260 module, follow one of the procedures in this section. For information on the exact syntax of each Download command, see the *DMM Commands Guide* (SA33-0275).

- **Out-of-band download:**

  Insert the diskette in the drive of a personal computer connected to the EIA-232 port of the DMM or EC-DMM. Download the code by entering the DOWNLOAD OUT_OF_BAND command.

  The IBM Universal Code Download Kit (80G3150) contains the ProComm** software program required for out-of-band download operations. The DTE patch cable used to connect the personal computer to the DMM module is shipped with the 8260 hub.

- **Inband download**

  Insert the diskette in a DOS workstation (or a workstation with DOS emulation, such as the RISC System/6000*) and read the code update. Enter the DOWNLOAD INBAND command to transfer the file over the network using the TCP/IP Trivial File Transfer Protocol (TFTP).

- **For standby DMMS:**

  Download the code by entering the DOWNLOAD_FROM_DEVICE command.

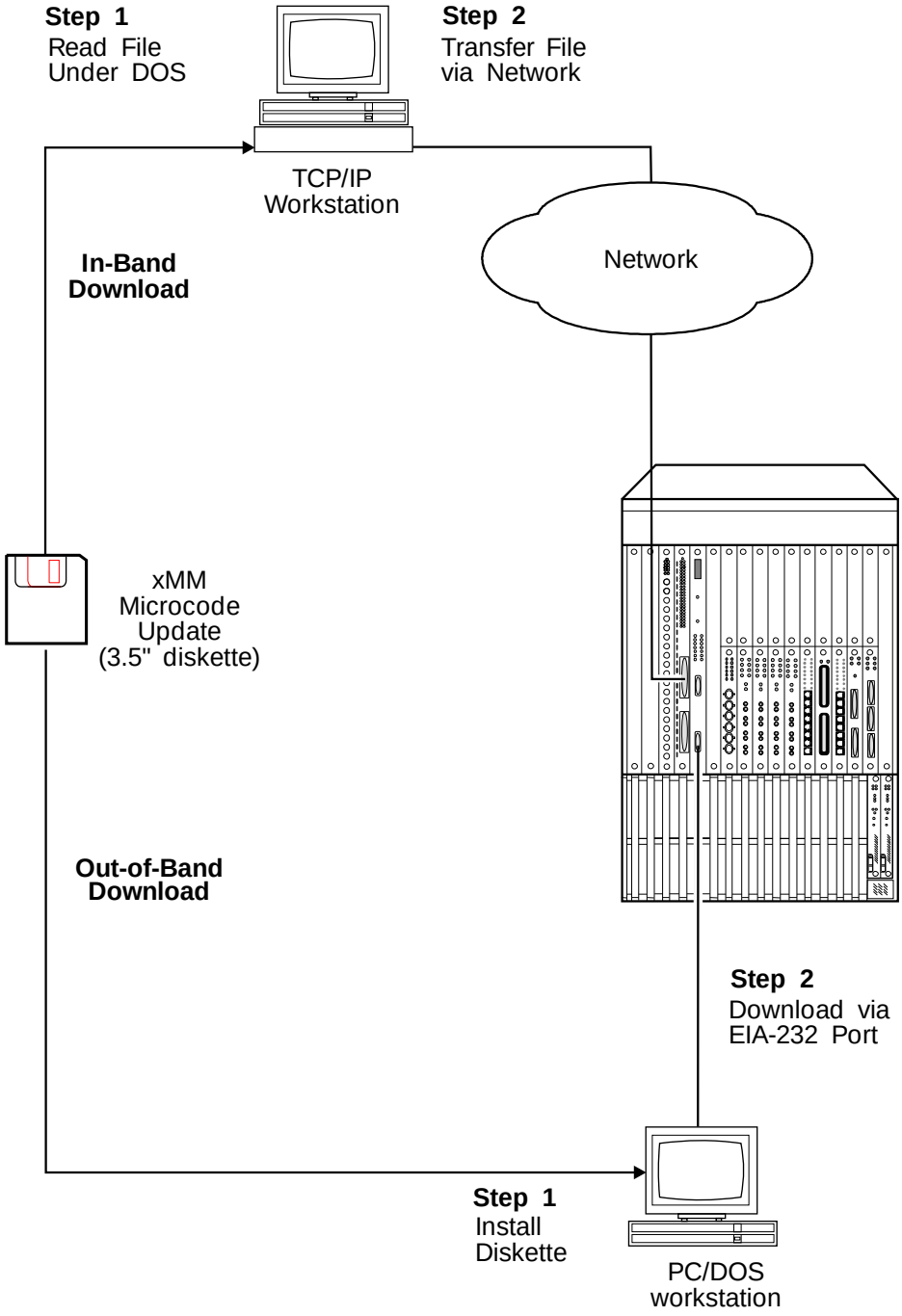

Figure 56. Upgrade Procedures for 8250 and 8260 Management Modules

Upgrading ATM Microcode

The hardware microcode for your A-CPSW and ATM media modules can be upgraded by inband operations. The software microcode for your A-CPSW and ATM media modules can be upgraded by out-of-band operations. These operations are shown in Figure 57.

For more information on upgrading ATM microcode, refer to the *ATM Control Point and Switch Module Installation and User's Guide* (SA33-0326).

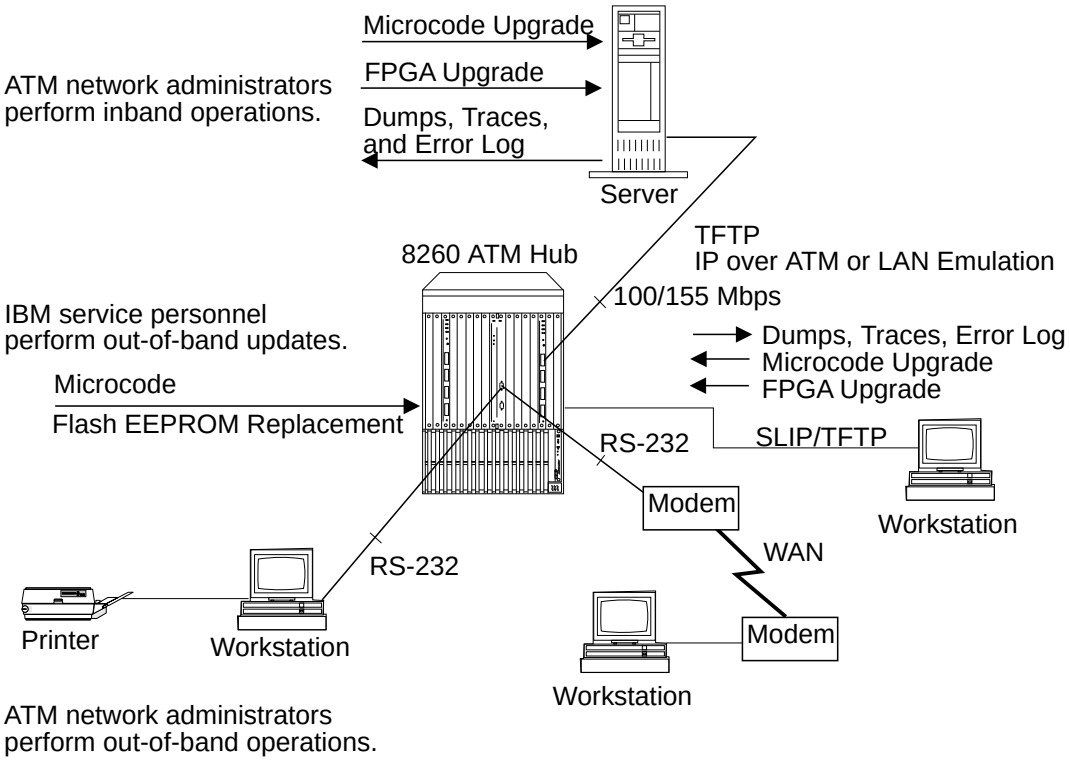

Figure 57. Upgrade Procedures for ATM Microcode

Chapter 4. Configuring 8250 Modules in an 8260 Hub

Before inserting 8250 modules in an 8260 hub, be sure to read the rules in this chapter.

When using 8250 modules in an 8260 hub, note the limits for the number of slots in the 8260 hub that you can use (Rule 1) and the number of modules you can install without adding additional power supplies (Rule 2). Appendix F. “Power Requirements” on page 179 describes the power required by each 8250 module for different voltages. Also, remember to carefully configure the hub so that you have the maximum number of network segments available (Rule 3).

Rule 1 - Maximizing the Chassis Capacity

As the size and orientation of 8250 modules is different than 8260 modules, you must carefully follow the information in this section to ensure proper operation and to maximize chassis capacity.

An 8250 adapter kit must be used whenever you install one or more 8250 modules in the 8260 hub. An 8250 adapter kit enables you to create an 8250 subsystem in the hub. An 8250 boundary adapter must be installed to cover empty slot space next to an installed 8250 module. An 8250 filler plate must be installed in the slot space above an installed 8250 module.

The minimum requirement for 8250 modules in an 8260 hub (for example, when only one 8250 single-slot or double-slot module is installed) is: at least one single-slot or double-slot filler plate, a right boundary adapter, and a left boundary adapter.

It is strongly recommended that you install all 8250 modules in consecutive slots in the hub. In this way, you lose only one slot in the 8250 subsystem because you install only one right boundary adapter, regardless of how many 8250 modules you install in consecutive slots to the left of the adapter.

Rule 2 - Ensuring the Fault Tolerant Power Capabilities

It is recommended that you run the hub with at least one power supply more than the minimum number needed. This minimizes the problems caused by insufficient power.

Also, by adding a power supply, you can achieve power supply fault tolerance in the hub. This is because with N+1 power supplies available (N= the minimum required to power all modules), the power subsystem can re-allocate its load sharing to compensate for a failed power supply.

Use the SHOW POWER BUDGET command on the 8260 Distributed Management Module (DMM) to display the amount of power currently available to installed modules. Compare this information to the power requirements for each module listed in Appendix F, “Power Requirements”. Be sure to calculate for the power requirements of any modules that you plan to install in the future even if you do not have a DMM module installed.

Note that DMM commands also allow you to prioritize 8260 modules so that the modules with the lowest priority are the first to lose power if a power failure occurs.

After determining the minimum number of power supplies needed to run your installed modules (including those you plan to install), you may want to add one or more additional power supplies in order to achieve power supply fault tolerance. This is achieved when the power requirements for the hub are exceeded by the output of one power supply.

The following sections show the power capacity available for modules (in watts), according to the types of power supplies used.

295 Watt Power Supply (AC or DC)

Non-Fault Tolerant Mode:

Table 10. Non-Fault-Tolerant Mode Power Capacity for Modules (295 Watt Supply)

Number of Power Supplies	Output Voltage					Total Watts
	+5.2	-5.0	+12.0	-12.0	+2.1	
One	204.00	15.00	48.00	18.00	8.40	293.40
Two	366.00	25.50	81.00	30.50	14.20	517.20
Three	549.00	38.25	121.50	45.75	21.30	775.80
Four	732.00	51.00	162.00	61.00	28.40	1034.40

Fault Tolerant Mode:

Table 11. Fault-Tolerant Mode Power Capacity for Modules (295 Watt Supply)

Number of Power Supplies	Output Voltage					Total Watts
	+5.2	-5.0	+12.0	-12.0	+2.1	
One[1]	—	—	—	—	—	—
Two	204.00	15.00	48.00	18.00	8.40	293.40
Three	366.00	25.50	81.00	30.50	14.20	517.20
Four	549.00	38.25	121.50	45.75	21.30	775.80

[1] Power fault-tolerance can only be established if the unallocated power budget (of at least one power supply) can be held in reserve.

415 Watt Power Supply

Non-Fault Tolerant Mode:

Table 12. Non-Fault-Tolerant Mode Power Capacity for Modules (415 Watt Supply)

Number of Power Supplies	Output Voltage					Total Watts
	+5.2	-5.0	+12.0	-12.0	+2.1	
One	301.00	15.00	72.00	18.00	8.40	414.40
Two	542.00	25.50	122.00	30.50	14.20	734.20
Three	813.00	38.25	183.00	45.75	21.30	1101.30
Four	1084.00	51.00	244.00	61.00	28.40	1468.40

Fault Tolerant Mode:

Table 13. Fault-Tolerant Mode Power Capacity for Modules (415 Watt Supply)

Number of Power Supplies	Output Voltage					Total Watts
	+5.2	-5.0	+12.0	-12.0	+2.1	
One[1]	—	—	—	—	—	—
Two	301.00	15.00	72.00	18.00	8.40	414.40
Three	542.00	25.50	122.00	30.50	14.20	734.20
Four	813.00	38.25	183.00	45.75	21.30	1101.30

[1] Power fault-tolerance can only be established if the unallocated power budget (of at least one power supply) can be held in reserve.

Mixed 295 and 415 Watt AC Power Supplies

Non-Fault Tolerant Mode:

Table 14. Non-Fault Tolerant Mode Power Capacity for Modules (Mixed Supplies)

Power Supplies	Output Voltage					Total Watts
	+5.2	-5.0	+12.0	-12.0	+2.1	
1 x 295 1 x 415	454.00	25.50	101.50	30.50	14.20	625.70
2 x 295 1 x 415	637.00	38.25	142.00	45.75	21.30	884.30
1 x 295 2 x 415	725.00	38.25	162.50	45.75	21.30	992.80
3 x 295 1 x 415	820.00	51.00	182.50	61.00	28.40	1142.90
2 x 295 2 x 415	908.00	51.00	203.00	61.00	28.40	1251.40
1 x 295 3 x 415	996.00	51.00	223.50	61.00	28.40	1359.40

Fault Tolerant Mode:

Table 15. Fault Tolerant Mode Power Capacity for Modules (Mixed Supplies)

Power Supplies	Output Voltage					Total Watts
	+5.2	-5.0	+12.0	-12.0	+2.1	
1 x 295 1 x 415	204.00	15.00	48.00	18.00	8.40	293.40
2 x 295 1 x 415	366.00	25.50	81.00	30.50	14.20	517.20
1 x 295 2 x 415	366.00	25.50	81.00	30.50	14.20	517.20
3 x 295 1 x 415	549.00	38.25	121.50	45.75	21.30	775.80
2 x 295 2 x 415	549.00	38.25	121.50	45.75	21.30	775.80
1 x 295 3 x 415	549.00	38.25	121.50	45.75	21.30	775.80

Note: If you have a mixture of 415 Watt and 295 Watt power supplies in your hub in fault-tolerant mode, the 415 Watt power supplies are treated as having 295 watts. This condition is a result of the physical limitation on the lower output power supply. The lower output power supply (295 Watt) cannot back up a higher output power supply (415 Watt).

Rule 3 - Maximizing Available Network Segments

This section describes how to maximize available network segments when you use 8250 modules in an 8260 hub. It also describes the new networks that are available when you upgrade from an 8250 to an 8260 hub.

Available Networks

The 8260 hub accommodates 8250 modules, and allows you to install and configure the same combinations of modules as in an 8250 hub. The major difference between the 8250 and 8260 backplanes is that the 8260 backplane has a second backplane connector that makes more networks available.

When you upgrade to an 8260 hub, you receive:

- Two guaranteed additional Ethernet networks
- Up to three more Ethernet networks, depending on how you use 8250 modules
- Up to four additional FDDI networks
- Up to ten additional Token-Ring networks
- The ability to trade off additional FDDI and Token-Ring networks.

Configuration Guidelines

When configuring networks within the 8260 hub, follow the guidelines in this section to optimize backplane resources in mixed configurations of 8250 and 8260 modules.

To create networks within an 8260 hub, you use management commands to configure a module or port connections to a network. Efficient use of network segments depends upon the order in which you assign ports and modules to networks.

When allocating modules to networks, follow this order:

1. Allocate 8250 modules
2. Allocate 8260 modules.

Allocating 8250 modules

By first configuring the network connections for 8250 modules, you ensure that configurations built for 8250 hubs will also work in 8260 hubs. Allocate 8250 modules in the following order:

1. Allocate 8250 Ethernet networks.

   The preferred order for creating Ethernet networks is: 3, 2, 1. This means that if you only create one Ethernet network to accommodate 8250 modules, you should connect these modules to network 3.

2. Allocate 8250 FDDI networks.

   The preferred order for creating FDDI networks is: 8, 7, 5, 4, 6, 3, 1, 2. This means that if you create only one FDDI network to accommodate 8250 modules, you should connect these modules to network 8.

3. Allocate 8250 Token-Ring networks.

   The preferred order for creating Token-Ring networks is: 15, 14, 13, 10, 9, 8, 7, 11, 12, 6, 5, 1, 4, 3, 2. This means that if you create only one Token-Ring network to accommodate 8250 modules, you should connect these modules to network 15.

   Refer to Figure 4 on page 8 to determine the number of segments available for Token-Ring networks after you have allocated Ethernet and FDDI networks.

Allocating 8260 modules

When you allocate 8260 modules in an 8260 hub, you can take advantage of the additional backplane resources. Configure your 8260 networks in the following order:

1. Connect 8260 Ethernet modules and ports to 8250-based networks.
2. Connect the remaining 8260 Ethernet modules and ports to 8260 based networks.

   These are the additional five networks offered by the 8260 hub. The preferred order for allocating 8260 Ethernet networks is: 8, 7, 6, 5, 4.
3. Allocate 8260 Token-Ring networks.

   The preferred order for allocating Token-Ring networks is: 21, 22, 23, 18, 19, 20, 24, 25, 16, 17.

Appendix A. 8260 Ethernet Product Specifications

This appendix describes the Ethernet products that you can use with the 8260 Nways Multiprotocol Switching Hub (all models).

Ethernet Modules

Type	Switching Mode	Connector Type(s)	Number of Ports	Slot Width	Feature Code	Faceplate Marking	Refer to
24-Port 10BASE-T	Port	TELCO	24	1	1024	E24PS-6	Page 121
36-Port 10BASE-T	Connector	TELCO	36	1	1036	E36CS-TP	Page 122
20-Port 10BASE-T	Port	RJ-45	20	1	1020	E20PS-TP	Page 123
40-Port 10BASE-T	Port	RJ-45	40	2	1040	E40PS-TP	Page 124
10BASE-FB	Port	ST	10	1	1110	E10PS-FB	Page 125
10BASE-FB	Port	FC	10	1	1210	E10PS-FB	Page 125
10BASE-FB	Port	SMA	10	1	1310	E10PS-FB	Page 125
Etherflex module	—	—	—	1	1004	E04M-MOD	Page 126
Bridge/Router (ENIM[1])	Port	—	6 [2]	1	7106	E06XR	Page 127
Bridge/Router (ENIM[1])	Port	—	6 [2]	2	7206	E06XR	Page 127

[1] ENIM = Ethernet Network Interconnect Module
[2] On backplane

Ethernet Daughter Cards

Type	Switching Mode	Connector Type(s)	Number of Ports	Slot Width	Feature Code	Faceplate Marking	Refer to
E-MAC Daughter Card	—	—	—	—	8918	E-MAC	Page 128
High-End E-MAC Card	—	—	—	—	8924	HEMAC	Page 128
Ethernet Security Card	—	—	—	—	8915	E-SEC	Page 128
10BASE-T I/O Card	Port	RJ-45	4	—	8917	E4-TPP	Page 129
10BASE-2 I/O Card	Port	BNC	3	—	8921	E3-BNC	Page 130
Male AUI I/O Card	Port	AUIm	3	—	8920	E3-AUIM	Page 131
Female AUI I/O Card	Port	AUIf	3	—	8919	E3-AUIF	Page 131
10BASE-FB/FL I/O Card	Port	ST	2	—	8916	E2-F	Page 133
10BASE-FB/FL I/O Card	Port	FC	2	—	8922	E2-F	Page 133
10BASE-FB/FL I/O Card	Port	SMA	2	—	8923	E2-F	Page 133
10BASE-T I/O Card for ENIM[1]	Port	RJ-45	1	—	8902	ET	Page 134
10BASE-2 I/O Card for ENIM[1]	Port	BNC	1	—	8903	E2	Page 135
10BASE-5 I/O Card for ENIM[1]	Port	AUI	1	—	8904	E5	Page 136
Token-Ring I/O Card for ENIM[1]	Port	DB-9	1	—	8905	TR	Page 137

[1] ENIM = Ethernet Network Interconnect Module

Ethernet Stand-Alone Transceivers

Note: These transceivers are also part of the 8250 product offerings.

