8260 Nways Multiprotocol Switching Hub

ATM 622 Mbps Module Installation and User's Guide

SA33-0438-00

8260 Nways Multiprotocol Switching Hub

ATM 622 Mbps Module Installation and User's Guide

SA33-0438-00

Note!

Before using this information and the product it supports, be sure to read the general information in Appendix C, “Notices” on page 53.

First Edition (June 1997)

The information contained in this booklet is subject to change from time to time. Any such changes will be reported in subsequent revisions.

Order publications through your IBM representative or the IBM branch office serving your locality. Publications are not stocked at the address given below.

A form for readers' comments appears at the back of this publication. If the form has been removed, address your comments to:

IBM France
Centre d'Etudes et Recherches
Service 0798 - BP 79
06610 La Gaude
France

- FAX: 33 4 93 24 77 97
- E-mail: FRIBMQF5 at IBMMAIL
- IBM Internal Use: LGERCF at LGEPROFS
- Internet: rcf_lagaude@vnet.ibm.com

When you send information to IBM, you grant IBM a non-exclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

Contents

Figures

Tables

How to Use This Guide

This guide presents information on how to install and configure the IBM* 8260 Nways* Multiprotocol Switching Hub Module (referred to as the 622 Mbps Module) in the IBM 8260 Nways Multiprotocol Switching Hub.

The 622 Mbps module is available with either:

- Multimode fiber port (the A1-MF622, feature code 5101)
- Single Mode fiber port (the A1-SF622, feature code 5201)

Unless otherwise specified, the information in this guide applies equally to both port types.

This guide describes how to:

- Plan and set up valid links in an ATM subnetwork using the 622 Mbps module
- Install the module in the 8260 hub
- Configure ATM links on the 622 Mbps module
- Diagnose and solve problems associated with the operation of the 622 Mbps module.

Who Should Use This Guide

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

- ATM network administrator
- ATM network operator
- Hardware installer

Contents of This Guide

This guide contains the following chapters and appendixes:

Chapter 1, "Overview" on page 1 gives an overview of the main functions of the 622 Mbps module and the ATM interfaces used to interconnect user devices in an ATM campus network.

Chapter 2, "Setting Up Fiber Connections" on page 9 describes how to set up an ATM campus network by laying out valid port-to-port and port-to-device fiber cable connections. It also describes how to maintain the ATM connections you create.

Chapter 3, "Installation and Configuration" on page 21 describes how to install and configure the 622 Mbps module in an 8260 hub.

Chapter 4, "Troubleshooting" on page 35 describes how to diagnose and solve problems associated with the operation of the 622 Mbps module.

Appendix A, "Technical Specifications" on page 45 describes the specifications for the 622 Mbps module, including the optical specifications for SC transmitters and receivers.

Appendix B, “ATM Components” on page 51 lists the part numbers for the ATM components that you can order for use with the 622 Mbps module.

Appendix C, “Notices” on page 53 describes the industrial and safety standards that the 622 Mbps module conforms to.

“Bibliography” on page 57 lists additional documents that may be helpful in understanding the material contained in this guide.

“Glossary” on page 59 describes the terms and abbreviations used in this manual.

“Index” on page 67 lists the concepts, terms, and tasks described in this manual and the page numbers on which you can find the information.

Terms Used in This Guide

The term *Command Reference Guides* used in this guide refers to the *IBM 8260/8285: ATM Command Reference Guide*, SA33-0385 and the *IBM 8260/8285 ATM Control Point Version 3: Command Reference Guide*, SA33-0453.

Related Information

To understand the information presented in this guide, refer to:

- *IBM 8260: Product Description*, GA33-0315 for more information features and characteristics of the IBM 8260 Nways Multiprotocol Switching Hub
- *IBM 8250/8260/8285: Planning and Site Preparation Guide*, GA33-0285 for more information regarding cabling and connectors.
- *IBM 8260/8285: ATM Command Reference Guide*, SA33-0385 for more information regarding ATM commands for the A-CPSW.
- *IBM 8260/8285 ATM Control Point Version 3: Command Reference Guide*, SA33-0453 for a full description of ATM commands specific to the A-CPSW Version 3.
- *IBM 8260/8285 ATM Control Point Version 3: User's Guide*, SA33-0452 for information on using the A-CPSW Version 3.
- Publications listed in the “Bibliography” on page 57 for information on the principles of asynchronous transfer mode (ATM) technology
- ATM Forum UNI Specification V3.0 and V3.1.