Type	Switching Mode	Connector Type(s)	Number of Ports	Slot Width	Feature Code	Faceplate Marking	Refer to
10BASE-T	—	RJ-45, AUI	—	—	3861	5101T-TPLA	Page 138
10BASE-T Fault Tolerant	—	RJ-45, AUI	—	—	3959	5102T-TPFT	Page 139
10BASE-FB	—	ST, AUI	—	—	6779	5101T-FB-ST	Page 140
10BASE-FB Fault Tolerant	—	ST, AUI	—	—	6780	5102T-FBFT	Page 141
10BASE-FL	—	ST, AUI	—	—	5888	5101T-FL1-ST	Page 142

10BASE-T 24-Port Module (Feature Code 1024)

Faceplate marking:	E24PS-6
Data rate:	10Mbps
Data modulation:	Manchester
Collision detection:	100% deterministic
Diagnostic modulation:	Link integrity pulse
Maximum number of nodes in a network:	1024
Configuration rules:	Supports IEEE 802.3 controllers and repeaters
Port connector:	50-pin TELCO connector
Number of ports:	24
Cabling:	Per the 10BASE-T standard
Host interface:	IBM 8260 hub bus interface standard
Installation attachment:	Two thumbscrews on the mounting bracket
Polarity detection:	Automatic reversal
Port partitioning:	After 63 collisions
Security:	Packet jamming to non-specified ports
Maximum link distance:	100 m (330 ft) on 22-gauge UTP cable
Ethernet network monitor support:	1 E-MAC card

10BASE-T 36-Port Module (Feature Code 1036)

Faceplate marking:	E36CS-TP
Data rate:	10Mbps
Data modulation:	Manchester
Collision detection:	100% deterministic
Diagnostic modulation:	Link integrity pulse
Maximum number of nodes in a network:	1024
Configuration rules:	Supports IEEE 802.3 controllers and repeaters
Port connector:	50-pin TELCO connector
Number of ports:	36
Cabling:	Per the 10BASE-T standard
Host interface:	IBM 8260 hub bus interface standard
Installation attachment:	Two thumbscrews on the mounting bracket
Polarity detection:	Automatic reversal
Port partitioning:	After 63 collisions
Security:	Packet jamming to non-specified ports
Maximum link distance:	100 m (330 ft) on 22-gauge UTP cable
Ethernet network monitor support:	2 E-MAC cards or 1 HEMAC card

10BASE-T 20-Port Module (Feature Code 1020)

Faceplate marking:	E20PS-TP
Data rate:	10Mbps
Data modulation:	Manchester
Collision detection:	100% deterministic
Diagnostic modulation:	Link integrity pulse
Maximum number of nodes in a network:	1024
Configuration rules:	Supports IEEE 802.3 controllers and repeaters
Port connector:	RJ-45, female
Number of ports:	20
Cabling:	Per the 10BASE-T standard
Host interface:	IBM 8260 hub bus interface standard
Installation attachment:	Two thumbscrews on the mounting bracket
Polarity detection:	Automatic reversal
Port partitioning:	After 63 collisions
Security:	Packet jamming to non-specified ports
Maximum link distance:	100 m (330 ft) on 22-gauge UTP cable
Ethernet network monitor support:	2 E-MAC cards or 1 HEMAC card

10BASE-T 40-Port Module (Feature Code 1040)

Faceplate marking:	E40PS-TP
Data rate:	10Mbps
Data modulation:	Manchester
Collision detection:	100% deterministic
Diagnostic modulation:	Link integrity pulse
Maximum number of nodes in a network:	1024
Configuration rules:	Supports IEEE 802.3 controllers and repeaters
Port connector:	RJ-45, female
Number of ports:	40
Cabling:	Per the 10BASE-T standard
Host interface:	IBM 8260 hub bus interface standard
Installation attachment:	Two thumbscrews on the mounting bracket
Polarity detection:	Automatic reversal
Port partitioning:	After 63 collisions
Security:	Packet jamming to non-specified ports
Maximum link distance:	100 m (330 ft) on 22-gauge UTP cable
Ethernet network monitor support:	2 E-MAC cards or 1 HEMAC card

10BASE-FB 10-Port Module (Feature Codes 1110, 1210, and 1310)

Faceplate marking:	E10PS-FB
Data rate:	10Mbps
Data modulation:	Manchester
Collision detection:	100% deterministic
Diagnostic modulation:	Pulse width
Maximum number of nodes in a network:	1024
Configuration rules:	Supports IEEE 802.3 controllers and repeaters
Port connector:	ST (Feature Code 1110) FC (Feature Code 1210) SMA (Feature Code 1310)
Number of ports:	10
Network diameter:	Up to 4 km
Maximum link distance:	Up to 4 km using 50/100 µm or larger fiber
Fiber optic cable:	50/125, 62.5/125, 85/125, or 100/140-µm diameter graded index, duplex fiber, 150MHz.km rating or better
Link redundancy:	Ports 2, 4, 6, 8, and 10 are user-selectable as backup links for ports 1, 3, 5, 7, and 9 respectively
Ethernet network monitor support:	1 E-MAC card

Flexible Concentration Module (Feature Code 1004)

Faceplate marking:	E04M-MOD
Data rate:	10Mbps
Data modulation:	Manchester
Collision detection:	100% deterministic
Diagnostic modulation:	Link integrity pulse
Maximum number of nodes in a network:	1024
Configuration rules:	Supports IEEE 802.3 controllers and repeaters
Single-height I/O card connectors:	RJ-45 for 10BASE-T BNC for 10BASE-2 ST, FC, or SMA for 10BASE-FB/FL
Double-height I/O card connectors:	AUI, male and female
Number of I/O card slots:	4
Network diameter:	Up to 4 km
Maximum link distance:	Up to 4 km using 50/100 µm or larger fiber
Ethernet network monitor support:	2 E-MAC cards or 1 HEMAC card

1-Slot Network Interconnect Module (Feature Code 7106)

Faceplate marking:	E06XR
Data rate:	10Mbps
Backplane connection:	Ethernet or IEEE 802.3
I/O cards:	None
Front panel connections:	None
Management port:	EIA-232-C (RS-232), asynchronous, 300-38400 bps
Management port connector:	9 pin D subminiature, male
Standards:	IEEE 802.1d Spanning Tree Protocol
Routing protocols:	IP RIP and OSPF NetWare** IPX DECnet** Phase IV

2-Slot Network Interconnect Module (Feature Code 7206)

Faceplate marking:	E06XR
Data rate:	10Mbps
Backplane connection:	Ethernet or IEEE 802.3
I/O cards:	Up to two. Mix of the following I/O cards: • 10BASE-T (Feature Code 8902) • 10BASE-2 (Feature Code 8903) • 10BASE-5 (Feature Code 8904) • Token-Ring (Feature Code 8905)
Front panel connections:	1 per I/O card
Management port:	EIA-232-C (RS-232), asynchronous, 300-38400 bps
Management port connector:	9 pin D subminiature, male
Standards:	IEEE 802.1d Spanning Tree Protocol
Routing protocols:	IP RIP and OSPF NetWare IPX DECnet Phase IV

Ethernet Security Card (Feature Code 8915)

Faceplate marking:	E-SEC
Power Consumption:	4.25 W at +5 V
Operating Temperature:	0° to 50° C (32° to 122° F)
Humidity:	Less than 95%, non-condensing
Caloric Value:	2.57 Kcal/hour (10.2 BTU/hour)
Networks secured per card:	1

Ethernet Medium Access Control Card (Feature Code 8918)

Faceplate marking:	E-MAC
Power Consumption:	4.25 W at +5 V
Operating Temperature:	0° to 50° C (32° to 122° F)
Humidity:	Less than 95%, non-condensing
Caloric Value:	3.65 Kcal/Hour (14.5 BTU/hour)
Networks monitored per card:	1
Processor:	Motorola** 68302
Memory:	1 MB of Flash EPROM 768KB of RAM
MIBs supported:	• MIB II • Enterprise specific (3Com) • RMON • TFTP

High-End Ethernet Medium Access Control Card (Feature Code 8924)

Faceplate marking:	HEMAC
Power Consumption:	8 W at +5 V
Operating Temperature:	0° to 50° C (32° to 122° F)
Humidity:	Less than 95%, non-condensing
Caloric Value:	6.88 Kcal/hour (27.3 BTU/hour)
Networks monitored per card:	2
Processor:	Motorola 68040 at 25MHz
Memory:	2 MB of Flash EPROM 4MB of DRAM (upgradable to 8 or 12MB)
MIBs supported:	• MIB II • Enterprise specific (3Com) • RMON • TFTP

EtherFlex RJ-45 10BASE-T I/O Card (Feature Code 8917)

Faceplate marking:	E4-TPP
Data rate:	10Mbps
Data modulation:	Manchester encoding
Collision detection:	100% deterministic
Diagnostic modulation:	Link integrity pulse
Port connector:	RJ-45, female
Number of ports:	4
Cabling:	STP and UTP Category 3 or better
Installation attachment:	3 screws to BIM standoffs and module faceplate
Bays used:	1

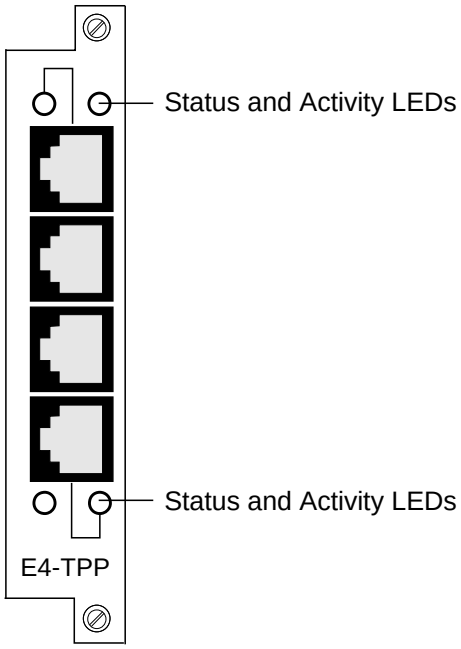

Figure 58. RJ-45 10BASE-T I/O Card

EtherFlex BNC 10BASE-2 I/O Card (Feature Code 8921)

Faceplate marking:	E3-BNC
Data rate:	10Mbps
Data modulation:	Manchester encoding
Collision detection:	100% deterministic
Port connector:	BNC
Number of ports:	3
Cabling:	10BASE-2 Standard
Installation attachment:	3 screws to BIM standoffs and module faceplate
Bays used:	1

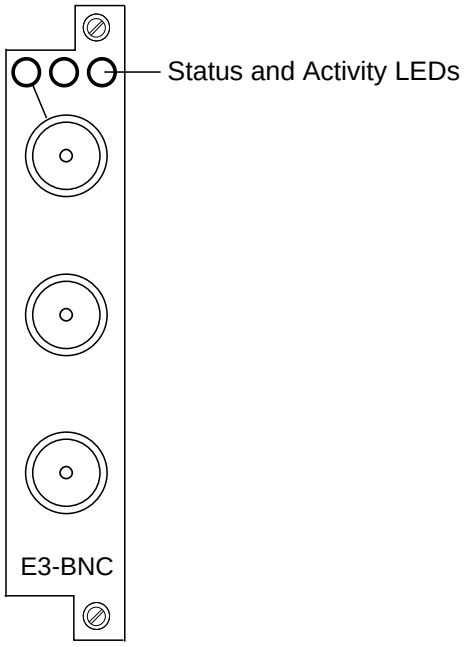

Figure 59. BNC 10BASE-2 I/O Card

EtherFlex Male AUI I/O Card (Feature Code 8920)

Faceplate marking:	E3-AUIM
Data rate:	10Mbps
Data modulation:	Manchester encoding
Collision detection:	100% deterministic
Port connector:	AUI, male
Number of ports:	3
Port redundancy:	Prevents network failure by allowing primary and secondary ports
SQE test:	Software Quality Engineering test for repeater compatability
Installation attachment:	4 screws to BIM standoffs and module faceplate
Bays used:	2

EtherFlex Female AUI I/O Card (Feature Code 8919)

Faceplate marking:	E3-AUIF
Data rate:	10Mbps
Data modulation:	Manchester encoding
Collision detection:	100% deterministic
Port connector:	AUI, female
Number of ports:	3
Installation attachment:	4 screws to BIM standoffs and module faceplate
Bays used:	2

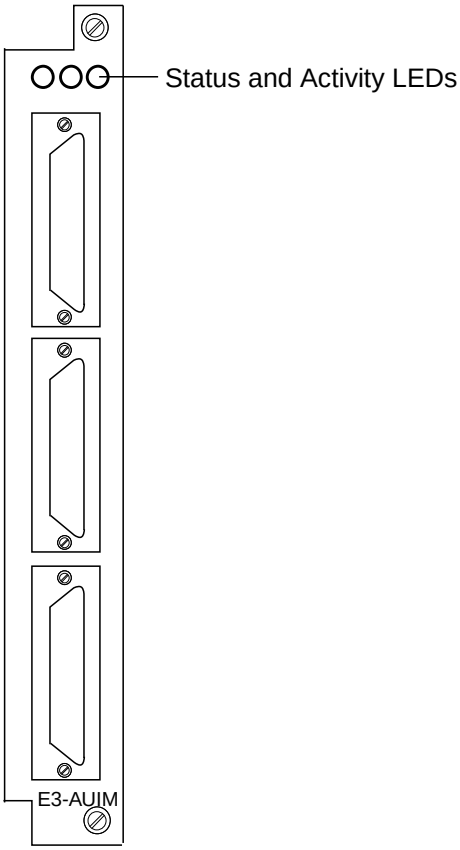

Figure 60. EtherFlex AUI I/O Card (Male or Female)

EtherFlex 10BASE-FB/FL I/O Card (Feature Codes 8916, 8922, and 8923)

Faceplate marking:	E2-F
Data rate:	10Mbps
Data modulation:	Manchester encoding
Collision detection:	100% deterministic
Port connectors:	ST, FC, and SMA
Number of ports:	2
Cabling:	10BASE-FB or 10BASE-FL Standard
Remote diagnostic mode:	Checks driver and receiver integrity
Port redundancy:	Prevents network failure by allowing primary and secondary ports
Autosensing:	Automatically configures the 10BASE-FB/FL ports on the EtherFlex module to the same protocol the network is running
Installation attachment:	3 screws to BIM standoffs and module faceplate
Bays used:	1

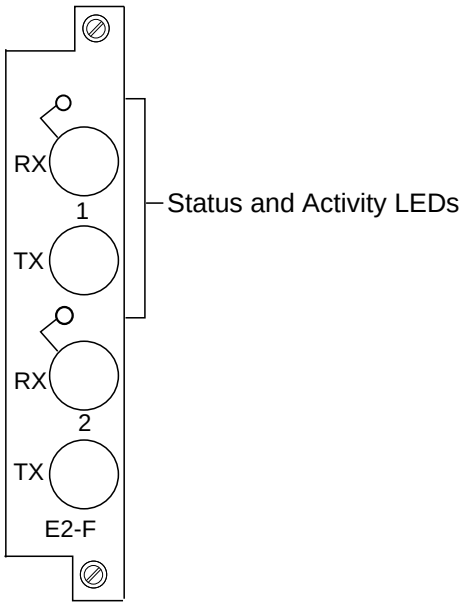

Figure 61. EtherFlex 10BASE-FB/FL I/O Card

10BASE-T I/O Card for ENIM (Feature Code 8902)

Faceplate marking:	ET
Data rate:	10Mbps
Data modulation:	Manchester encoding
Collision detection:	100% deterministic
Diagnostic modulation:	Link integrity pulse
Port connector:	RJ-45, female
Number of ports:	1
Cabling:	10BASE-T Standard
Installation attachment:	6 screws to BIM standoffs and module faceplate

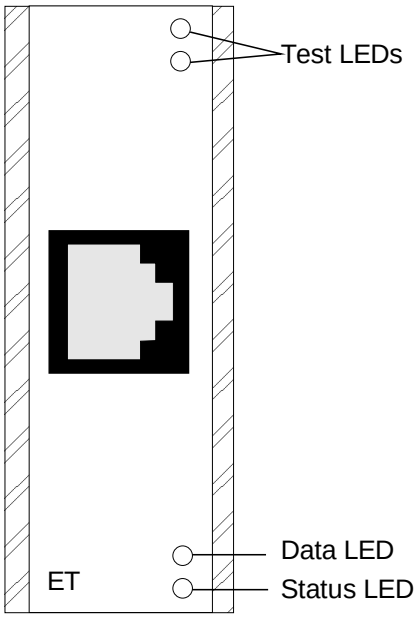

Figure 62. 10BASE-T I/O Card for ENIM

10BASE-2 I/O Card for ENIM (Feature Code 8903)

Faceplate marking:	E2
Data rate:	10Mbps
Data modulation:	Manchester encoding
Collision detection:	100% deterministic
Diagnostic modulation:	Link integrity pulse
Port connector:	BNC
Number of ports:	1
Cabling:	RG58 50 ohms coaxial
Installation attachment:	6 screws to BIM standoffs and module faceplate

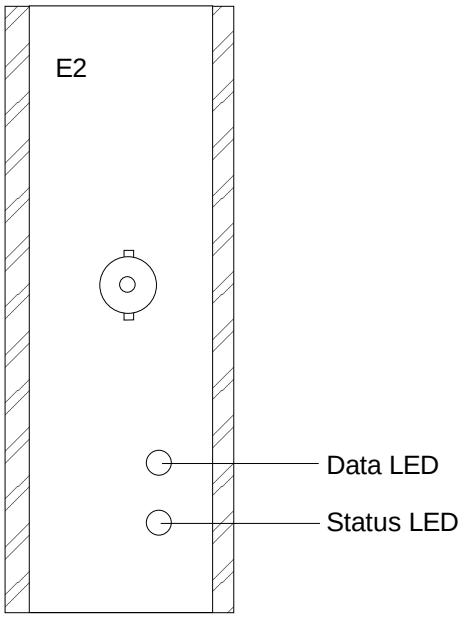

Figure 63. 10BASE-2 I/O Card for ENIM

10BASE-5 I/O Card for ENIM (Feature Code 8904)

Faceplate marking:	E5
Data rate:	10Mbps
Data modulation:	Manchester encoding
Collision detection:	100% deterministic
Diagnostic modulation:	Link integrity pulse
Port connector:	15-pin D subminiature, female
Number of ports:	1
Cabling:	AUI cable
Installation attachment:	6 screws to BIM standoffs and module faceplate

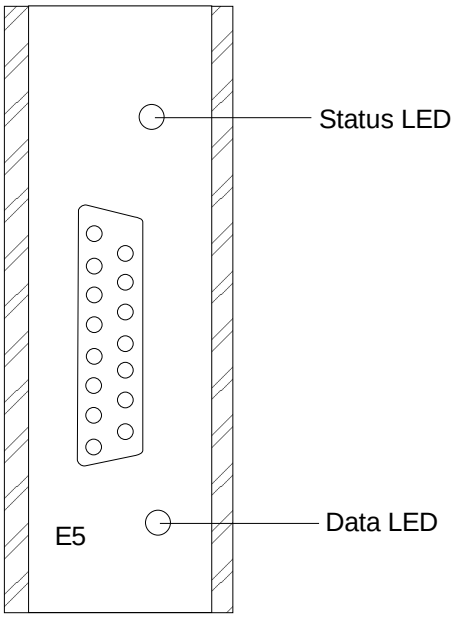

Figure 64. 10BASE-5 I/O Card for ENIM

Token-Ring I/O Card for ENIM (Feature Code 8905)

Faceplate marking:	TR
Data rate:	4Mbps or 16Mbps
Data modulation:	Differential Manchester encoding
Port connector:	9-pin D subminiature, female
Number of ports:	1
Cabling:	STP IBM Type 1 or 6, or Category 3 UTP
Installation attachment:	6 screws to BIM standoffs and module faceplate

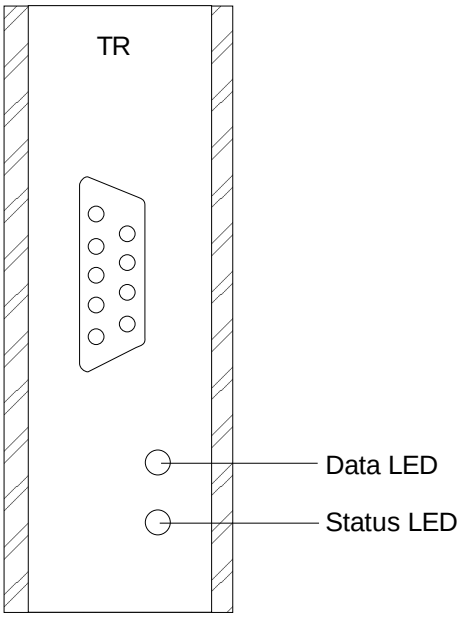

Figure 65. Token-Ring I/O Card for ENIM

10BASE-T Transceiver (Feature Code 3861)

The 10BASE-T transceiver is a fully compliant 10BASE-T stand-alone box with the following additional specifications:

- This transceiver implements LinkALERT** fault reporting, allowing the transmitting hub to report a down link failure to the management station. Under normal operation, a down link fault is detected by the receiving end node transceiver.
- The fault reporting is activated by a switch. If the fault reporting is not activated, the normal Link Integrity test is performed. Another switch allows auto-polarity reversal in order to compensate for the reversed pair wiring.