World Wide Web

You can access the latest news and information about IBM network products, customer service and support, and microcode upgrades via the Internet, at the URL:

`http://www.networking.ibm.com`

Conventions Used in This Guide

The following text conventions are used in this guide:

Text Convention	Meaning	Example
Bold	Text emphasis	**Selective backpressure** temporarily stops one virtual connection. **Global backpressure** temporarily stops an ATM link.
Italics	Special term	This is known as a *hot swap*.
	Document titles	Refer to the *ATM User-Network Interface Specification - Version 3.0* for more information.
`Monospace`	Command syntax (parameters and variables)	`SET PORT slot.port ENABLE`
	User input (including carriage return)	To display detailed information, enter the following command: `show port 4.1 verbose [ENTER]`

	System messages and screen displays	`Port display for 8260 ATM 622 Mbps Module:`
		`Port  Type  Mode  Status`
		`----------`
		`4.01  VOID enabled  UP-OKAY`

Chapter 1. Overview

This chapter presents an overview of the 622 Mbps Module. It describes the main functions of the module and how it operates as part of the ATM subsystem in the IBM 8260 Nways Multiprotocol Switching Hub.

The 622 Mbps Module

The 622 Mbps module is a double-slot, 1-port 622 Mbps concentrator module that functions as part of the IBM 8260 Nways Multiprotocol Switching Hub.

622 Mbps modules can be used in any of the following ways:

- To exchange data with other ATM subsystems
- To link to high capacity workstations and servers that function in ATM mode and support the SONET lite (LAN) standard.

Note: The 622 Mbps module supports throughput of up to 212 Mbps per slot, with total Reserved Bandwidth available up to 180 Mbps per slot.

622 Mbps modules interface with the ATM Control Point and Switch (A-CPSW) module and process ATM data cells by:

- Checking their validity
- Accessing the switching tables to locate the destination port
- Preparing the internal ATM format required by the ATM Control Point and Switch
- Sending the cells to the ATM Control Point and Switch.

Slot Positions

The 622 Mbps module can be installed in any pair of adjacent 8260 slots, excluding slots 9, 10, and (for 17-slot models) 11, which are reserved for A-CPSW modules. In 17-slot 8260 models, although slot 12 is also reserved, you can use slot 12 for an 622 Mbps module if no A-CPSW module is installed in slot 11.

Like other ATM media modules, the 622 Mbps module is hot-pluggable. That is, it can be inserted in its slots while the switch is operating, without disturbing data traffic on other modules. Before removing the module from its slots, however, you must first isolate it by using the SET MODULE command.

For more information on how to install and change modules, see the *IBM 8260: Installation and Operation Guide*.

Functions

The 622 Mbps module has the following characteristics:

- One port operating with up to 622 Mbps to connect to stations, servers, and other hubs The port may connect to:
  - An ATM or multimedia workstation that requires a high bit rate
  - A UNI, IISP, or PNNI device using a supported interface.

  Note: The 622 Mbps module supports throughput of up to 212 Mbps per slot, with total Reserved Bandwidth available up to 180 Mbps per slot.
- Physical interface: optical fiber.
- ATM connections: switch-to-switch, switch-to-server, and switch-to-workstation having the maximum distances shown in Table 1.

Table 1. Maximum Distances for Valid ATM Connections

	Fiber Type		
Module Type	**MMF 50/125 micron**	**MMF 62.5/125 micron**	**SMF 9/125 micron**
Multimode (A1-MF622)	200 m[1]	500 m	—
Single Mode (A1-SF622)	3.1 Km[2]	2.9 Km[2]	15 Km

In any case, the optical power loss in all links must be calculated and compared to the total power budget for the connection, as described in “Planning Cabling Distances” on page 10.

- Up to seven 622 Mbps modules can be installed in the 17-slot 8260 hub at the same time (four in the 10-slot 8260 hub).

Notes:

1. The A1-MF622 module may be connected to an existing 50/125 micron fiber base, however this is not recommended when setting up a new fiber base.
2. The distances achievable depend not only on the fiber diameter but also on the modal dispersion of the fiber given by the fiber manufacturer, as shown in the table below.