Faceplate marking:	5101T-TPLA
Physical specifications:	Width: 42 mm (1.65 in.) Length: 79 mm (3.1 in.) Height: 24 mm (0.94 in.) Weight: 96g (0.21 lb)
Interface:	IEEE 802.3
Interface connector:	15-pin AUI, male
Port connector:	RJ-45S (connects directly to the DTE or repeater or an AUI cable)

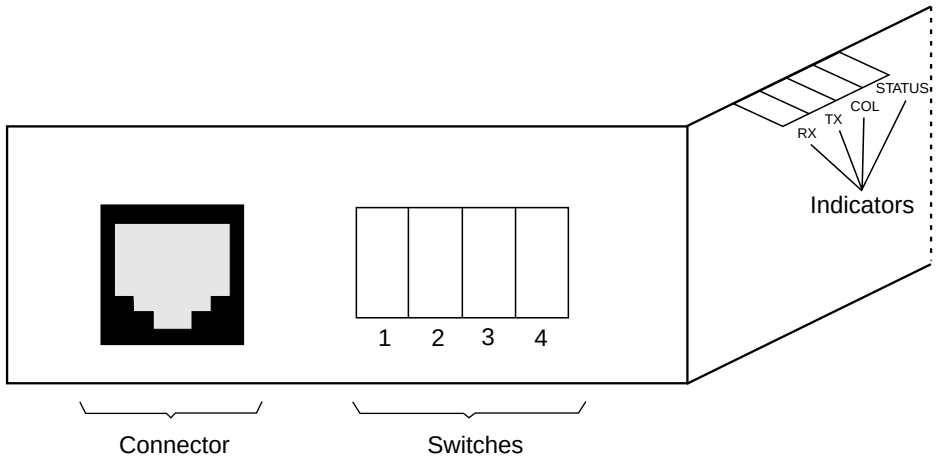

Figure 66. Ethernet 10BASE-T Transceiver

10BASE-T Fault-Tolerant Transceiver (Feature Code 3959)

The front panel of the transceiver includes the primary and backup RJ-45 connectors and link indicator LEDs. When the link attached to the primary port fails, the transceiver begins using the backup port without a noticeable disruption in service.

Note: Do not connect this transceiver to another fault-tolerant 10BASE-T transceiver in a point-to-point link. It was not designed for this configuration and may not function properly if used in this manner. It is recommended that you use fiber with fault tolerant transceivers to create fault-tolerant point-to-point links.

Faceplate marking:	5102T-TPFT
Physical specifications:	Width: 94 mm (3.7 in.) Length: 116 mm (4.6 in.) Height: 29 mm (1.2 in.) Weight: 260g (0.57 lb)
Collision detection:	100 % deterministic
Port connector:	RJ-45
Interface connector:	15-pin AUI, male
Conformance:	IEEE 802.3, Ethernet Version 2.0

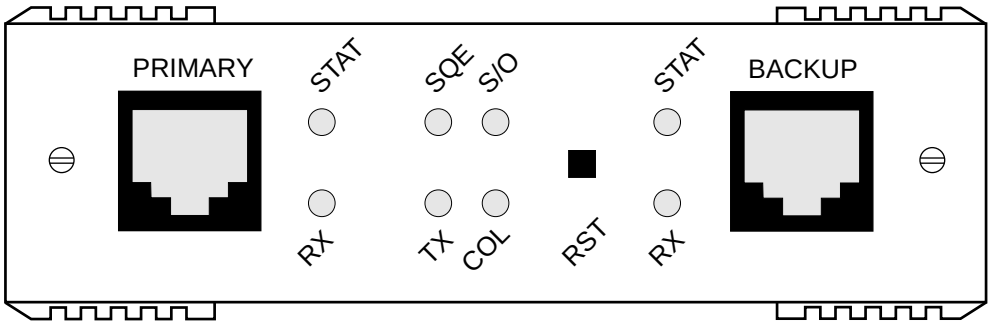

Figure 67. Fault-Tolerant 10BASE-T Transceiver

10BASE-FB Transceiver (Feature Code 6779)

This device contains one fiber optic port and can be placed either on top of the device to which it is attached, or directly on the AUI connection on the DTE.

Faceplate marking:	5101T-FB-ST
Physical specifications:	Width: 60 mm (2.4 in.) Length: 120 mm (4.8 in.) Height: 23 mm (0.9 in.) Weight: 115g (0.25 lb)
Port connector:	ST
Interface:	IEEE 802.3, Ethernet Version 2.0 (use of Version 1.0 is not recommended)
Interface connector:	15-pin AUI, male (AUI cable not to exceed 50 m or 164 ft)
Data rate:	10Mbps
Cable size:	50/125, 62.5/125, 100/140 µm diameter
Maximum link distance:	Up to 4 km (with high power optics)
Cable bandwidth:	40MHz/km minimum
Jabber protection:	30 ± 3 µsecond (non-latching)

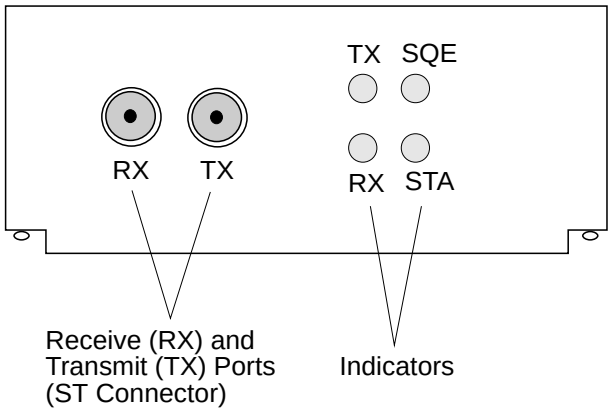

Figure 68. Ethernet 10BASE-FB Transceiver

10BASE-FB Fault-Tolerant Transceiver (Feature Code 6780)

This stand-alone device contains two fiber optic ports, one primary and one backup for link redundancy. If the primary path fails, the backup link automatically takes over with no disruption to network traffic, thus providing high availability for critical devices and backbones.

The device may also be connected to a repeater.

Faceplate marking:	5102T-FBFT
Physical specifications:	Width: 133 mm (5.25 in.) Length: 212.6 mm (8.37 in.) Height: 30.5 mm (1.2 in.) Weight: 790g (1.75 lb)
Port connector:	ST
Interface:	IEEE 802.3, Ethernet Version 2.0 (use of Version 1.0 is not recommended)
Interface connector:	15-pin AUI
Data rate:	10Mbps
Data modulation:	Manchester
Maximum link distance:	Up to 4 km (with high power optics)
Fiber optic cable:	50/125, 62.5/125, 85/125, or 100/140 µm diameter graded index, duplex fiber, 150MHz/km rating or better

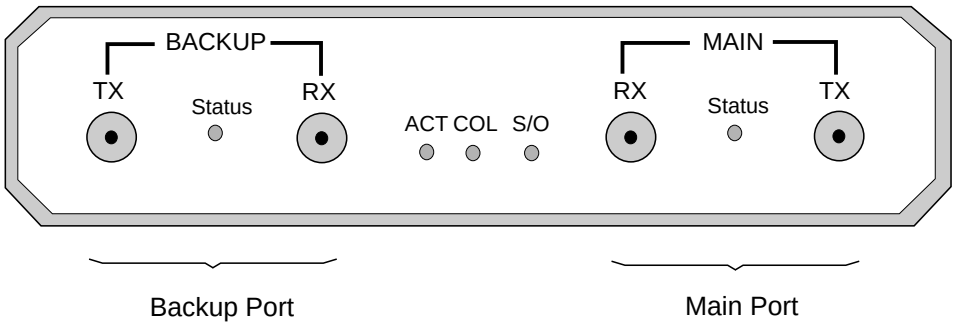

Figure 69. 10BASE-FB Fault-Tolerant Transceiver

10BASE-FL Transceiver (Feature Code 5888)

This unit complies with the 10BASE-FL standard and connects either to the DTE, repeater, or to an AUI cable.

Faceplate marking:	5101T-FL1-ST
Physical specifications:	Width: 58 mm (2.3 in.) Length: 81 mm (3.2 in.) Height: 23 mm (0.9 in.) Weight: 70g (0.15 lb)
Port connector:	ST
Interface:	IEEE 802.3, 10BASE-FL compliant
Interface connector:	15-pin AUI
Cable size:	50/125, 62.5/125, 100/140, 200 PCS

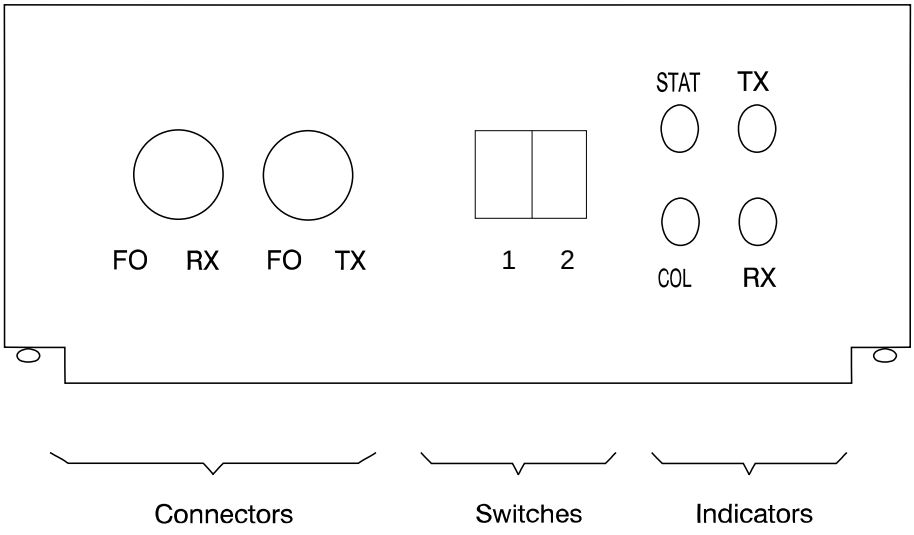

Figure 70. Ethernet 10BASE-FL Transceiver

Appendix B. 8260 Token-Ring Product Specifications

This appendix describes the Token-Ring products that you can use with the 8260 Nways Multiprotocol Switching Hub (all models).

Token-Ring Modules

Type	Switching Mode	Connector Type(s)	Number of Ports	Slot Width	Feature Code	Faceplate Marking	Refer to
Active Port-Switching	Port	RJ-45	18	1	3018	T18PSA	Page 144
Active Module-Switching	Module	RJ-45	18	1	3118	T18MSA	Page 144
Dual Fiber Repeater	Port	RJ-45, ST	10	1	3010	T10R-F	Page 145
Passive Module-Switching	Module	RJ-45	20	1	3020	T20MS	Page 145

Token-Ring Daughter Cards

Type	Switching Mode	Connector Type(s)	Number of Ports	Slot Width	Feature Code	Faceplate Marking	Refer to
Jitter Attenuator Card	—	—	—	—	8914	T-JIT	Page 146
MAC Daughter Card	—	—	—	—	8913	T-MAC	Page 146
High-End MAC Daughter Card	—	—	—	—	8925	HTMAC	Page 147

Active Port-Switching Media Module (Feature Code 3018)

Faceplate marking:	T18PSA
Data rate:	4Mbps and 16Mbps
Connectors:	Shielded RJ-45
Cable requirements:	Supports UTP and STP cabling systems
Host interface:	IBM 8260 hub bus interface standard
Power requirements:	38 W +5 V dc, 0.5 W +12 V dc
Mechanical:	1 slot
Daughter cards:	One T-JIT, one T-MAC or HTMAC
Regulatory compliance:	EMI emissions: FCC Class A certification, VDE B certification, VCCI, CISPR22/A, EN 55022 Safety: CSA-22.2, IEC 950 (EN 60950), UL 1950, AS 3260, NZS 6661
Number of ports:	18

Active Module-Switching Media Module (Feature Code 3118)

Faceplate marking:	T18MSA
Data rate:	4Mbps and 16Mbps
Connectors:	Shielded RJ-45
Cable requirements:	Supports UTP and STP cabling systems
Host interface:	IBM 8260 hub bus interface standard
Power requirements:	28 W +5 V dc, 0.5 W +12 V dc
Mechanical:	1 slot
Daughter cards:	One T-JIT, one T-MAC or HTMAC
Regulatory compliance:	EMI emissions: FCC Class A certification, VDE B certification, VCCI, CISPR22/A, EN 55022 Safety: CSA-22.2, IEC 950 (EN 60950), UL 1950, AS 3260, NZS 6661
Number of ports:	18

Dual Fiber Repeater Module (Feature Code 3010)

Faceplate marking:	T10R-F
Data rate:	4Mbps and 16Mbps
Connectors:	Shielded RJ-45, ST fiber
Port	Active lobe port
Cable requirements:	Supports UTP and STP cabling systems, 62.5/125 µm fiber
Power requirements:	37 W +5 V dc, 0.5 W +12 V dc, and 0.25 W -12 V dc
Mechanical:	1 slot
Daughter cards:	Two T-JIT, one T-MAC or HTMAC
Regulatory compliance:	EMI emissions: FCC Class A certification, VDE B certification, VCCI, CISPR22/A, EN 55022 Safety: CSA-22.2, IEC 950 (EN 60950), UL 1950, AS 3260, NZS 6661
Number of ports:	10

Passive Media Module (Feature Code 3020)

Faceplate marking:	T20MS-TP
Data rate:	4Mbps and 16Mbps
Connectors:	Shielded RJ-45
Cable requirements:	Supports UTP and STP cabling systems
Power requirements:	16 W +5 V dc, 1.5 W +12 V dc, and 1.25 W -12 V dc
Mechanical:	1 slot
Daughter cards:	One T-MAC or HTMAC
Regulatory compliance:	EMI emissions: FCC Class A certification, VDE B certification, VCCI (Level 1 with UTP, Level 2 with STP), CISPR22/A, EN 55022 EMC immunity: EN55101-2/3/4, IEC 801-5 and 6 (drafts) Safety: CSA-22.2, IEC 950 (EN 60950), UL 1950, AS 3260, NZS 6661
Number of ports:	20

Jitter Attenuator Card (Feature Code 8914)

Faceplate marking:	T-JIT
Connectors:	30-pin connector
Power requirements:	1 W +5 V dc, 1 W +12 V dc, and 0.5 W -12 V dc
Mechanical:	6.35 cm x 12.7 cm (2.5 in. x 5 in.)
Operating temperature:	0° to 50° C (32° to 122° F)
Humidity:	Less than 95%, non-condensing
Btus/hr:	8.5
Regulatory compliance:	EMI emissions: FCC Class A certification, VDE B certification, VCCI , CISPR22/A, EN 55022 Safety: CSA-22.2, IEC 950 (EN 60950), UL 1950, AS 3260, NZS 6661

Medium Access Control Card (Feature Code 8913)

Faceplate marking:	T-MAC
Processor:	Motorola 68331
Memory:	Up to 2176KB of Flash (2MB for 68331 processor, 128K for TR) Up to 2304KB of SRAM (2MB maximum for 68331 processor, 256K for buffer)
Power consumption:	8 W at +5 V
Operating temperature:	0° to 50° C (32° to 122° F)
Humidity:	Less than 95%, non-condensing
Btus/hr:	30.7
Networks monitored per card:	1
MIBs supported:	• MIB II • Enterprise specific (3Com) • RMON compliance: statistics group, host group, ring station group, ring station order group, ring station configuration group, source routing group • TFTP

High-End Medium Access Control Card (Feature Code 8925)

Faceplate marking:	HTMAC
Processor:	PowerPC 603 at 64 MHZ, with 64 KB data bus and 8 KB instruction cache
Local bus:	PCI with 32 MHz bus speed and 32-bit bus width
Memory:	Flash memory: 8 MB operational 512 KB boot memory Data: 8 MB (F/C 8988) or 16 MB (F/C 8996) 64-bit data interface Uses SODIMM memory modules
Data Rate:	4Mbps or 16Mbps
Power consumption:	13 W at +5 V
Operating temperature:	0° to 50° C (32° to 122° F)
Humidity:	Less than 95%, non-condensing
Networks monitored per card:	1
MIBs supported:	• MIB II (RFC 1213) • IEEE 802.5 Token-Ring MIB (RFC 1231) • RMON MIB and Token-Ring Extensions (RFC 1271 and 1513) • Aspen Config MIB • IBM Token-Ring Surrogate MIB • IBM 8260 MIB

Appendix C. 8260 ATM Product Specifications

This appendix describes the ATM products that you can use with the 8260 Nways Multiprotocol Switching Hub (models A10, A17, and G17).

ATM Modules

Type	Switching Mode	Connector Type(s)	Number of Ports	Slot Width	Feature Code	Faceplate Marking	Refer to
Control Point and Switch		EIA 232	—	2	5100	A-CPSW	page 150
4-Port 100Mbps	Port	MIC	4	1	5004	A4-FB100	page 150
4-Port 100Mbps	Port	SC	4	1	5104	A4-SC100	page 150
12-Port 25Mbps	Port	RJ-45	12	1	5012	A12-TP25	page 151
ATMflex 2-Port 155Mbps	Port	—	2	1	5002	A2-MB155	page 151
3-Port 155Mbps	Port	—	3	1	5003	A3-MB155	page 151
ATM WAN	Port	—	2	1	5302	A2-WAN	page 152
8281 ATM LAN Bridge	Port	RJ-45, AUI	4	2	5204	A04MB-BRG	page 153
MSS Server	—	RS-232, DB9	—	2	5300	A-MSS	page 153
1-Slot ATM Carrier	—	—	—	1	5102	A-CMU1	page 153
2-Slot ATM Carrier	—	—	—	2	5202	A-CMU2	page 153
Video Distribution	Port		8	2	5008	A8-MPEG	—

ATM Daughter Cards

Type	Switching Mode	Connector Type(s)	Number of Ports	Slot Width	Feature Code	Faceplate Marking	Refer to
ATMflex Daughter Cards							
Multimode Fiber I/O Card	Port	SC	1	—	8800	MF	page 154
Singlemode Fiber I/O Card	Port	SC	1	—	8801	SF	page 154
UTP/STP I/O Card	Port	RJ-45	1	—	8802	TP	page 155
ATM WAN Daughter Cards							
E3 I/O Card	Port	BNC	1	—	8501	E3	page 156
DS3 I/O Card	Port	BNC	1	—	8502	DS3	page 156
STM-1 MMF I/O Card	Port	SC	1	—	8506	S-MF	page 156
STM-1 SMF I/O Card	Port	SC	1	—	8505	S-SF	page 157
OC3 MMF I/O Card	Port	SC	1	—	8504	O-MF	page 157
OC3 SMF I/O Card	Port	SC	1	—	8503	O-SF	page 157
ATM 25Mbps Concentration Daughter Card							
Multimode Fiber I/O Card	Port	SC	1	—	8510	MF	page 158

Control Point and Switch Module (Feature Code 5100)

Faceplate marking:	A-CPSW
Connectors:	One RS-232 DB-9 connector for console port connections One RS-232 DB-9 connector for auxiliary port connections
Processors:	MC 68EC040 and MC 68EN360 used in companion mode
Memory:	32KB nonvolatile RAM 256KB static RAM 4MB Flash EPROM (eight modules of 512KB each) 16MB Dynamic RAM (two modules of 8MB each)
Special circuits:	ATM dedicated chip sets Realtime clock with 32KB NVRAM
Modem support:	For 100% Hayes-compatible modems, baud rates up to 19.2Kbps supported
Packet switched module:	16 ports (DATA-IN: 8 bits; DATA-OUT: 8 bits)

4-Port Fiber 100Mbps Module (Feature Code 5004 or 5104)

Faceplate marking:	A4-FB100 or A4-SC100
Connectors:	MIC or SC fiber
Number of ports:	4
Power requirements:	35 W at +5 Vdc, 2.5 W at +12 Vdc
Operating temperature:	0°C to 50°C (32°F to 122°F)
Humidity:	Less than 95% non-condensing
Optical Specifications:	For details, refer to *ATM 4-Port 100 Mbps Module Installation and User's Guide*, SA33-0324

12-Port 25Mbps Concentration Module (Feature Code 5012)

Faceplate marking:	A12-TP25
Connectors:	RJ-45
Number of ports:	12
Power requirements:	25 W at +5 Vdc, 1.2 W at +12 Vdc
Operating temperature:	0°C to 50°C (32°F to 122°F)
Humidity:	Less than 95% non-condensing

2-port 155Mbps Flexible Concentration Module (Feature Code 5002)

Faceplate marking:	A2-MB155
Connectors:	SC for fiber I/O card RJ-45 for twisted pair I/O card
Number of ports:	2
Power requirements:	25 W at +5 Vdc, 1.2 W at +12 Vdc
Operating temperature:	0°C to 50°C (32°F to 122°F)
Humidity:	Less than 95% non-condensing
Optical Specifications:	For details, refer to *ATM 155Mbps Flexible Concentration Module Installation and User's Guide*, SA33-0358

3-Port 155Mbps Module (Feature Code 5003)

Faceplate marking:	A3-MB155
Connectors:	SC for fiber I/O card RJ-45 for twisted pair I/O card
Number of ports:	3
Power requirements:	25 W at +5 Vdc, 1.2 W at +12 Vdc
Operating temperature:	0°C to 50°C (32°F to 122°F)
Humidity:	Less than 95% non-condensing
Optical Specifications:	For details, refer to *ATM 3-Port 155Mbps Module Installation and User's Guide*, SA33-0397

WAN Module (Feature Code 5302)

Faceplate marking:	A2-WAN
Connectors:	SC for fiber I/O cards BNC for coax I/O cards
Number of ports:	2
Power requirements:	18.4 W at +5 Vdc
Operating temperature:	0°C to 50°C (32°F to 122°F)
Humidity:	Less than 95% non-condensing
Optical Specifications:	For details, refer to *ATM WAN Module Installation and User's Guide*, SA33-0396

8281 LAN Bridge Module (Feature Code 5204)

Faceplate marking:	A04MB-BRG
Connectors:	One EIA-232 DB for configuration console Four shielded RJ-45 for Token-Ring or Ethernet ports Two AUI DB-15 for Ethernet ports (ports 2 and 4 only)
Number of ports:	4
Backplane connection:	ATM
Processors:	Two i960CF at 33 MHz
Memory:	Packet memory: 4MB SRAM Lower processor: 2MB DRAM, 128KB SRAM 1 MB Flash EPROM Upper processor: 1MB SRAM Upper and lower processor: 16KB dual port SRAM
Special circuits:	ATM dedicated chip sets IBM chip sets for LAN interface
Data rate:	4Mbps and 16Mbps on Token-Ring 10Mbps on Ethernet
Cable requirements:	UTP Category 3 (or better) or STP cabling on RJ-45 ports AUI cable on AUI ports
Power Requirements:	70 W at +5 Vdc 6 W at +12 Vdc (for each AUI port used)

Carrier Modules (Feature Codes 5102 and 5202)

Faceplate marking:	A-CMU1 (for 1-slot module) A-CMU2 (for 2-slot module)
Backplane connection:	ATM
Internal clocking:	20 MHz
Number of ports:	2
Port connector:	120-pin AMP
Power requirements:	18.2 W at +5 Vdc
Daughter cards:	2
Daughter card interface:	UTOPIA-1 (8 bits)
Maximum allowable power (for daughter card):	+5 V : 28.6 W (1-slot module) 54.8 W (2-slot module) +12 V : 9.6 W -5 V : 2.5 W -12 V : 3 W

Multiprotocol Switched Services Server Module (Feature Code 5300)

Faceplate marking:	A-MSS
Connectors:	One RS-232 DB-9 connector for service port connection Two Type 3 PCMCIA slots
Backplane connection:	ATM
Processor:	Power PC 603E at 100 MHz
Power requirements:	42 W at + 5 Vdc, 1 W at +12 Vdc
Memory:	8KB of non-volatile RAM 512KB of high-speed level 2 cache memory 12MB of FLash EPROM 32MB of dynamic RAM (two 16MB SIMMs) 10MB of ATM packet memory
Special circuits:	ATM dedicated chip sets
Modem support:	PCMCIA data/FAX 28.2Kbps modem PCMIA voice/data/FAX 28.2Kbps modem 100% Hayes-compatible modem via RS-232 port

2-Port and 3-Port 155Mbps Module Daughter Cards

Common Technical Specifications

Connectors:	40-pin connector
Power requirements:	2.5 W at +5 Vdc
Operating temperature:	0°C to 50°C (32°F to 122°F)
Humidity:	Less than 95% non-condensing
Btus/hr:	8.5
Mechanical:	6.35 cm x 6 cm (2.5 in. x 2.36 in.)
Regulatory compliance:	EMI emissions: FCC Class A certification, VDE B certification, CCI, CISPR22/A, EN 55022 Safety: CSA-22.2, IEC 950 (EN 60950), UL 1950, AS 3260, NZS 6661

Multimode Fiber I/O Card (Feature Code 8800)

Faceplate marking:	MF
Connector:	SC

Singlemode Fiber I/O Card (Feature Code 8801)

Faceplate marking:	SF
Connector:	SC

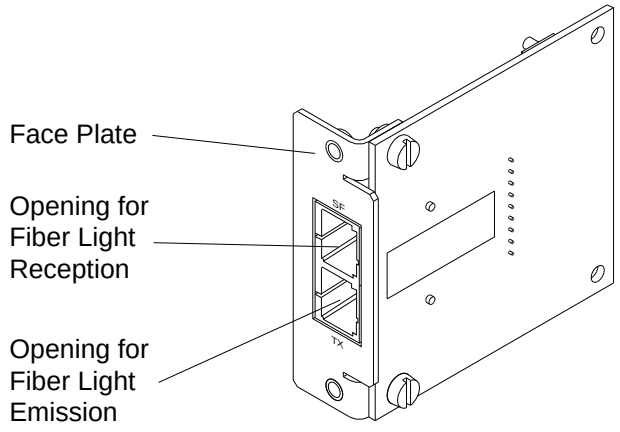

Figure 71. 155Mbps Module Fiber Daughter Card

Twisted Pair I/O Card (Feature Code 8802)

Faceplate marking:	TP
Connector:	RJ-45

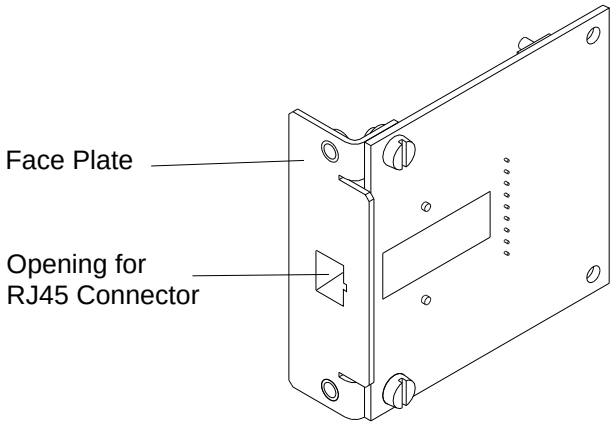

Figure 72. 155Mbps Module UTP/STP Daughter Card

WAN Module Daughter Cards

DS3 I/O Card (Feature Code 8502)

Faceplate Marking:	DS3
Connectors:	BNC
Data rate:	44.736Mbps
Cable type:	Coax RG59 (75 ohm)
Power requirements:	7.9 W at +5 Vdc
Maximum link distance:	135m (443 ft.)

E3 I/O Card (Feature Code 8501)

Faceplate Marking:	E3
Connectors:	BNC
Data rate:	34.368Mbps
Cable type:	Coax RG59 (75 ohm)
Power requirements:	7.9 W at +5 Vdc
Maximum link distance:	100m (330 ft.)

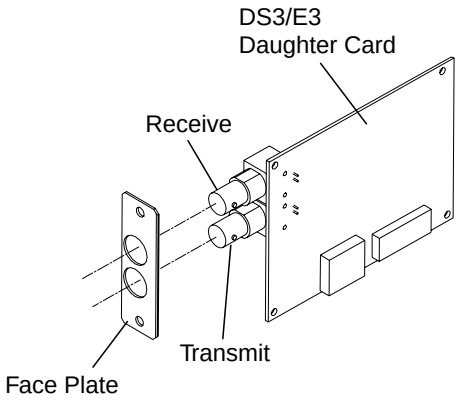

Figure 73. WAN Module DS3/E3 Daughter Card

STM-1 MMF I/O Card (Feature Code 8506)

Faceplate Marking:	S-MF
Connectors:	SC
Data rate:	155.520Mbps
Cable type:	Multimode fiber
Power requirements:	7.9 W at +5 Vdc
Maximum link distance:	2.2 km (1.36 miles)

STM-1 SMF I/O Card (Feature Code 8505)

Faceplate Marking:	S-SF
Connectors:	SC
Data rate:	155.520Mbps
Cable type:	Singlemode fiber
Power requirements:	7.9 W at +5 Vdc
Maximum link distance:	20 km (12.42 miles)

OC3 MMF I/O Card (Feature Code 8504)

Faceplate Marking:	O-MF
Connectors:	SC
Data rate:	155.520Mbps
Cable type:	Multimode fiber
Power requirements:	7.9 W at +5 Vdc
Maximum link distance:	2.2 km (1.36 miles)

OC3 SMF I/O Card (Feature Code 8503)

Faceplate Marking:	O-SF
Connectors:	SC
Data rate:	155.520Mbps
Cable type:	Singlemode fiber
Power requirements:	7.9 W at +5 Vdc
Maximum link distance:	20 km (12.42 miles)

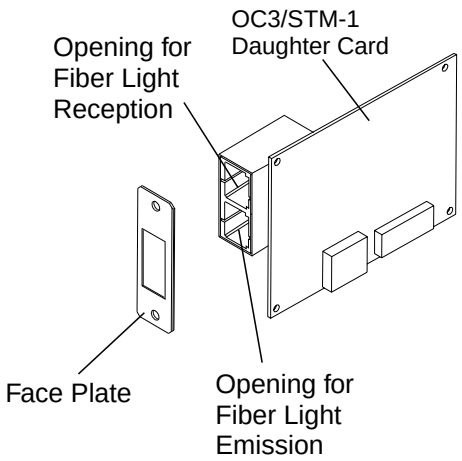

Figure 74. WAN Module OC3/STM-1 Daughter Card

25Mbps Concentration Module Daughter Card

MMF I/O Card (Feature Code 8510)

Faceplate Marking:	MF
Connectors:	SC
Data rate:	155.520Mbps
Cable type:	Multimode fiber
Power requirements:	10 W at +5 Vdc
Maximum link distance:	2.2 km (1.36 miles)

Appendix D. 8260 LAN Switch Product Specifications

This appendix describes the LAN switching products that you can use with the 8260 Nways Multiprotocol Switching Hub.

LAN Switch Modules

Type	Switching Mode	Connector Type(s)	Number of Ports	Slot Width	Feature Code	Faceplate Marking	Refer to
827x LAN Switch Modules							
2-slot 8271 Ethernet LAN Switch	Port	RJ-45	12	2	6212	E12-LS2	Page 161
3-slot 8271 Ethernet LAN Switch	Port	RJ-45	12	3	6312	E12-LS4	Page 161
2-slot 8271 ATM/Ethernet LAN Switch	Port	RJ-45	12	2	5212	A-E12LS2	Page 162
3-slot 8271 ATM/Ethernet LAN Switch	Port	RJ-45	12	3	5312	A-E12LS4	Page 162
2-slot 8272 Token-Ring LAN Switch	Port	RJ-45	8	2	6208	TR8-LS2	Page 163
3-slot 8272 Token-Ring LAN Switch	Port	RJ-45	8	3	6308	TR8-LS4	Page 163
2-slot 8272 ATM/Token-Ring LAN Switch	Port	RJ-45	8	2	5208	A-TR8LS2	Page 164
3-slot 8272 ATM/Token-Ring LAN Switch	Port	RJ-45	8	3	5308	A-TR8LS4	Page 164
Switching Module Series (see note)							
12-Port 10BASE-T	Port	RJ-45	12	1	7312	SWE12-TP	Page 165
24-Port 10BASE-T	Port	RJ-45	24	2	7324	SWE24-TP	Page 165
10-Port 10BASE-FB/FL	Port	ST	10	1	7310	SWE10-F	Page 166
20-Port 10BASE-FB/FL	Port	ST	20	2	7320	SWE20-F	Page 166
2-Port DAS FDDI	Port	MIC	2	1	7304	SWF4-F	Page 167
12-Port 10BASE-T and DAS FDDI	Port	RJ-45 and MIC	14	2	7314	SWE12F2-TPF	Page 167
10-Port 10BASE-FB/FL and DAS FDDI	Port	ST and MIC	12	2	7412	SWE10F2-FF	Page 168
4-Port 100BASE-Tx	Port	RJ-45	4	1	7504	SWE4-TX	Page 169
4-Port 100BASE-Fx	Port	SC	4	1	7404	SWE4-FX	Page 169

Note: If the module is used in an 8260 hub not equipped with the PacketChannel backplane, the module will operate as a stand-alone switch unit.

Universal Feature Cards

Type	Switching Mode	Connector Type(s)	Number of Ports	Feature Code	Faceplate Marking	Refer to
UTP/STP Token-Ring UFC	Port	RJ-45	4	9196	—	Page 170
UTP/STP Token-Ring UFC (enhanced)	Port	RJ-45	4	5092	—	Page 170
Fiber Token-Ring UFC	Port	ST	2	6985	—	Page 170
Fiber Token-Ring UFC (enhanced)	Port	ST	2	5087	—	Page 171
10BASE-T UFC	Port	RJ-45	4	9195	—	Page 171
10BASE-FL UFC	Port	ST	3	8603	—	Page 171
100BASE-Tx UFC	Port	RJ-45	1	6995	—	Page 172
100BASE-Fx UFC	Port	ST	1	7000	—	Page 172
ATM/Ethernet MMF UFC	Port	SC	1	6988	—	Page 173
ATM/Token-Ring MMF UFC	Port	SC	1	5076	—	Page 173

8271 Ethernet LAN Switch Module (Feature Code 6212)

Faceplate marking:	E12-LS2
Number of slots:	2
Numbers of UFCs:	2
Number of ports:	12
Backplane connection:	TriChannel
Power consumption:	21 W at +5 V
Data rate:	10Mbps
Port connector:	RJ-45

8271 Ethernet LAN Switch Module (Feature Code 6312)

Faceplate marking:	E12-LS4
Number of slots:	3
Numbers of UFCs:	4
Number of ports:	12
Backplane connection:	TriChannel
Power consumption:	21 W at +5 V
Data rate:	10Mbps
Port connector:	RJ-45

8271 ATM/Ethernet LAN Switch Module (Feature Code 5212)

Faceplate marking:	A-E12LS2
Number of slots:	2
Numbers of UFCs:	2
Number of ports:	12
Backplane connection:	ATM
Power consumption:	58.5 W at +5 V
Data rate:	10Mbps
Port connector:	RJ-45

8271 ATM/Ethernet LAN Switch Module (Feature Code 5312)

Faceplate marking:	A-E12LS4
Number of slots:	3
Numbers of UFCs:	4
Number of ports:	12
Backplane connection:	ATM
Power consumption:	58.5 W at +5 V
Data rate:	10Mbps
Port connector:	RJ-45

8272 Token-Ring LAN Switch Module (Feature Code 6208)

Faceplate marking:	TR8-LS2
Number of slots:	2
Numbers of UFCs:	2
Number of ports:	8
Backplane connection:	TriChannel
Power consumption:	30 W at +5 V
Data rate:	4Mbps or 16Mbps
Port connector:	RJ-45

8272 Token-Ring LAN Switch Module (Feature Code 6308)

Faceplate marking:	TR8-LS4
Number of slots:	3
Numbers of UFCs:	4
Number of ports:	8
Backplane connection:	TriChannel
Power consumption:	30 W at +5 V
Data rate:	4Mbps or 16Mbps
Port connector:	RJ-45

8272 ATM/Token-Ring LAN Switch Module (Feature Code 5208)

Faceplate marking:	A-TR8LS2
Number of slots:	2
Numbers of UFCs:	2
Number of ports:	8
Backplane connection:	ATM
Power consumption:	67.5 W at +5 V
Data rate:	4Mbps or 16Mbps
Port connector:	RJ-45

8272 ATM/Token-Ring LAN Switch Module (Feature Code 5308)

Faceplate marking:	A-TR8LS4
Number of slots:	3
Numbers of UFCs:	4
Number of ports:	8
Backplane connection:	ATM
Power consumption:	67.5 W at +5 V
Data rate:	4Mbps or 16Mbps
Port connector:	RJ-45

12-Port 10BASE-T Switching Module (Feature Code 7312)

Faceplate marking:	SWE12-TP
Processor:	Motorola 68040
Switch engine:	ISC4000
Memory:	2MB of Flash EPROM 2MB of RMON RAM (expandable to 18MB) 4MB of DRAM
Backplane connection:	PacketChannel
Power consumption:	23 W at +5 V, 0.5 W at -5 V, 0.25 W at +12 V
Data rate:	10Mbps
Number of ports:	12
Port connector:	RJ-45
Cabling:	UTP 100 ohm Category 3 or better
Maximum link distance:	180 m (591 ft.) on STP 150 ohm cable

24-Port 10BASE-T Switching Module (Feature Code 7324)

Faceplate marking:	SWE24-TP
Processor:	Motorola 68040
Switch engine:	ISC4000
Memory:	2MB of Flash EPROM 2MB of RMON RAM (expandable to 18MB) 4MB of DRAM
Backplane connection:	PacketChannel
Power consumption:	31 W at +5 V, 0.5 W at -5 V, 0.25 W at +12 V
Data rate:	10Mbps
Number of ports:	24
Port connector:	RJ-45
Cabling:	UTP 100 ohm Category 3 or better
Maximum link distance:	180 m (591 ft.) on STP 150 ohm cable

10-Port 10BASE-FB/FL Switching Module (Feature Code 7310)

Faceplate marking:	SWE10-F
Processor:	Motorola 68040
Switch engine:	ISC4000
Memory:	2MB of Flash EPROM 2MB of RMON RAM (expandable to 18MB) 4MB of DRAM
Backplane connection:	PacketChannel
Power consumption:	33 W at +5 V, 0.5 W at -5 V, 0.25 W at +12 V
Data rate:	10Mbps
Number of ports:	10
Port connector:	ST
Cabling:	Multimode fiber
Maximum link distance:	4 km (2.48 miles) with high power

20-Port 10BASE-FB/FL Switching Module (Feature Code 7320)

Faceplate marking:	SWE20-F
Processor:	Motorola 68040
Switch engine:	ISC4000
Memory:	2MB of Flash EPROM 2MB of RMON RAM (expandable to 18MB) 4MB of DRAM
Backplane connection:	PacketChannel
Power consumption:	51 W at +5 V, 0.5 W at -5 V, 0.25 W at +12 V
Data rate:	10Mbps
Number of ports:	20
Port connector:	ST
Cabling:	Multimode fiber
Maximum link distance:	4 km (2.48 miles) with high power

2-Port DAS FDDI Switching Module (Feature Code 7304)

Faceplate marking:	SWF4-F
Processor:	Motorola 68040
Switch engine:	ISC4000
Memory:	2MB of Flash EPROM 2MB of RMON RAM (expandable to 18MB) 4MB of DRAM
Backplane connection:	PacketChannel
Power consumption:	31 W at +5 V, 0.5 W at -5 V, 0.25 W at +12 V
Data rate:	100Mbps
Number of ports:	2 dual FDDI
Port connector:	MIC
Cabling:	Multimode fiber
Maximum link distance:	2 km (1.24 miles)

12-Port 10BASE-T and DAS FDDI Switching Module (Feature Code 7314)

Faceplate marking:	SWE12F2-TPF
Processor:	Motorola 68040
Switch engine:	ISC4000
Memory:	2MB of Flash EPROM 2MB of RMON RAM (expandable to 18MB) 4MB of DRAM
Backplane connection:	PacketChannel
Power consumption:	31 W at +5 V, 0.5 W at -5 V, 0.25 W at +12 V
Data rate:	10Mbps on 10BASE-T ports 100Mbps on FDDI ports
Number of ports:	12 10BASE-T 1 dual FDDI
Port connector:	RJ-45 for 10BASE-T MIC for FDDI
Cabling:	UTP 100 ohm Category 3 or better Multimode fiber
Maximum link distance:	180 m (330 ft) on STP 150 ohm cable 2 km (1.24 miles) on FDDI

10-Port 10BASE-FB/FL and DAS FDDI Switching Module (Feature Code 7412)

Faceplate marking:	SWE10F2-FF
Processor:	Motorola 68040
Switch engine:	ISC4000
Memory:	2MB of Flash EPROM 2MB of RMON RAM (expandable to 18MB) 4MB of DRAM
Backplane connection:	PacketChannel
Power consumption:	41 W at +5 V, 0.5 W at -5 V, 0.25 W at +12 V
Data rate:	10Mbps on 10BASE-T ports 100Mbps on FDDI ports
Number of ports:	10 10BASE-F 1 dual FDDI
Port connector:	ST for 10BASE-F MIC for FDDI
Cabling:	Multimode fiber
Maximum link distance:	4 km (2.48 miles) on 10BASE-F (with high power) 2 km (1.24 miles) on FDDI

4-Port 100BASE-Fx Switching Module (Feature Code 7404)

Faceplate marking:	SWE4-FX
Processor:	Motorola 68040
Switch engine:	ISC4000
Memory:	2MB of Flash EPROM 2MB of RMON RAM (expandable to 18MB) 4MB of DRAM
Backplane connection:	PacketChannel
Power consumption:	36 W at +5 V, 0.5 W at -5 V, 0.25 W at +12 V
Data rate:	100Mbps
Number of ports:	4
Port connector:	SC
Cabling:	Multimode fiber
Maximum link distance:	400 m (1312 ft) in half-duplex mode 2 km (1.24 miles) in full-duplex mode

4Port 100BASE-Tx Switching Module (Feature Code 7504)

Faceplate marking:	SWE4-TX
Processor:	Motorola 68040
Switch engine:	ISC4000
Memory:	2MB of Flash EPROM 2MB of RMON RAM (expandable to 18MB) 4MB of DRAM
Backplane connection:	PacketChannel
Power consumption:	35 W at +5 V, 0.5 W at -5 V, 0.25 W at +12 V
Data rate:	100Mbps
Number of ports:	4
Port connector:	RJ-45
Cabling:	UTP 100 ohm Category 5 or better
Maximum link distance:	100 m (328 ft)

Universal Feature Cards

4-Port Token-Ring UTP/STP UFC (Feature Code 9196 or 5092)

Number of ports:	4
Connector:	RJ-45
Date rate:	4Mbps or 16Mbps
Cable type:	STP, UTP Category 3 or better
Power consumption:	11 W at +5 V (Feature Code 9196) 12 W at +5 V (Feature Code 5092)

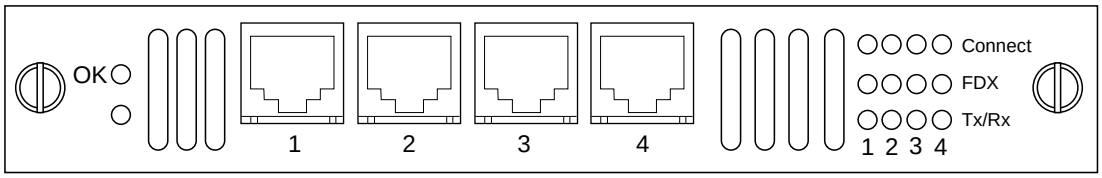

Figure 75. 4-Port Token-Ring UTP/STP Universal Feature Card

2-Port Token-Ring Fiber UFC (Feature Code 6985 or 5087)

Number of ports:	2
Connector:	ST
Date rate:	4Mbps or 16Mbps
Cable type:	Multimode fiber
Power consumption:	8 W at +5 V (Feature Code 6985) 11 W at +5 V (Feature Code 5087)

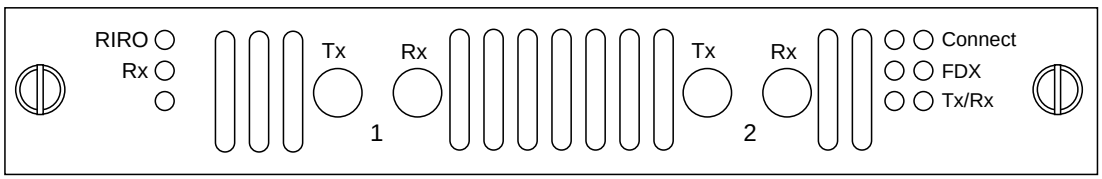

Figure 76. 2-Port Token-Ring Fiber Universal Feature Card

4-Port Ethernet 10BASE-T UFC (Feature Code 9195)

Number of ports:	4
Connector:	RJ-45
Date rate:	10Mbps
Cable type:	STP, UTP Category 3 or better
Power consumption:	5.5 W at +5 V

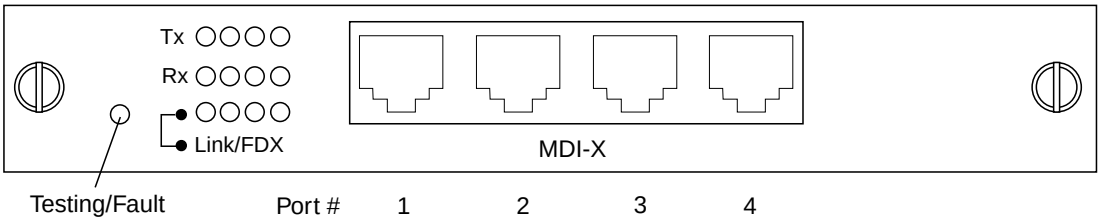

Figure 77. 4-port Ethernet 10BASE-T Universal Feature Card

3-Port Ethernet 10BASE-FL UFC (Feature Code 8603)

Number of ports:	3
Connector:	ST
Date rate:	10Mbps
Cable type:	Multimode fiber
Power consumption:	6.7 W at +5 V

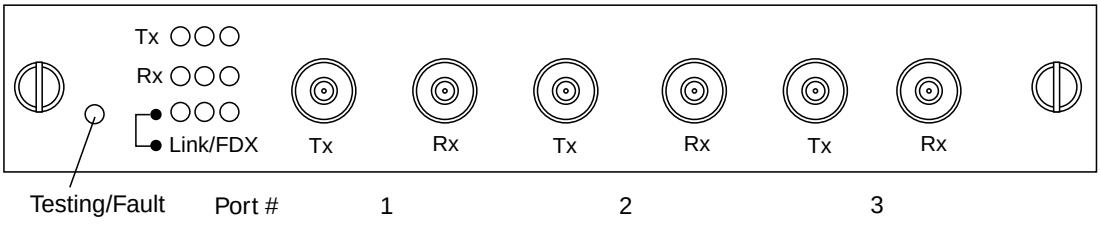

Figure 78. 3-Port Ethernet 10BASE-FL Universal Feature Card

1-port Ethernet 100BASE-Tx UFC (Feature Code 6995)

Number of ports:	1
Connector:	RJ-45
Date rate:	100Mbps
Cable type:	STP, UTP Category 5
Power consumption:	5.7 W at +5 V

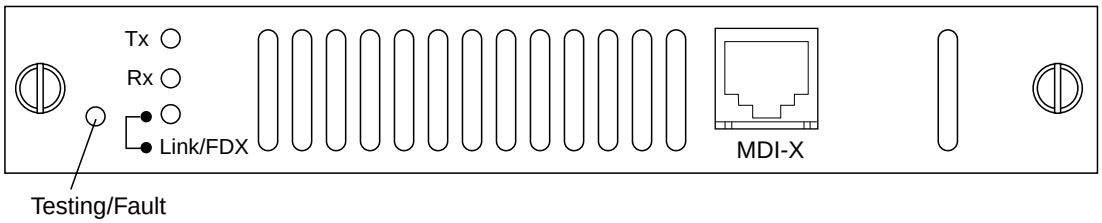

Figure 79. 1-port Ethernet 100BASE-Tx Universal Feature Card

1-Port Ethernet 100BASE-Fx UFC (Feature Code 7000)

Number of ports:	1
Connector:	ST
Date rate:	100Mbps
Cable type:	Multimode fiber
Power consumption:	6 W at +5 V

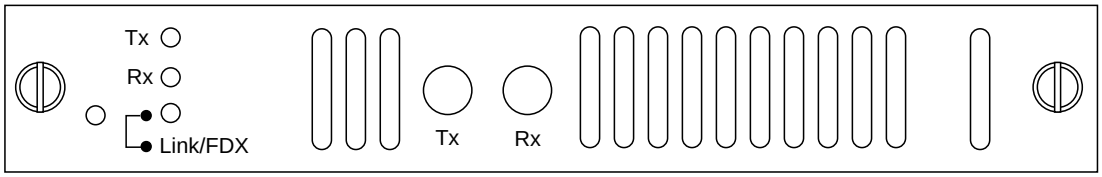

Figure 80. 1-Port Ethernet 100BASE-Fx Universal Feature Card

1-Port ATM/Ethernet UFC (Feature Code 6988)

Number of ports:	1
Connector:	SC
Date rate:	155Mbps
Cable type:	Multimode fiber
Power consumption:	25 W at +5 V

1-Port ATM/Token-Ring UFC (Feature Code 5076)

Number of ports:	1
Connector:	SC
Date rate:	155Mbps
Cable type:	Multimode fiber
Power consumption:	25 W at +5 V

Appendix E. 8260 Management Product Specifications

This appendix describes the Redundant Controller and Management modules that you can use with the 8260 Nways Multiprotocol Switching Hub (all models).

Redundant Controller Module

Type	Switching Mode	Connector Type(s)	Number of Ports	Slot Width	Feature Code	Faceplate Marking	Refer to
Redundant Controller	—	—	—	1	8000	8000-RCTL	Page 176

Management Modules

Type	Switching Mode	Connector Type(s)	Number of Ports	Slot Width	Feature Code	Faceplate Marking	Refer to
Distributed Management Modules							
Distributed Management (DMM)	—	EIA-232	—	1	1200	DMM	Page 176
Ethernet Carrier DMM	—	EIA-232	—	1	1300	EC-DMM	Page 177
Advanced DMM/Controller Module							
DMM/Controller	—	micro DB9	—	1	1700	DMM-CTLR	page 178

Redundant Controller Module (Feature Code 8000)

Faceplate marking:	8000-RCTL
Power consumption:	5W at +5 V, 2 W at +12 V
Operating temperature:	0° to 50° C (32° to 122° F)
Humidity:	Less than 95%, non-condensing
Front panel indicators:	Power supply status, Fan status, Temperature status, Current active controller
Front panel buttons:	Hub reset, LED test

Distributed Management Module (Feature Code 1200)

Faceplate marking:	DMM
Processors:	One Motorola 68040 CPU and one Motorola 68302
Connectors:	One front panel EIA-232 (RS-232) shielded DB9 connector for console port connections One front panel EIA-232/EIA-423 (RS-232/RS-423) shielded DB9 connector for auxiliary port connections
Memory:	2MB of flash EPROM (upgradeable to 4MB) 3MB of RAM (upgradeable to 5MB) Additional 128KB of Flash PROM (EC-DMM only) Additional 128KB of local RAM (EC-DMM only)
External modem support:	For 100% Hayes-compatible modems Baud rates supported up to 38.4Kbps
Power consumption:	13 W at +5 V, 1.25 W at -5 V, 1 W at +12 V, 0.75 W at -12 V, 0.1 W at +2 V
Operating temperature:	0° to 50° C (32° to 122° F)
Humidity:	Less than 95%, non-condensing
Btus/hr:	55
Front panel indicators:	Four-character alpha-numeric display Module status LED
Front panel buttons:	Module reset button Control button for alpha-numeric display
Ethernet MAC cards supported:	None
Connectivity supported:	Local console port Modem connection Telnet SNMP TFTP

Ethernet Carrier Distributed Management Module (Feature Code 1300)

The Ethernet Carrier Distributed Management Module (EC-DMM) is the same as Distributed Management Module (DMM), Feature Code 1200 (see page 176), except that it allows six additional E-MAC cards (Feature Code 8918), or three HEMAC cards (Feature Code 8924) for network control.

Except for its faceplate marking, the EC-DMM has the same technical specifications as the DMM.

Faceplate marking:	EC-DMM
Front panel indicators:	Four-character alpha-numeric display Module status LED Monitor LED (per network on the Ethernet backplane) Activity LED (per network on the Ethernet backplane) Collision LED (per network on the Ethernet backplane)
Front panel buttons:	Module reset Display Control for alpha-numeric display

Advanced DMM/Controller Module (Feature Code 1700)

Faceplate marking:	DMM-CTLR
Processors:	One Motorola 68040 CPU and one Motorola 68302
Connectors:	One front panel EIA-232 (RS-232) shielded micro DB9 connector for console port connections One front panel EIA-232/EIA-423 (RS-232/RS-423) shielded micro DB9 connector for auxiliary port connections
Memory:	4MB of flash EPROM (upgradeable to 6MB) 8MB of RAM (upgradeable to 36MB) 512KB of Flash PROM for controller functions 128KB of SRAM for controller functions
External modem support:	For 100% Hayes-compatible modems Baud rates supported up to 38.4Kbps
Power consumption:	12 W at +5 V, 0.25 W at -5 V, 1 W at +12 V, 0.5 W at -12 V
Operating temperature:	0° to 50° C (32° to 122° F)
Humidity:	Less than 95%, non-condensing
Btus/hr:	46
Mechanical:	1 controller bay slot
Front panel indicators:	Four-character alpha-numeric display Controller status LED
Front panel buttons:	Display button DMM reset button LED test button Hub reset button
Ethernet MAC cards supported:	None
Connectivity supported:	Local console port Modem connection Telnet SNMP TFTP

Appendix F. Power Requirements

8260 Modules and Daughter Cards

Table 16. 8260 Module and Daughter Card Power Consumption

Type	Feature Code	Slot Width	Power Required (Watts)			
			+5 Volts	-5 Volts	+12 Volts	-12 Volts
Ethernet 10BASE-T Modules						
24-Port	1024	1	17	0.1	0.1	—
20-Port	1020	1	15	1	0.5	—
40-Port	1040	2	25	1	0.5	—
36-Port	1036	1	15	0.85	0.1	—
Ethernet 10BASE-FB Fiber Modules						
10BASE-FB	1110 1210 1310	1	17	0.1	0.1	—
Ethernet Flexible Concentration Module and Daughter Cards						
EtherFlex	1004	1	6.75	0.85	0.1	—
10BASE-FB/FL I/O Card	8916	—	3	—	—	—
10BASE-FB/FL I/O Card	8922	—	3	—	—	—
10BASE-FB/FL I/O Card	8923	—	3	—	—	—
10BASE-T RJ-45 I/O Card	8917	—	1.5	—	—	—
10BASE-2 BNC I/O Card	8921	—	5.2	—	—	—
AUI Male I/O Card	8920	—	2.6	—	—	—
AUI Female I/O Card	8919	—	2.6	—	18	—
Ethernet Interconnect Modules						
1-Slot	7106	1	30	1	0.5	—
2-Slot	7206	2	30	1	0.5	—
10BASE-T I/O Card	8902	—	7	—	—	—
10BASE-2 I/O Card	8903	—	8		1.5	—
10BASE-5 I/O Card	8904	—	9	—	4	—
Token-Ring I/O Card	8905	—	9		—	—
Ethernet Daughter Cards						
E-MAC	8918	—	4.25	—	—	—
High-End E-MAC	8924	—	8	—	—	—
Security Card	8915	—	4.25	—	—	—

Table 16. 8260 Module and Daughter Card Power Consumption

Type	Feature Code	Slot Width	Power Required (Watts)			
			+5 Volts	-5 Volts	+12 Volts	-12 Volts
Token-Ring Modules						
Dual Fiber Repeater	3010	1	37	—	0.5	0.25
Active Per-Port Switching	3018	1	38	—	0.5	—
Active Per-Module Switching	3118	1	28	—	0.5	—
Passive Media Module	3020	1	16	—	1.5	1.25
Token-Ring Daughter Cards						
T-MAC	8913	—	8	—	—	—
HTMAC	8925	—	13	—	—	—
T-JIT	8914	—	1	—	1	0.5
ATM Modules						
A-CPSW	5100	2	45	—	3.5	—
A4-FB100	5004	1	35	—	2.5	—
A4-SC100	5104	1	35	—	2.5	—
A2-MB155	5002	1	25	—	1.2	—
A3-MB155	5003	1	25	—	1.2	—
A12-TP25	5012	1	25	—	1.2	—
A2-WAN	5302	1	18.4	—	—	—
A04MB-BRG	5204	2	70	—	12	—
1-Slot ATM Carrier	5102	1	18.2	—	—	—
2-Slot ATM Carrier	5202	2	18.2	—	—	—
MSS	5300	2	42	—	1	—
VDM	5008	2	37.5	—	—	—
ATM Module Daughter Cards						
MM Fiber I/O Card	8800	—	2.5	—	—	—
SM Fiber I/O Card	8801	—	2.5	—	—	—
UTP/STP I/O Card	8802	—	2.5	—	—	—
E3 I/O Card	8501	—	7.9	—	—	—
DS3 I/O Card	8502	—	7.9	—	—	—
STM-1 MMF I/O Card	8506	—	7.9	—	—	—
STM-1 SMF I/O Card	8505	—	7.9	—	—	—
OC3 MMF I/O Card	8504	—	7.9	—	—	—
OC3 SMF I/O Card	8503	—	7.9	—	—	—
A12-TP25 MMF I/O Card	8510	—	10	—	—	—

Table 16. 8260 Module and Daughter Card Power Consumption

Type	Feature Code	Slot Width	Power Required (Watts)			
			+5 Volts	-5 Volts	+12 Volts	-12 Volts
LAN Switching Modules						
2-Slot 8271 Ethernet	6212	2	21	—	—	—
3-Slot 8271 Ethernet	6213	3	21	—	—	—
2-Slot 8271 ATM/Ethernet	5212	2	58.5	—	—	—
3-Slot 8271 ATM/Ethernet	5312	3	58.5	—	—	—
2-Slot 8272 Token-Ring	6208	2	30	—	—	—
3-Slot 8272 Token-Ring	6308	3	30	—	—	—
2-Slot 8272 ATM/Token-Ring	5208	2	67.5	—	—	—
3-Slot 8272 ATM/Token-Ring	5308	3	67.5	—	—	—
12-port 10BASE-T	7312	1	23	0.5	0.25	—
24-port 10BASE-T	7324	2	31	0.5	0.25	—
10-port 10BASE-FB/FL	7310	1	33	0.5	0.25	—
20-port 10BASE-FB/FL	7320	2	51	0.5	0.25	—
2-port DAS FDDI	7304	1	31	0.5	0.25	—
12-port 10BASE-T and DAS FDDI	7314	2	31	0.5	0.25	—
10-port 10BASE-FB/FL and DAS FDDI	7412	2	41	0.5	0.25	—
4-port 100BASE-Fx	7404	1	36	0.5	0.25	—
4-port 100BASE-Tx	7504	1	35	0.5	0.25	—
Universal Feature Cards						
4-port Token-Ring UTP/STP	5092	—	12	—	—	—
4-port Token-Ring UTP/STP	9196	—	11	—	—	—
2-port Token-Ring Fiber	5087	—	11	—	—	—
2-port Token-Ring Fiber	6985	—	8	—	—	—
4-port Ethernet 10BASE-T	9195	—	5.5	—	—	—
3-port Ethernet 10BASE-FL	8603	—	6.7	—	—	—
1-port Ethernet 100BASE-Tx	6995	—	5.7	—	—	—
1-port Ethernet 100BASE-Fx	7000	—	6.0	—	—	—
1-port ATM/Ethernet	6988	—	25	—	—	—
1-port ATM/Token-Ring	5076	—	25	—	—	—
Redundant Controller and Distributed Management Modules						
Redundant Controller	8000	1	5	—	2	—
DMM	1200	1	13	1.25	1	0.75
EC-DMM	1300	1	13	1.25	1	0.75
DMM/Controller	1700	1	12	0.25	1	0.5

8250 Modules

Table 17. 8250 Module Power Consumption

Type	Feature Code	Slot Width	Power Required (Watts)	
			+5 Volts	+12 Volts
Ethernet 10BASE-T Modules				
10BASE-T	3800	1	9.7	—
10BASE-T	3801	1	11	—
10BASE-T	3802	1	11	—
10BASE-T	3829	1	10	—
10BASE-T	3248	2	10	—
10BASE-T Security	7385	1	10	—
Ethernet 10BASE-FB Fiber Modules				
10BASE-FB	6773	1	8.5	—
10BASE-FB[1]	7390	1	8.5	—
10BASE-FB[1]	7393	1	8.5	—
10BASE-FB	6774	1	8.5	—
10BASE-FB[1]	7391	1	8.5	—
10BASE-FB[1]	7394	1	8.5	—
10BASE-FB	6775	1	8.5	—
10BASE-FB[1]	7392	1	8.5	—
10BASE-FB[1]	7395	1	8.5	—
Ethernet 10BASE-2 BNC Modules				
10BASE-2	3817	1	12	4.5
Ethernet FOIRL Modules				
FOIRL[1]	3814	1	10.2	—
FOIRL[1]	3815	1	10.2	—
FOIRL[1]	3816	1	10.2	—
Ethernet 10BASE-FL Modules				
10BASE-FL	5895	1	10	—
10BASE-FL[1]	5896	1	10	—
10BASE-FL[1]	5897	1	10	—
Ethernet Transceiver and Repeater Modules				
Transceiver	3803	1	8.75	—
Repeater	3804	1	6.00	12
Ethernet Terminal Server Modules				
TCP/LAT	3896	1	13.5	3.6
TCP/LAT/3270	3932	1	13.5	3.6

Table 17. 8250 Module Power Consumption

Type	Feature Code	Slot Width	Power Required (Watts)	
			+5 Volts	+12 Volts
Ethernet Interconnect Modules				
Bridge	3828	2	20	1.5
Bridge[1]	6768	2	40	12
Switch	6767	2	40	12
Router	6769	2	40	13.2
Ethernet RMON Probe Module				
RMON	5894	1	12.5	0.1
Ethernet Management Modules (EMM)				
Advanced Management	3788	1	14	0.5
Basic Management	3819	1	14	0.5
EMM Starter	4010	1	14	0.5
Token-Ring Media/Repeater Modules				
MAU[1]	3820	1	6.5	—
Media	3821	2	12.5	0.01
Active 18-Port	7400	2	25	0.5
Fiber Repeater	3822	1	11.5	0.2
Copper Repeater	7386	1	11	—
Token-Ring 3174 Modules				
WNM	3174	2	18	1.5
Token-Ring Bridge Modules				
SR Bridge[1]	3883	1	11.25	—
SR/SRT Bridge[1]	3958	1	13.75	—
Token-Ring Management Modules (TRMM)				
Advanced Management	3884	1	17.5	0.6
Basic Management	3823	1	17.5	0.6
FDDI Media Modules				
Fiber Optic	3825	2	36	8.4
Fiber Optic	7388	2	36	8.4
STP[1]	3826	2	17.5	8.4
Copper	6718	2	42	—
FDDI Management Modules (FMM)				
Multimode	3827	2	22	5.5
Singlemode	6717	2	22	5.5

Table 17. 8250 Module Power Consumption

Type	Feature Code	Slot Width	Power Required (Watts)	
			+5 Volts	+12 Volts
Multiprotocol Integration Modules				
8235 Ethernet	3160	1	7.5	—
8235 Token-Ring	3155	1	7.5	0
8229 SR Bridge	3182	2	25	0
8229 SR/SRT Bridge	3179	2	25	0
8229 Ethernet Bridge	3142	2	25	0

1. No longer in manufacture.

Bibliography

IBM 8250 and 8260 Related Publications

The related publications available for the IBM 8250 and IBM 8260 are:

Table 18. Related Publications

Manual Title	Planning	Installation	Network Software	Network Theory	Problem Determination
IBM 8250 Multiprotocol Intelligent Hub, IBM 8260 Nways Multiprotocol Switching Hub IBM 8285 Nways ATM Workgroup Switch: Planning and Site Preparation Guide, GA33-0285	✓				
A Building Planning Guide for Communication Wiring, G320-8059	✓				
IBM Cabling System Planning and Installation Guide, GA27-3361	✓	✓			✓
IBM Token-Ring Network Introduction and Planning Guide, GA27-3677	✓	✓			
IBM Token-Ring Network Optical Fiber Cable Options, GA27-3747	✓				
IBM Token-Ring Network Supplement for Operation with Unshielded Twisted Pair Lobes, GD21-0048	✓	✓			
IBM Cabling System Catalog, G570-2040	✓	✓			
IBM Cabling System Optical Fiber Planning and Installation Guide, GA27-3943	✓	✓			
FDDI Network Introduction and Planning Guide, GA27-3892				✓	
Ethernet Terminal Server Reference Guide, SA33-0206		✓	✓		✓
8250 Ethernet 6-Port Interconnect Module Management Reference Guide, SA33-0338		✓	✓		✓
Installation and Assembly of Coaxial Cable and Accessories, GA27-2805	✓	✓			
IBM Rolm 3270 Coax-to-Twisted Pair Adapter Planning and Installation Guide, GA27-3722	✓	✓			
IBM 3299 Terminal Multiplexer Product Information and Setup, G520-4216	✓	✓			
8260 Reference Library and Planning Chart, SA33-0252	✓				
Management Programs					
IBM 8250 Intelligent Hub and IBM Hub Management Program/6000, GG24-4033 (from IBM International Technical Centers)	✓		✓		✓
IBM AIX NetView Hub Management Program/6000: Installation Guide, SH11-3069		✓	✓		✓

Table 18. Related Publications

Manual Title	Planning	Installation	Network Software	Network Theory	Problem Determination
IBM AIX NetView Hub Management Program/6000: User's Guide, SH11-3070		✓	✓		✓
IBM AIX NetView Hub Management Program/6000: Reference Card, SH11-3071		✓	✓		✓
IBM AIX NetView Hub Management Program/6000 Entry: Installation Guide and User's Guide, SH11-3061		✓	✓		✓
IBM AIX NetView Hub Management Program/DOS Entry: Installation Guide and User's Guide, SH11-3064		✓	✓		✓
IBM Hub Manager for Windows Version 1: Installation and User's Guide, SH11-3074		✓	✓		✓
IBM ATM Campus Manager for AIX: Installation and User's Guide, SH11-3068		✓	✓		✓

IBM 8250 Related Publications Packaged With the Product

The related publications available with the IBM 8250 are:

Table 19. 8250 Related Publications

Manual Title	Planning	Installation	Network Software	Network Theory	Problem Determination
Multiprotocol Intelligent Hub					
8250 6-Slot with Hidden Controller, Single Power Supply Installation Guide, SA33-0235		✓			✓
8250 6-Slot with Integrated Server Installation and Operation Guide, SA33-0267		✓			✓
8250 17-Slot Multiprotocol Intelligent Hub Installation Guide, SA33-0195		✓			✓
Controller Module					
Fault-Tolerant Controller Module Installation Guide, SA33-0193		✓			✓
Ethernet Modules					
Ethernet 10BASE-T Module Installation Guide, SA33-0196		✓			✓
Ethernet 50-Pin Module Installation Guide, SA33-0197		✓			✓
Ethernet 6-Port Bridge, Switch and Router Installation and Operation Guide, SA33-0245		✓			✓
Ethernet 10BASE-FB Module Installation Guide, SA33-0246		✓			✓
Ethernet 24 Port 10BASE-T Module Installation Guide, SA33-0198		✓			✓
Ethernet Transceiver Module Installation Guide, SA33-0199		✓			✓
Ethernet Repeater Module Installation Guide, SA33-0200		✓			✓
Ethernet Fiber Module Installation Guide, SA33-0201		✓			✓
Ethernet Port-Switching; Fiber Module Installation Guide, SA33-0202		✓			✓
Ethernet FOIRL Module Installation Guide, SA33-0204		✓			✓
Ethernet BNC Module Installation Guide, SA33-0205		✓			✓
Ethernet Terminal Server Module Installation Guide, SA33-0207		✓			✓
Ethernet Terminal Server Installation and Operation Guide, SA33-0296		✓			✓
Ethernet Terminal Server Reference Guide, SA33-0297		✓			✓
Ethernet Management Module Installation Guide, SA33-0209		✓			✓

Table 19. 8250 Related Publications

Manual Title	Planning	Installation	Network Software	Network Theory	Problem Determination
Ethernet Management Module (EMM) Quick Reference Guide GA33-0208 *(*Included in SA33-0209*)*		✓			✓
Ethernet Bridge Module Installation Guide, SA33-0218		✓			✓
Ethernet Bridge Module Quick Reference Guide, SA33-0220 *(*Included in SA33-0218*)*		✓			✓
10BASE-T Security Module Installation and Operation Guide, SA33-0295		✓			✓
Ethernet 10BASE-FL Module Installation Guide, SA33-0331		✓			✓
Token-Ring Modules					
Token-Ring MAU Module Installation Guide, SA33-0210		✓			✓
Token-Ring Media Module Installation Guide, SA33-0211		✓			✓
Token-Ring Fiber Repeater Module Installation Guide, SA33-0212		✓			✓
Token-Ring Management Module Installation and Operation Guide, SA33-0213		✓			✓
Token-Ring Management Module Quick Reference Guide, SA33-0233 (included in SA33-0213*)*		✓			✓
Token-Ring Bridge Module Installation and Operation Guide, SA33-0219		✓			✓
Token-Ring Workstation Networking Module Installation and Customisation Guide, GA27-4022		✓			✓
Token-Ring Workstation Networking Module Problem Determination Guide, SY27-0342					✓
Token-Ring Copper Repeater Module Installation and Operation Guide, SA33-0298		✓			✓
Token-Ring 18-Port Active Module Installation and Operation Guide, SA33-0314		✓			✓
FDDI Modules					
FDDI Fiber Module Installation Guide, SA33-0215		✓			✓
FDDI STP Module Installation Guide, SA33-0216		✓			✓
FDDI Copper Module Installation Guide, SA33-0346		✓			✓
FDDI Management Module Installation and Operation Guide, SA33-0217		✓			✓
FDDI Quick Reference Guide, SA33-0237 (included in SA33-0217*)*		✓			✓
FDDI 8-Port FB, MIC Module Installation Guide, SA33-0250		✓			✓

Table 19. 8250 Related Publications

Manual Title	Planning	Installation	Network Software	Network Theory	Problem Determination
Management Modules					
8250 Commands Guides, SA33-0302			✓		
Multiprotocol Integration Modules					
8235 Dial-In Access to LANs Servers for Token-Ring and Ethernet: Installation and Operation Guide, SA33-0343		✓			✓
8235 Dial-In Access to LANs Servers for Token-Ring and Ethernet: Administrator's Guide, SC30-3629		✓			✓
Supplement to 8235 Dial-In Access to LANs Servers for Token-Ring and Ethernet Administrator's Guide, SD21-0057		✓			✓
Token-Ring 8229 Bridge Module Installation and Operation Guide, SA33-0341		✓			✓

IBM 8260 Related Publications Packaged With the Product

The related publications available with the IBM 8260 are:

Table 20. 8260 Related Publications

Manual Title	Planning	Installation	Network Software	Network Theory	Problem Determination
Multiprotocol Intelligent Switching Hub (see Note 1)					
8260 Nways Multiprotocol Switching Hub Installation Guide, SA33-0251		✓			✓
Ethernet Modules					
Ethernet Medium Access Control Card Installation Guide, SA33-0274		✓			✓
Ethernet 24-Port 10BASE-T Module User's Guide, SA33-0260		✓			✓
Ethernet 20/40-Port 10BASE-T Module User's Guide, SA33-0345		✓			✓
Ethernet 36-Port 10BASE-T Module User's Guide, SA33-0352		✓			✓
Ethernet 10-Port 10BASE-FB Module User's Guide, SA33-0261		✓			✓
Ethernet Flexible Concentration Module User's Guide, SA33-0357		✓			✓
Ethernet Security Installation and User's Guide, SA33-0262		✓			✓
8260 Ethernet Network Interconnect Module User's Guide, SA33-0258		✓			✓
8260 Ethernet Network Interconnect Module Reference Guide, SA33-0288		✓			✓
8271 Ethernet LAN Switch Module Planning and Installation Guide, GA27-4162		✓			✓
Distributed Management Modules					
Distributed Management Module User's Guide, SA33-0259		✓			✓
Distributed Management Module Commands Guide, SA33-0275		✓			✓
Token-Ring Modules					
Token-Ring Media Modules User's Guide, SA33-0256 (This User's Guide covers the Feature Codes 3018, 3010, 3118, and 3020)		✓			✓
8272 Token-Ring LAN Switch Module Planning and Installation Guide, GA27-4163		✓			✓
High-End Token-Ring Medium Access Control Card User's Guide, GA27-4152		✓			✓

Table 20. 8260 Related Publications

Manual Title	Planning	Installation	Network Software	Network Theory	Problem Determination
ATM Modules					
8260 Nways Multiprotocol Switching Hub *8285 Nways ATM Workgroup Switch* *ATM Command Reference Guide,* SA33-0385			✓		
ATM Control Point and Switch Module Installation and User's Guide, SA33-0326		✓			✓
ATM 4-Port 100Mbps Module Installation and User's Guide, SA33-0324		✓			✓
ATM 155Mbps Flexible Concentration Module Installation and User's Guide, SA33-0358		✓			✓
ATM 3-Port 155Mbps Module Installation and User's Guide, SA33-0397		✓			✓
ATM 12-Port 25Mbps Module Installation and User's Guide, SA33-0383		✓			✓
ATM WAN Module, Installation and User's Guide SA33-0396		✓			✓
ATM Kit Technical Overview GA33-0370			✓	✓	
8281 ATM LAN Bridge Module Installation and Operation Guide, SA33-0361		✓			✓
Video Distribution Module User's Guide, GA27-4173		✓			✓
MSS Server *Configuration and Operation Guide,* SC30-3821		✓			
MSS Server Module Setup and Problem Determination Guide, SC30-3821		✓			✓
Switching Module Series (See Note 1)					
Switching Modules User's Guide, SA33-0409			✓		✓
Switching Modules Command Reference Guide, P/N 29H4392			✓		✓
Campus Manager (see Note 2)					
IBM Nways Campus Manager - ATM			✓		✓
IBM Nways Campus Manager - LAN			✓		✓
IBM Nways Campus Manager - LAN Remote Monitor			✓		✓

Note 1: These publications are available on CD-ROM only (order *Nways Switching Hub, IBM Hub Documentation*, GA33-0431, Part Number 94H9850).

Note 2: IBM Nways Campus Manager products have online documentation only and cannot be ordered separately.

Standard Publications

The publications that define standards comprise:

Table 21. Standard Publications

Manual Title	Planning	Installation	Network Software	Network Theory	Problem Determination
EIA/TIA-568, Commercial Building Telecommunications Wiring Standard	✓				
EIA/TIA-569, Commercial Building Telecommunication Pathways and Spaces	✓			✓	
ISO/IEC JTC 1/SC25/WG3 Draft Standard for Customer Premises Cabling	✓				
CSA Standard T529: Design Guidelines for Telecommunications Wiring Systems in Commercial Buildings	✓			✓	
CSA Standard T530: Building Facilities, Design Guidelines for Telecommunications	✓			✓	
Token-Ring Access Methods and Physical Layer Specification, IEEE Standard 802.5-1989	✓			✓	
CSMA/CD Access Method and Physical Layer Specification, IEEE Standard 803.5-1989	✓			✓	
Ethernet Media Access Method and Media Types, IEEE Standard 802.3	✓			✓	
ANSI X.3.166-1990, FDDI Physical Medium Dependent (PMD)	✓			✓	
ANSI X3.148-1988, FDDI Token-Ring Physical Layer Protocol (PHY)	✓			✓	
ANSI X.3.139-1988, FDDI Token-Ring Media Access Control (MAC)	✓				
ATM Forum, ATM User-Network Interface Specification - Version 3				✓	
ATM - Solution for Broadband ISDN				✓	
Integrated Broadband Networks - An Introduction to ATM-based Networks				✓	

IBM Workstation Network Module (WNM) Related Publications

The related publications available for the IBM Workstation Network Module (Feature Code 3174) are:

Table 22. WNM Related Publications

Manual Title	Planning	Installation	Network Software	Network Theory	Problem Determination
Safety Notices, GA27-3834 (see note)		✓			
3174 Introduction, GA27-3850	✓				
Site Planning, GA23-0213	✓				
Planning Guide, GA27-3918 (see note)	✓	✓			
Utilities Guide, GA27-3920 (see note)		✓			
Central Site Customizing User's Guide, GA27-3919 (see note)		✓			
ASCII Functions Reference, GA27-3872		✓	✓	✓	
Customer Problem Determination, GA23-0217 (see note)					✓
Status Codes, GA27-3832 (see note)					✓
Terminal User's Reference for Expanded Functions, GA23-0332				✓	
Functional Description, GA23-0218 (see note)	✓	✓	✓	✓	
Data Stream Programmer's Reference, GA23-0059			✓		
3174 Reference Summary, GX27-3872			✓	✓	
3174 Character Set Reference, GA27-3831	✓				
3270 X.25 Operation, GA23-0204				✓	

Note: These publications are available as a kit, GBOF-4844-00. IBM strongly recommends that you order a kit when you order your WNM (Feature Code 3174).

List of Abbreviations

AIX	Advanced Interactive Executive
ANSI	American National Standards Institute
ARL	adjusted ring length
ASCII	American National Standard Code for Information Interchange
ATM	asynchronous transfer mode
ATMC	ATM Campus
AT&T	American Telephone and Telegraph
AUI	attachment unit interface
AUI CI	CI wire number of the AUI
AUI DI	DI wire number of the AUI
AUIF	attachment unit interface female
AUIM	attachment unit interface male
AWG	American wire gauge
BNC	bayonet node connector (type of connector for coaxial cable)
BOOTP	bootstrap protocol
BP	backplane
bps	bit per second
BS	backplane segment
Btu	British thermal unit
c	speed of light in vacuum
CHA	channel A
CHB	channel B
CL	cable length
CMIP	common management information protocol
CMOL	CMIP over LLC
CPU	central processing unit
CRC	cyclic redundancy check character
CSMA/CA	carrier sense multiple access with collision avoidance
CSMA/CD	carrier sense multiple access with collision detection
dB	decibel
dBkm	decibel per kilometer
dBm	decibel based on 1 milliwatt
dBmV	decibel based on 1 millivolt
DB9	9-pin connector
DAC	dual-access concentrator
DAS	dual-attached station
DEC	Digital Equipment Corporation
DIP	dual in-line package (type of switch)
DMM	distributed management module
DSR	data set ready
DTE	data terminal equipment
DTR	data terminal ready
EBM	Ethernet bridge module
EE	Ethernet-Ethernet
EC	Ethernet carrier
EEPROM	electrically erasable programmable read-only memory
EF	Ethernet fiber
EC	Ethernet FOIRL
EIA	Electronic Industries Association
EIM	Ethernet interconnect module
E-MAC	Ethernet medium access control
EMM	Ethernet management module
EMM	Ethernet management module
ENIM	Ethernet network interconnect module
E-SEC	Ethernet security card
ES	Ethernet-serial router
ESD	electrostatic discharge
ESX	Ethernet-serial router for X.25
ETL	Engineering Testing Laboratory
ETS	Ethernet terminal server
EUI	end user interface
FC	ferrule connector
FCC	Federal Communications Commission (U.S.A.)
FCS	frame check sequence
FDDI	fiber distribution data interface
FFM	fiber FDDI module
FIB	fiber
FL	abbreviation of the FOIRL module
FMM	FDDI management module

FOIRL	fiber optic interconnection repeater link
FP	abbreviation of the port-switching module
FR	fiber repeater
FTP	file transfer protocol
GRD	ground
HEMAC	high-end Ethernet medium access control
HTMAC	high-end Token-Ring medium access control
ICMP	internet control message protocol
ICS	IBM Cabling System
IEEE	Institute of Electrical and Electronic Engineers (USA)
IHMP/6000	IBM AIX NetView Hub Management Program/6000 which manages the LAN network with the IBM 8250 Multiprotocol Intelligent Hub
IP	Internet protocol
ISO	International Organization for Standardization
KB	Kilobytes (1024 bytes)
Kbps	kilobits (1000) per second
KHz	kilohertz
LAN	local area network
LAT	local area transport
LBS	LAN bridge server module
LEA	last error address
LED	light-emitting diode
LLC	logical link control
LNM	LAN network manager
LSM	LAN station manager
MAC	medium access control
MAU	1) multi-station access unit (token ring) 2) medium attachment unit
Mb	megabit
Mbps	megabits per second
MB	megabyte
MH	megahertz
MIB	management information base
MIC	medium interface connector
MM	management module
MMJ	modified modular jack
MOTIF	Window manager from Open Software Foundation, Inc.
MS	module segment
MSTR	master
NA	Not Applicable
NCP	network control program
ns	nanosecond
OSF	Open Software Foundation
OSI	open system interconnection
OSPF	open shortest path first
P	primary
PPS	packet per second
PROM	programmable read-only memory
PS/2	Personnel System/2
RAM	random access memory
REM	ring error monitor
RFC	request for comment
RFS	remote failure signaling
RI	ring-in
RI/RO	ring-in/ring-out
RIP	routing information protocol
RISC	reduced instruction set computer
RJ-12	6-pin connector
RJ-45	8-pin connector
RJ-58	X-pin connector
RLOGIN	remote login
ROM	read-only memory
RX	receive
S	secondary
SAC	single-access concentrator
SAS	single-attached station
SDDI	shielded distribution data interface
SLIP	serial line Internet protocol
SMA	straight medium adaptor connector
SMIT	system management information tool
SMT	system management team
SNMP	simple network management protocol
SR	source routing
SRAM	slow RAM

SRT	source routing transparent
ST	straight tipped connector
STP	shielded twisted pair
SWx	switch number x
T	terminal
TCP	transmission control protocol
TELCO	Telephone Company
Telnet	telecommunication network protocol
TFTP	trivial file transfer protocol
T-MAC	Token-Ring medium access control
TP	twisted pair
TPDDI	twisted pair distribution data interface
TRMM	token-ring management module
TS	terminal server
TX	transmit
UL	Underwriters Laboratories
USOC	universal service ordering code
UTP	unshielded twisted pair
VDE	Verband Deutscher Elecktrotechniker (Germany)
VDM	video distribution module
WAN	wide area network
WNM	workstation networking module
WT	worldtrade
xMM	Token-Ring, Ethernet, FDDI, or Distributed Management module
XNS	Xerox Networking System
10BASE-FB	IEEE standard for Ethernet
10BASE-FL	IEEE standard for Ethernet
10BASE-T	IEEE standard for Ethernet
10BASE-2	IEEE standard for Ethernet

Glossary

This Glossary defines local area network terms and abbreviations. It includes terms and definitions from the *IBM Dictionary of Computing (Information Processing, Personal Computing, Telecommunications, Office Systems, IBM-Specific Terms)*, SC20-1699.

- The symbol (A) identifies definitions from the *American National Dictionary for Information Processing Systems*, copyright 1982 by the Computer and Business Equipment Manufacturers Association (CBEMA).
- The symbol (I) identifies definitions from the *ISO Vocabulary-Information Processing* and *ISO Vocabulary-Office Machines*, developed by the International Organization for Standardization, Technical Committee 97, Subcommittee 1.
- The symbol (T) identifies definitions from draft international standards, draft proposals, and working papers in development by the International Organization for Standardization, Technical Committee 97, Subcommittee 1.

This Glossary uses standard reference words for entries. They are:

Reference	Meaning
Synonymous with	Appears in the commentary of a preferred term and identifies less desirable or less specific terms that have the same meaning.
Synonym for	Appears in the commentary of a less desirable or less specific term and identifies the preferred term that has the same meaning. The less desired or less specific term is not defined.
Contrast with	Refers to a term that has an opposite or substantially different meaning.
See	Refers to terms in which this term appears.
See also	Refers to related terms that have similar (but not synonymous) meanings.

Because FDDI is an emerging technology, this glossary contains terms not only from this manual but also from the published and draft FDDI standards. These definitions may be subject to change as the standards evolve. The source of each definition is included in parentheses. Terms without sources have been defined by IBM.

The sources are:

MAC	*FDDI Media Access Control*
PHY	*FDDI Physical Layer Protocol*
PMD	*FDDI Physical Layer Medium Dependent*
SMT	*FDDI Station Management* (draft)
SMFPMD	*Single-mode fiber physical layer medium dependent.*

A

access unit. A unit that allows multiple attaching devices access to a token-ring network at a central point such as a wiring closet or in an open work area.

active. (1) Able to communicate on the network. A token-ring network adapter is active if it is able to transmit and receive on the network. (2) Operational. (3) Pertaining to a node or device that is connected or is available for connection to another node or device. (4) Currently transmitting or receiving.

active input interface (AII). The active PMD element which detects modulated light from an active output interface (AOI) via a fiber optic wavelength and converts it to digital electrical signals. (SMFPMD)

active output interface (AOI). The active PMD element which converts digital electrical signals into modulated light to be transmitted to an active input interface via a fiber optic waveguide. (SMFPMD)

adapter. In a LAN, within a communicating device, a circuit card that, with its associated software and/or microcode, enables the device to communicate over the network.

adapter address. Twelve hexadecimal digits that identify a LAN adapter.

address. (1) In data communication, the IEEE-assigned unique code or the unique locally administered code assigned to each device or workstation connected to a network. (2) To refer to a device or an item of data by its address. (A)

adjusted ring length (ARL). In a multiple-wiring-closet ring, the sum of all wiring closet-to-wiring closet cables in the main ring path less the length of the shortest of those cables.

alert. (1) For IBM LAN management products, a notification indicating a possible security violation, a persistent error condition, or an interruption or potential interruption in the flow of data around the network. See also *network management vector transport*. (2) In SNA, a record sent to a system problem management focal point to communicate the existence of an alert condition. (3) In the NetView program, a high-priority event that warrants immediate attention. This data base record is generated for certain event types that are defined by user-constructed filters.

American National Standard Code for Information Interchange (ASCII). The standard code, using a coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information interchange among data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphics characters. (A)

application program. (1) A program written for or by a user that applies to the user's work. Some application programs receive support and services from a special kind of application program called a network application program. (2) A program used to connect and communicate with stations in a network, enabling users to perform application-oriented activities.

architecture. A logical structure that encompasses operating principles including services, functions, and protocols. See *computer architecture, network architecture, Systems Application Architecture (SAA), Systems Network Architecture (SNA)*.

asynchronous. (1) Pertaining to two or more processes that do not depend upon the occurrence of a specific event such as a common timing signal. (T) (2) A class of data transmission service whereby all requests for service contend for a pool of dynamically allocated ring bandwidth and response time. (MAC) (3) In fiber distributed data interface (FDDI) rings, a type of data traffic that does not need bounded access delay to the medium and guaranteed throughput.

attach. To make a device a part of a network logically.

Note: Not to be confused with *connect*, which implies physically connecting a device to a network.

attaching device. Any device that is physically connected to a network and can communicate over the network.

attachment. A port or a pair of ports, optionally including an associated optical bypass, that are managed as a functional unit. A dual attachment includes two ports: a port A, and a port B. A single attachment includes a port S. (SMT)

attenuation. (1) Level of optical power loss expressed in units of dB. (SMFPMD) (2) The level of optical power loss expressed in units of dB. (PMD)

average power. The optical power measured using an average reading power meter when the FDDI station is transmitting a stream of Halt symbols. (SMFPMD) (PMD)

B

backup path. In an IBM Token-Ring Network, an alternative path for signal flow through access units and their main ring path cabling. The backup path allows recovery of the operational portion of the network while problem determination procedures are being performed.

balun. A transformer used to connect balanced cables, such as twisted-pair cables, to unbalanced cables, such as coaxial cables, by matching the electrical characteristics of the cables.

bandwidth. (1) The difference, expressed in hertz, between the highest and the lowest frequencies of a range of frequencies. For example, analog transmission by recognizable voice telephone requires a bandwidth of about 3000 hertz (3 kHz). (2) The bandwidth of an optical link designates the information-carrying capacity of the link and is related to the maximum bit rate that a fiber link can support.

baseband. (1) A frequency band that uses the complete bandwidth of a transmission medium. Contrast with *broadband*, *carrierband*. (2) A method of data transmission that encodes, modulates, and impresses information on the transmission medium without shifting or altering the frequency of the information signal.

Basic Input/Output System (BIOS). In IBM personal computers with PC I/O channel architecture, microcode that controls basic hardware operations such as interactions with diskette drives, fixed disk drives, and the keyboard.

baud. The rate at which signal conditions are transmitted per second. Contrast with *bits per second (bps)*.

beaconing. An error-indicating function of token-ring adapters that assists in locating a problem causing a hard error on a token-ring network.

BER. Bit error rate.

bit error rate (BER). The ratio of the number of bits experiencing error on a telecommunications link divided by the number of bits sent over the link.

bits per second (bps). The rate at which bits are transmitted per second. Contrast with *baud*.

bridge. (1) An attaching device that connects two LAN segments to allow the transfer of information from one LAN segment to the other. A bridge may connect the LAN segments directly by network adapters and software in a single device, or may connect network adapters in two separate devices through software and use of a telecommunications link between the two adapters. (2) A functional unit that connects two LANs that use the same logical link control (LLC) procedures but may use the same or different medium access control (MAC) procedures. (T) Contrast with *gateway* and *router*.

bridge number. The bridge identifier that the user specifies in the bridge program configuration file. The bridge number distinguishes among parallel bridges. Parallel bridges connect the same two LAN segments.

broadband. (1) A frequency band between any two non-zone frequencies. (2) A frequency band divisible into several narrower bands so that different kinds of transmissions such as voice, video, and data transmission can occur at the same time. Synonymous with *wideband*. Contrast with *baseband*, *carrierband*.

broadband local area network (LAN). A local area network (LAN) in which information is encoded, multiplexed, and transmitted through modulation of a carrier. (T)

buffer. (1) A portion of storage used to hold input or output data temporarily. (2) A routine or storage used to compensate for a difference in data rate or time of occurrence of events, when transferring data from one device to another. (A)

building cable. The permanently installed cable within a building that interconnects offices to wiring closets, wiring closets to wiring closets, and wiring closets to computer rooms of building entrances.

bus. (1) In a processor, a physical facility on which data is transferred to all destinations, but from which only addressed destinations may read in accordance with appropriate conventions. (I) (2) A network configuration in which nodes are interconnected through a bidirectional transmission medium. (3) One or more conductors used for transmitting signals or power. (A)

bypass. (1) The ability of a station to be optically isolated from the network while maintaining the integrity of the ring. (SMFPMD) (PMD) (2) The ability of a node to optically isolate itself from the FDDI network while maintaining the continuity of the cable plant. (SMT)

byte. (1) A string that consists of a number of bits, treated as a unit, and representing a character. (T) (2) A binary character operated upon as a unit and usually shorter than a computer word. (A) (3) A string that consists of a particular number of bits, usually 8, that is treated as a unit, and that represents a character. (4) A group of 8 adjacent binary digits that represent one extended binary-coded decimal interchange code (EBCDIC) character. (5) See *n-bit byte*.

C

cable loss. The amount of radio frequency (RF) signal attenuation caused by a cable. See *attenuation*.

cable loss (optical). The loss in an optical cable equals the attenuation coefficient for the cabled fiber times the cable length.

cable segment. A section of cable between components or devices on a network. A segment may consist of a single patch cable, multiple patch cables connected together, or a combination of building cable and patch cables connected together. See *LAN segment*, *ring segment*.

capture. The act of removing a token from the ring for the purpose of frame transmission. (MAC)

carrier. A wave or pulse train that may be varied by a signal bearing information to be transmitted over a communication system.

carrierband. A frequency band in which the modulated signal is superimposed on a carrier signal (as differentiated from baseband), but only one channel is present on the medium (as differentiated from broadband). Contrast with *baseband*, *broadband*.

CBX. Computerized branch exchange.

center wavelength. The average of the two wavelengths measured at the half amplitude points of the power spectrum. (PMD)

central wavelength. The weighted average wavelength of the active output interface optical spectrum. (SMFPMD)

channel. (1) A functional unit, controlled by a host computer, that handles the transfer of data between processor storage and local peripheral equipment. (2) A path along which signals can be sent. (3) The portion of a storage medium that is accessible to a given reading or writing station. (4) In broadband transmission, a designation of a frequency band 6 MHz wide.

cladding. The optical material surrounding the core of an optical fiber which has a lower index of refraction than the core.

claim token. A process whereby one or more stations bid for the right to initialize the ring. (MAC)

closed network. Synonym for *closed path*.

closed path. A network in which all of the cable paths and wiring closets are directly or indirectly connected. Synonymous with *closed network*.

CNM. Communication network management.

code group. The specific sequence of five code bits representing a DLL symbol. (PHY) does not have a state transition at the mid-bit point.

code-bit. The smallest signaling element used by the physical layer for transmission on the medium. (SMFPMD) (SMT) (PMD) (PHY)

component. (1) Any part of a network other than an attaching device, such as an IBM 8228 Multistation Access Unit. (2) Hardware or software that is part of a functional unit.

computer architecture. The organizational structure of a computer system, including hardware and software. (A)

computerized branch exchange (CBX). An exchange in which a central node acts as a high-speed switch to establish direct connections between pairs of attached nodes.

concentrator. (1) An FDDI node that provides additional attachment points for stations that are not part of the dual ring. (SMFPMD) (PMD) (2) An FDDI node that has additional points beyond those required for its own attachment to an FDDI network. These additional ports are for attaching other FDDI nodes (including other concentrators) in a tree topology. (SMT) (3) A node on the FDDI ring, which in turn provides connections for additional conforming FDDI stations so that they may communicate with other attachments to the FDDI ring. A conventrator has physical layer entities and may or may not have one or more data link layer entities. (PHY)

configuration. (1) The arrangement of a computer system or network as defined by the nature, number, and chief characteristics of its functional units. More specifically, the term may refer to a hardware configuration or a software configuration. (I) (A) (2) The devices and programs that make up a system, subsystem, or network. (3) See also *system configuration*.

connect. In a LAN, to physically join a cable from a station to an access unit or network connection point. Contrast with *attach*.

connecting blocks. Fixtures used to terminate telephone wires in a wiring closet.

connection management (CMT). That portion of the station management (SMT) function that controls network insertion, removal, and connection of PHY and MAC entities within a station. (PHY)

controller. A unit that controls input/output operations for one or more devices.

converter. In an IBM Token-Ring Network, a device that converts electronic signals to light pulses or vice versa for use in an optical fiber subsystem.

core. The central region of an optical fiber through which light is transmitted.

counter-rotating. An arrangement whereby two signal paths, one in each direction, exist in a ring topology. (SMT)

CRC. Cyclic redundancy check.

crosstalk. The disturbance caused in a circuit by an unwanted transfer of energy from another circuit. (T)

cut-off wavelength. In an optical fiber, the wavelength above which light propagates only in a single mode.

Note: The cut-off wavelength of cabled optical fiber, l_{cc}, is typically lower that the cut-off wavelength of uncabled optical fiber. (SMFPMD)

D

DAS. Dual attached station (see *dual station*).

data. (1) A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by human or automatic means. (I) (A) (2) Any representations such as characters or analog quantities to which meaning is or might be assigned. (A)

data communication. (1) Transfer of information between functional units by means of data transmission according to a protocol. (T) (2) The transmission, reception, and validation of data. (A)

data rate. See *data transfer rate, line data rate*.

data transfer rate. The average number of bits, characters, or blocks per unit of time passing between equipment in a data-transmission session. (I) The rate is expressed in bits, characters, or blocks per second, minute, or hour.

data transmission. The conveying of data from one place for reception elsewhere by means of telecommunications. (I)

dB. Decibel.

dBkm. Decibels per kilometer.

dBm. Decibels based on 1 milliwatt.

dBmV. Decibels based on 1 millivolt.

data dependant jitter (DDJ). Jitter that is related to the transmitted symbol sequence. DDJ is caused by the limited bandwidth characteristics and imperfections in the optical channel components. DDJ results from non-ideal individual pulse responses and from variation in the average value of the encoded pulse sequence which may cause base-line wander and may change the sampling threshold level in the receiver. (SMFPMD) (PMD)

DDL. Data link layer. (SMFPMD)

decibel (dB). (1) One tenth of a bel. (2) A unit that expresses the ratio of two power levels on a logarithmic scale. (3) A unit for measuring relative power. The number of decibels is 10 times the logarithm (base 10) of the ratio of the measured power levels; if the measured levels are voltages (across the same or equal resistance), the number of decibels is 20 times the log of the ratio. See also *neper*.

decibels based on 1 milliwatt (dBm). A unit of absolute power measurement that is scaled such that 0 dBm equals 1 milliwatt.

default. Pertaining to an attribute, value, or option that is assumed when none is explicitly specified.

destination. Any point or location, such as a node, station, or particular terminal, to which information is to be sent.

destination address. A field in the medium access control (MAC) frame that identifies the physical location to which information is to be sent. Contrast with *source address*.

device. (1) A mechanical, electrical, or electronic contrivance with a specific purpose. (2) An input/output unit such as a terminal, display, or printer. See also *attaching device.*

diagnostics. Modules or tests used by computer users and service personnel to diagnose hardware problems.

disk operating system (DOS). An operating system for computer systems that use disks and diskettes for auxiliary storage of programs and data.

distribution panel. A wiring board that provides a patch panel function and mounts in a rack. See also *patch panel*.

DOS. Disk operating system.

downstream. (1) On an IBM Token-Ring Network, the direction of data flow. (2) In the direction of data flow or toward the destination of transmission. Contrast with *upstream*.

drop. A cable that leads from a faceplate to the distribution panel in a wiring closet. When the IBM Cabling System is used with the IBM Token-Ring Network, a drop may form part of a lobe. See also *lobe.*

dual attachment concentrator. A concentrator that offers a dual attachment to the FDDI network and is capable of accommodating a dual (counter-rotating) ring. (SMT)

dual attachment station. A station that offers a dual attachment to the FDDI network and is capable of accommodating a dual (counter-rotating) ring. (SMT)

dual ring (FDDI dual ring). A pair of counter-rotating logical rings. (SMT)

dual station (or dual attachment station). A station that offers two attachments to the FDDI network which are capable of accommodating a dual (counter-rotating) ring. It may offer additional attachments (see *concentrator*). (SMFPMD) (PMD)

duty cycle distortion jitter (DCD). Distortion usually caused by propagation delay differences between low-to-high and high-to-low transitions. DCD is manifested as a pulse width distortion of the nominal baud time. (SMFPMD) (PMD)

E

electromagnetic interference (EMI). A disturbance in the transmission of data on a network resulting from the magnetism created by a current of electricity.

EMI. Electromagnetic interference.

enterprise. A business or organization that consists of two or more sites separated by a public right-of-way or a geographical distance. Contrast with *establishment*.

entity. (1) An active functional agent within an Open System Interconnection (OSI) layer or sublayer, including both operational and management functions. (MAC) (2) An active service or management element within an Open Systems Interconnection (OSI) layer or sublayer. (SMT) (3) An active element within an Open System Interconnection (OSI) layer, or sublayer; or SMT, in a specific station. (PHY)

equipment rack. A metal stand for mounting network components, such as distribution panels and IBM 8228 Multistation Access Units. Synonymous with *rack*.

establishment. A user's premises that do not extend across public rights of way (for example, a single office building, warehouse, or campus). Contrast with *enterprise*.

Ethernet network. A baseband LAN with a bus topology in which messages are broadcast on a coaxial cable using a carrier sense multiple access/collision detection (CSMA/CD) transmission method.

exception. An abnormal condition such as an I/O error encountered in processing a data set or a file. See also *overflow exception* and *underflow exception*.

extinction ratio. The ratio of the low, or off optical power level, (P_L) to the high, or on optical power level (P_H) when the station is transmitting a stream of Halt symbols. (SMFPMD) (PMD)

Extinction Ratio (%)=(P_L/P_H)*100

F

faceplate. A wall-mounted or surface-mounted plate for connecting data and voice connectors to a cabling system.

fault. An accidental condition that causes a functional unit to fail to perform its required function. (I) (A)

fiber. (1) Dielectric material that guides light; waveguide (see *multimode and single-mode fiber*). (SMFPMD) (2) Dielectric material that guides light; waveguide. (PMD)

fiber budget. The optical power loss as a result of the number of connections in the optical fiber link subtracted from the working budget. The loss as a result of connections includes the connector loss and the splice loss. The fiber budget is expressed in decibels.

fiber distributed data interface (FDDI).
A high-performance, general-purpose, multi-station network designed for efficient operation with a peak data transfer rate of 100 Mbps. It uses token-ring architecture with optical fiber as the transmission medium over distances of several kilometers.

fiber optic cable. (1) A jacketed fiber(s). (SMFPMD) (PMD) (2) A cable containing one or more optical fibers. (SMT)

fiber optics. The technology whereby optical signals from light-generating transmitters are propagated through optical fiber waveguides to light-detecting receivers. (MAC) (PHY)

field. On a data medium or a storage medium, a specified area used for a particular category of data; for example, a group of character positions used to enter or display wage rates on a panel. (T)

file. A named set of records stored or processed as a unit. (T)

file server. A high-capacity disk storage device or a computer that each computer on a network can access to retrieve files that can be shared among the attached computers.

filter. A device or program that separates data, signals, or material in accordance with specified criteria. (A)

flag. A character or indicator that signals the occurrence of some condition, such as the setting of a switch, or the end of a word. (A)

FOTP. Fiber optic test procedure. (SMFPMD)

frame. (1) The unit of transmission in some LANs, including the IBM Token-Ring Network and the IBM PC Network. It includes delimiters, control characters, information, and checking characters. On a token-ring network, a frame is created from a token when the token has data appended to it. On a token bus network (IBM PC Network), all frames including the token frame contain a preamble, start delimiter, control address, optional data and checking characters, end delimiter, and are followed by a minimum silence period. (2) A protocol data unit transmitted between cooperating MAC entities on a ring, consisting of a variable number of octets. (PHY)

G

gateway. A device and its associated software that interconnect networks or systems of different architectures. The connection is usually made above the reference model network layer. For example, a gateway allows LANs access to System/370 host computers. Contrast with *bridge* and *router*.

group. (1) A set of related records that have the same value for a particular field in all records. (2) A collection of users who can share access authorities for protected resources. (3) A list of names that are known together by a single name.

H

hard error. An error condition on a network that requires that the source of the error be removed or that the network be reconfigured before the network can resume reliable operation. See also *beaconing*. Contrast with *soft error*.

hardware. Physical equipment as opposed to programs, procedures, rules, and associated documentation. (I) (A)

header. The portion of a message that contains control information for the message such as one or more destination fields, name of the originating station, input sequence number, character string indicating the type of message, and priority level for the message.

hertz (Hz). A unit of frequency equal to one cycle per second.
Note: In the United States, line frequency is 60Hz or a change in voltage polarity 120 times per second; in Europe, line frequency is 50Hz or a change in voltage polarity 100 times per second.

hierarchical network. A multiple-segment network configuration providing only one path through intermediate segments between source segments and destination segments. Contrast with *mesh network*.

host computer. (1) The primary or controlling computer in a multi-computer installation or network. (2) In a network, a processing unit in which resides a network access method. Synonymous with *host processor*.

host processor. Synonym for *host computer*.

Hz. Hertz.

I

impedance. The combined effect of resistance, inductance, and capacitance on a signal at a particular frequency.

initialize. In a LAN, to prepare the adapter (and adapter support code, if used) for use by an application program.

input/output (I/O). (1) Pertaining to a device whose parts can perform an input process and an output process at the same time. (I) (2) Pertaining to a functional unit or channel involved in an input process, output process, or both, concurrently or not, and to the data involved in such a process.

insert. To make an attaching device an active part of a LAN.

interchannel isolation. The ability to prevent undesired optical energy from appearing in one signal path as a result of coupling from another signal path; cross talk. (SMFPMD) (PMD)

interface. (1) A shared boundary between two functional units, defined by functional characteristics, common physical interconnection characteristics, signal characteristics, and other characteristics as appropriate. (I) (2) A shared boundary. An interface may be a hardware component to link two devices or a portion of storage or registers accessed by two or more computer programs. (A) (3) Hardware, software, or both, that links systems, programs, or devices.

interference. (1) The prevention of clear reception of broadcast signals. (2) The distorted portion of a received signal.

J

jabber. Transmission by a data station beyond the time interval allowed by the protocol. (T)

jack. A connecting device to which a wire or wires of a circuit may be attached and which is arranged for insertion of a plug.

jumper. A connector between two pins on a network adapter that enables or disables an adapter option, feature, or parameter value.

jumper cable. Synonym for *patch cable*.

K

kilobit (Kb). One thousand binary digits.

kilobyte (KB). 1024 bytes for processor and data storage (memory) size; otherwise, 1000 bytes.

L

LAN multicast. The sending of a transmission frame intended to be accepted by a group of selected data stations on the same LAN.

LAN segment. (1) Any portion of a LAN (for example, a single bus or ring) that can operate independently but is connected to other parts of the establishment network via bridges. (2) An entire ring or bus network without bridges. See *cable segment*, *ring segment*.

LAT. Local area transport. Synonymous with *waiting time*. See also *ring latency*.

layer. (1) One of the seven levels of the Open Systems Interconnection reference model. (2) In open systems architecture, a collection of related functions that comprise one level of hierarchy of functions. Each layer specifies its own functions and assumes that lower level functions are provided. (3) In SNA, a grouping of related functions that are logically separate from the functions of other layers. Implementation of the functions in one layer can be changed without affecting functions in other layers.

line data rate. The rate of data transmission over a telecommunications link.

link loss. The optical power loss due to fiber attenuation and losses in splices and connectors; usually expressed in dB.

link margin. In an optical fiber link, the unused portion of the working budget. See also *fiber budget*.

lobe. In the IBM Token-Ring Network, the section of cable (which may consist of several cable segments) that connects an attaching device to an access unit.

lobe receptacle. In the IBM Token-Ring Network, an outlet on an access unit for connecting a lobe.

local area network (LAN). A computer network located on a user's premises within a limited geographical area. **Note:** Communication within a local area network is not subject to external regulations; however, communication across the LAN boundary may be subject to some form of regulation. (T)

locally administered address. An adapter address that the user can assign to override the universally administered address. Contrast with *universally administered address*.

logical ring. (1) The set of MACs serially connected to form a single ring. A fault-free FDDI network provides two logical rings. (SMT)

loop. A closed unidirectional signal path connecting input/output devices to a network.

M

MAC. Medium access control. (SMFPMD)

main ring path. In the IBM Token-Ring Network, the part of the ring made up of access units, repeaters, converters, and the cables connecting them. See also *backup path*.

Mb. Megabit.

MB. Megabyte.

media access control (MAC). The portion of the data link layer responsible for scheduling and routing data transmissions on a local area network (e.g., an FDDI ring).

media interface connector (MIC). An optical fiber connector which connects the fiber media to the FDDI attachment. The MIC consists of two halves, a plug and a receptacle. (SMFPMD) (SMT) (PMD)

medium. A physical carrier of electrical or optical energy.

megabit (Mb). A unit of measure for throughput. 1 megabit = 1 048 576 bits.

megabyte (MB). A unit of measure for data. 1 megabyte = 1 048 576 bytes.

megahertz (MHz). A unit of measure of frequency. 1 megahertz = 1 000 000 hertz.

mesh network. A multiple-segment network configuration providing more than one path through intermediate LAN segments between source and destination LAN segments. Contrast with *hierarchical network*.

MHz. Megahertz.

mode field diameter. Is a measure of the width of the guided optical power's intensity distribution in the core and the cladding of a single-mode fiber. (SMFPMD)

modulation. (1) The process by which a characteristic of a signal is varied according to a characteristic of another signal. (2) The process by which a message signal is impressed upon a carrier signal so that the carrier is altered to represent the message signal.

multicast address. See *LAN multicast*.

multimode fiber (MMF). An optical fiber waveguide usually characterized by a core diameter of 50 to 100 µm that will allow a large number of modes to propagate. (SMFPMD)

N

NA. Numerical aperture.

n-bit byte. A string that consists of n bits. (T)

neper. A unit for measuring power. The number of nepers is the logarithm (base e) of the ratio of the measured power level.

network. (1) A configuration of data processing devices and software connected for information interchange. (2) An arrangement of nodes and connecting branches. Connections are made between data stations. (T)

network (FDDI network). A collection of FDDI nodes interconnected to form a trunk, or a tree, or a trunk ring with multiple trees. This topology is sometimes called a dual ring of trees. (SMT)

network administrator. A person who manages the use and maintenance of a network.

network application program. A program used to connect and communicate with adapters on a network, enabling users to perform application-oriented activities and to run other application programs.

network architecture. The logical structure and operating principles of a computer network. (T) See also *systems network architecture (SNA)* and *Open Systems Interconnection (OSI) architecture*.
Note: The operating principles of a network include those of services, functions, and protocols.

Network Basic Input/Output System (NETBIOS). A message interface used on LANs to provide message, print server, and file server functions. The IBM NETBIOS application program interface (API) provides a programming interface to the LAN so that an application program can have LAN communication without knowledge and responsibility of the data link control (DLC) interface.

network management. The conceptual control element of a station that interfaces with all of the architectural layers of that station and is responsible for the resetting and setting of control parameters, obtaining reports of error conditions, and determining if the station should be connected to or disconnected from the network.

network management vector transport. The portion of an alert transport frame that contains the alert message.

network manager. A program or group of programs that is used to monitor, manage, and diagnose the problems of a network.

network wiring closet. See *wiring closet*.

nm. Nanometers.

node. A generic term applying to an active element in an FDDI network (station, or concentrator). (SMT)

noise. (1) A disturbance that affects a signal and that can distort the information carried by the signal. (T) (2) Random variations of one or more characteristics of

any entity, such as voltage, current, or data. (A) (3) Loosely, any disturbance tending to interfere with normal operation of a device or system. (A)

nonreturn to zero (NRZ). A technique in which a polarity level high, or low, represents a logical “1” (one), or “0” (zero).

nonreturn to zero invert to ones (NRZI). A technique in which a polarity transition represents a logical “1” (one). The absence of a polarity transition denotes a logical “0” (zero). (PHY)

NRZI. Non-return-to-zero inverted transmission (SMFPMD).

ns. Nanosecond.

numerical aperture (NA). The sine of the radiation or acceptance half angle of an optical fiber, multiplied by the refractive index of the material in contact with the entrance face. (PMD)

O

OD. Outdoor.

open. (1) To make an adapter ready for use. (2) A break in an electrical circuit. (3) To make a file ready for use.

Open Systems Interconnection (OSI) reference model. A model that represents the hierarchical arrangement of the seven layers described by the Open Systems Interconnection architecture.

operating system. Software that controls the execution of programs. An operating system may provide services such as resource allocation, scheduling, input/output control, and data management. (A) Examples are IBM PC DOS and IBM OS/2.

optical budget. The amount of optical power launched into an optical fiber less the receive sensitivity of the receiver. This difference is the permissible loss in the cable plant and patch cables (See also *fiber budget*).

optical fall time. The time interval for the falling edge of an optical pulse to transition from 90% to 10% of the puls amplitude. (SMFPMD) (PMD)

optical fiber. A small-diameter strand made from glass and/or polymer that consists of a core surrounded by a lower-index-of-refraction cladding. It guides light from one end to another by a combination of a graded index in the core and internal reflectance.

optical fiber cable. One or more optical fibers aligned with each other, with strengthening material and a protective cover.

optical fiber connector. Hardware installed on optical fiber cable ends to provide physical attachment of the cable to a transmitter, a receiver, or a communication patch panel.

optical reference plane. The plane that defines the optical boundary between the MIC plug and the MIC receptacle. (SMFPMD) (PMD)

optical return loss (ORL). The ratio (expressed in units of dB) of optical power reflected by a component or an assembly to the optical power incident on a component port when that component or assembly is introduced into a link or system. (SMFPMD)

optical rise time. The time interval for the rising edge of an optical pulse to transition from 10% to 90% of the pulse amplitude. (SMFPMD) (PMD)

option. (1) A specification in a statement, a selection from a menu, or a setting of a switch, that may be used to influence the execution of a program. (2) A hardware or software function that may be selected or enabled as part of a configuration process. (3) A piece of hardware (such as a network adapter) that can be installed in a device to modify or enhance device function.

OTDR. Optical time domain reflector.

output device. A device in a data processing system by which data can be received from the system. (I) (A) Synonymous with *output unit*.

output unit. Synonym for *output device*.

P

P. Primary.

page. (1) The complete set of formatted information that appears in a single display on a visual display unit. (2) To move back and forth among the pages of a multiple-page panel. See also *scroll*.

parameter. (1) A variable that is given a constant value for a specified application and that may denote the application. (I) (A) (2) An item in a menu or for which the user specifies a value or for which the system provides a value when the menu is interpreted. (3) Data passed between programs or procedures.

patch cable. A length of cable. with data connectors at both ends that is normally used to interconnect two sections of building cable at a patch panel or to connect a product to the building cable. Synonymous with *jumper cable*.

patch panel. An organized concentration of cable terminations, usually mounted in a flat panel, that facilitates the interconnection of communication cables.

path. (1) In a network, any route between any two nodes. (T) (2) The route traversed by the information exchanged between two attaching devices in a network.

PC. Personal Computer.

PC network. An IBM broadband or baseband LAN with a bus topology in which messages are broadcast from PC network adapter to PC network adapter.

PHY. physical layer protocol standard. (SMFPMD)

physical connection. The full-duplex physical layer association between adjacent PHY entities (in concentrators, repeaters, or stations) in an FDDI ring, i.e., a pair of physical links. (SMFPMD) (PMD) (SMT)

physical layer. In the Open Systems Interconnection reference model, the layer that provides the mechanical, electrical, functional, and procedural means to establish, maintain, and release physical connections over the transmission medium. (T)

physical link. The simplex path (through PMD and attached medium) from the transmit function of one PHY entity to the receive function of an adjacent PHY entity (in concentrators, repeaters, or stations) in an FDDI ring. (PHY) (SMFPMD) (SMT) (PMD)

plug. (1) A connector designed to insert into a receptacle or socket. (2) To insert a connector into a receptacle or socket.

PMD. Physical medium dependent standard. (SMFPMD)

pointer. (1) An identifier that indicates the location of an item of data. (A) (2) A data element that indicates the location of another data element. (T) (3) A physical or symbolic identifier of a unique target.

port. (1) An access point for data entry or exit. (2) A connector on a device to which cables for other devices such as display stations and printers are attached. Synonymous with *socket*. (3) A PHY entity and a PMD entity in a node, together creating a PHY/PMD pair, that may connect to the fiber media and provide one end of a physical connection with another node. (SMT)

power budget. See *fiber budget*.

primitive. An element of the services provided by one entity to another. (SMFPMD) (SMT) (PMD) (PHY)

PROM. Programmable read-only memory.

protocol. (1) A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication. (I) (2) In SNA, the meanings of and the sequencing rules for requests and responses used for managing the network, transferring data, and synchronizing the states of network components. (3) A specification for the format and relative timing of information exchanged between communicating parties.

protocol data unit (PDU). Information delivered as a unit between peer entities that may contain control information, address information and data (e.g., a service data unit from a higher layer). (PHY)

R

R. Riser.

rack. Synonym for *equipment rack*.

radio frequency (RF). Any frequency in the range within which radio waves may be transmitted, from about 10 KHz to about 300 000 MHz.

random jitter (RJ). RJ is due to thermal noise and may be modeled as a Gaussian process. The peak-peak value of RJ is of a probabilistic nature and thus any specific value requires an associated probability. (SMFPMD) (PMD)

receive. The action of a station in accepting a frame, token, or control sequence from the medium. (PHY)

receiver. An optoelectronic circuit that converts an optical signal to an electrical logic signal. (SMFPMD) (PMD)

receiver (optical). An optoelectronic circuit that converts an optical signal to an electrical logic signal. (SMT)

receptacle. Electrically, a fitting equipped to receive a plug and used to complete a data connection or electrical path. See also *lobe receptacle.*

remove. (1) To take an attaching device off a network. (2) To stop an adapter from participating in data passing on a network.

repeat. The act of a station in receiving a code-bit stream (e.g., frame or token) from an upstream station and placing it on the medium to the next station. The station repeating the code-bit stream examines it and may copy it into a buffer and modify control indicators as appropriate. (PHY)

repeater. (1) In a network, a device that amplifies or regenerates data signals in order to extend the distance between attaching devices. (2) A physical layer relay in an FDDI network.

RI. Ring-in.

ring-in (RI). In an IBM Token-Ring Network, the receive or input receptacle on an access unit or repeater.

ring latency. In an IBM Token-Ring Network, the time, measured in bit times at the data transmission rate, required for a signal to propagate once around the ring. ring latency includes the signal propagation delay through the ring medium, including drop cables, plus the sum of propagation delays through each data station connected to the token-ring network. (T)

ring network. A network configuration in which a series of attaching devices is connected by unidirectional transmission links to form a closed path. A ring of an IBM Token-Ring Network is referred to as a LAN segment or as a token-ring network segment.

ring-out (RO). In an IBM Token-Ring Network, the transmit or output receptacle on an access unit or repeater.

ring segment. A ring segment is any section of a ring that can be isolated (by unplugging connectors) from the rest of the ring. A segment can consist of a single lobe, the cable between access units, or a combination of cables, lobes, and/or access units. See *cable segment*, *LAN segment*.

ring sequence. The order in which devices are attached to a ring network.

RO. Ring-out.

router. An attaching device that connects two LAN segments, which use similar or different architectures, at the reference model network layer. Contrast with *bridge* and *gateway*.

routine. Part of a program, or a sequence of instructions called by a program, that may have some general or frequent use.

routing. (1) The assignment of the path by which a message will reach its destination. (2) The forwarding of a message unit along a particular path through a network, as determined by the parameters carried in the message unit, such as the destination network address in a transmission header.

S

S. Secondary.

SAS. Single attached station.

scroll. To move all or part of the display image vertically or horizontally to display data that cannot be observed within a single display image. See also *page (2)*.

SDU. See *service data unit*.

segment. See *cable segment*, *LAN segment*, *ring segment*.

server. (1) A device, program, or code module on a network dedicated to providing a specific service to a network. (2) On a LAN, a data station that provides facilities to other data stations. Examples are a file server, print server, and mail server.

service data unit (SDU). The unit of data transfer between a service user and a service provider. (PHY)

services. (1) The services provided by one entity to a higher entity or to SMT. (SMFPMD) (PMD) (PHY)
(2) The services provided by one entity to another. Data services are provided to a higher layer entity; management services are provided to a management entity in the same or another layer. (SMT)

signal. (1) A time-dependent value attached to a physical phenomenon for conveying data. (2) A variation of a physical quantity, used to convey data.

single attachment concentrator. A concentrator that offers a single attachment to the FDDI network. (SMT)

single station (or single attachment station). A station that offers one attachment to the FDDI network. (SMFPMD)

single-mode fiber (SMF). Single-mode fiber is an optical fiber waveguide usually characterized by a very small mode field diameter (9-10 μm). When operated above its cut-off wavelength, it propagates only a single mode (see *cut-off wavelength*). (SMFPMD)

SMF. See *single-mode fiber*.

SMFPMD. Single-mode fiber physical layer medium dependent

SNA. Systems Network Architecture.

SNMP. Simple network management protocol.

socket. Synonym for *port (2)*.

soft error. An intermittent error on a network that causes data to have to be transmitted more than once to be received. A soft error affects the network's performance but does not, by itself, affect the network's overall reliability. If the number of soft errors becomes excessive, reliability is affected. Contrast with *hard error*.

source address. A field in the medium access control (MAC) frame that identifies the location from which information is sent. Contrast with *destination address*.

spectral width, full width half maximum (FWHM). The absolute difference between the wavelengths at which the spectral radiant intensity is 50% of the maximum power. (PMD)

spectral width-RMS. The weighted root mean square (RMS) width of the active output interface optical spectrum. (SMFPMD)

station. (1) A communication device attached to a network. The term used most often in LANs is an *attaching device* or *workstation*. (2) An input or output point of a system that uses telecommunication facilities. See also *attaching device, workstation*. (3) An addressable node on an FDDI network capable of transmitting, repeating and receiving information.
A station has exactly one SMT, at least one MAC, at least one PHY, and at least one PMD. (SMT)

station management (SMT). The entity within a station on the ring that monitors station activity and exercises overall appropriate control of station activity. (PHY)

subsystem. A secondary or subordinate system, or programming support, usually capable of operating independently of or asynchronously with a controlling system.

symbol. (1) The smallest signalling element used by MAC, i.e., the PHY SDU. The symbol set consists of 16 data symbols and 8 control symbols. Each symbol maps to a specific sequence of five code bits as transmitted by the physical layer. (MAC) (2) The smallest signalling element used by the data link layer (DDL). The symbol set consists of 16 data symbols and 8 control symbols. Each symbol corresponds to a specific sequence of code bits (code group) to be transmitted by the physical layer. (PHY)

synchronous. (1) Pertaining to two or more processes that depend on the occurrences of a specific event such as common timing signal. (I) (A) (2) Occurring with a regular or predictable timing relationship. (3) A class of data transmission service whereby each requester is preallocated a maximum bandwidth and guaranteed a response time not to exceed a specific delay. (MAC)

system configuration. A process that specifies the devices and programs that form a particular data processing system.

Systems Network Architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through, and controlling the configuration and operation of, networks.
Note: The layered structure of SNA allows the ultimate origins and destinations of information, that is, the end users, to be independent of and unaffected by the specific SNA network services and facilities used for information exchange.

T

tailgate. The area of a computer or control unit where I/O cables are connected.

TCP/IP. Transmission Control Protocol/Internet Protocol.

telephone twisted pair. One or more twisted pairs of copper wire in the unshielded voice-grade cable commonly used to connect a telephone to its wall jack. Also referred to as “unshielded twisted pair” (UTP).

token. An explicit indication of the right to transmit on a shared medium. On a token-ring the token circulates sequentially through the stations in the ring. At any time, it may be held by zero or one station. FDDI uses two classes of tokens: restricted and nonrestricted. (MAC)

token-ring. A network with a ring topology that passes tokens from one attaching device (node) to another. A node that is ready to send can capture a token and insert data for transmission.

token-bus network. A bus network in which a token-passing procedure is used. (T)

token-ring network. (1) A ring network that allows unidirectional data transmission between data stations by a token-passing procedure over one transmission medium so that the transmitted data returns to and is removed by the transmitting station. (T) The IBM Token-Ring Network is a baseband LAN with a star-wired ring topology that passes tokens from network adapter to network adapter. (2) A network that uses a ring topology, in which tokens are passed in a sequence from node to node. A node that is ready to send can capture the token and insert data for transmission. (3) A group of interconnected token-rings.

topology. The physical or logical arrangement of nodes in a computer network. Examples include ring topology and bus topology.

trace. (1) A record of the execution of a computer program. It exhibits the sequences in which the instructions were executed. (2) A record of the frames and bytes transmitted on a network.

transmission medium. (1) A physical carrier of electrical energy or electromagnetic radiation. (2) The physical medium that conveys data between data stations; for example, twisted-pair wire, optical fiber, coaxial cable. (T)

transmit. (1) The action of a station in generating a token, frame, or other symbol sequence and placing it on the outgoing medium. (MAC) (2) The action of a station that consists of generating a frame, token, or control sequence, and placing it on the medium to the next station. (PHY)

transmitter. (1) A circuit used in data communication applications to send information from one place for reception elsewhere. (2) The device in which the transmission circuits are housed.

transmitter (optical). An optoelectronic circuit that converts an electrical logic signal to an optical signal. (SMT)

tree. A physical topology consisting of a hierarchy of master-slave connections between a concentrator and other FDDI nodes (including subordinate concentrators). (SMT)

trunk. A physical loop topology, either open or closed, employing two optical fiber signal paths, one in each direction (i.e., counter-rotating), forming a sequence of peer connections between FDDI nodes. When the trunk

forms a closed loop it is sometimes called a trunk ring. (SMT)

twisted pair. A transmission medium that consists of two insulated conductors twisted together to reduce noise. (T)

U

unattended mode. A mode in which no operator is present or in which no operator station is included at system generation.

underflow exception. A condition caused by the result of an arithmetic operation having a magnitude less than the smallest possible nonzero number.

universal service ordering code (USOC). This is the industrial standard for the voice transmission for USA.

universally administered address. The address permanently encoded in an adapter at the time of manufacture. All universally administered addresses are unique. Contrast with *locally administered address*.

unshielded twisted pair (UTP). See *telephone twisted pair*.

upstream. On an IBM Token-Ring Network, the direction opposite that of data flow. Contrast with *downstream*.

V

variable. (1) In computer programming, a character or group of characters that refers to a value and, in the execution of a computer program, corresponds to an address. (2) A quantity that can assume any of a given set of values. (A)

W

wideband. Synonym for *broadband*.

wiring closet. A room that contains one or more distribution panels and equipment racks that are used to interconnect cables. Sometimes called a *network wiring closet* to distinguish it from a telephone wiring closet.

wiring concentrator. A unit that allows multiple attaching devices access to the ring at a central point such as a wiring closet or in an open work area. A star-wired ring consists of one or more concentrators connected together to form a ring. See also *access unit*.

work area. An area in which terminal devices (such as displays, keyboards, and printers) are located. Access units may also be located in work areas.

working budget. The allowable optical power loss in an optical fiber link, including cables, splices, and connectors. It takes into account things such as bit error rate (BER), dispersion penalties, retiming penalty, aging, temperature, and other tolerances (See also *fiber budget*).

workstation. (1) An I/O device that allows either transmission of data or the reception of data (or both) from a host system, as needed to perform a job: for example, a display station or printer. (2) A configuration of I/O equipment at which an operator works. (T) (3) A terminal or microcomputer, usually one connected to a mainframe or network, at which a user can perform tasks.

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