Table 2. Modal Dispersion and Range

	50/125 micron diameter		**62.5/125 micron diameter**	
Modal Dispersion (MHz/Km)	600	1000	500	800
Range (Km)	2.1	3.1	2.0	2.9

For other modal dispersion values, use a linear interpolation. For example, for a 50/125 micron fiber of 800 MHz/Km, the range is:

2.1 + (3.1–2.1) * (800–600)/(1000–600) = 2.6 Km

Supported Interfaces

The 622 Mbps module supports the following interfaces:

- User-to-network (UNI)
- Interim Inter-Switch Protocol (IISP)
- Public Network-to-Network Interface (PNNI).

The UNI and IISP interfaces supported by the 622 Mbps module are defined in the following documents:

- ATM Forum UNI Specification 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)

622 Mbps Components

The following sections describe the user interface of the 622 Mbps module:

- The front panel
- The LEDs
- The Module Reset button.

Front Panel

The 622 Mbps port connector, LEDs and controls are accessed from the front panel of the module, as shown in Figure 1. ATM connections are made through the module by means of the port on the front panel and its backplane interfaces.

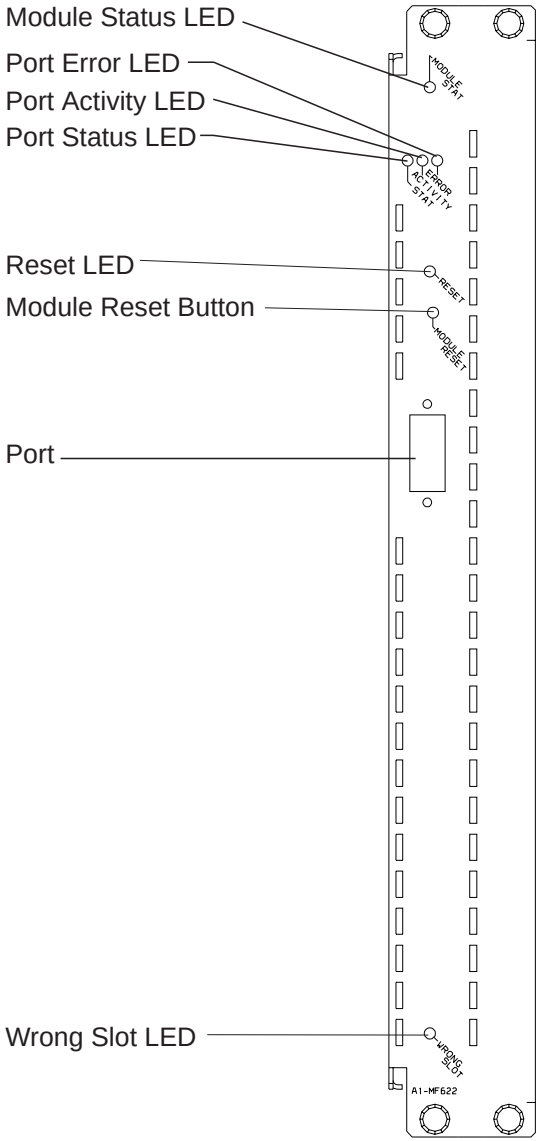


Figure 1. Front Panel

LEDs

The meaning of each LED is shown in Table 3 on page 5.

Table 3. Meaning of the 622 Mbps LEDs

LED Name	Color	State	Meaning
Module Status (MODULE STAT)	Green	OFF	Either no power is reaching the 622 Mbps module or the module is inoperable (isolated).
		ON	Normal operation (connected).
Port Error (ERR)	Yellow	OFF	Normal operation.
		ON	Either no signal is detected or an error condition is detected on the port.
Port Activity (ACTIVITY)	Yellow	OFF	No ATM data traffic is being transmitted.
		ON	ATM cells are being transmitted.
Port Status (STAT)	Green	OFF	Port is disabled.
		ON	Port is enabled.
		Blinking	Port is enabled, but either no cable is connected or the cable is damaged.
Reset	Yellow	OFF	Normal operation. Module is not being reset.
		ON	Module is being reset; data traffic is interrupted.
Wrong Slot	Yellow	OFF	Normal operation. 622 Mbps module is installed in the correct slot.
		ON	622 Mbps module is installed in an incorrect slot and no power is reaching the module.

Module Reset Button

By pressing the Module Reset button, you interrupt and reset the operation of the 622 Mbps module. All ATM data traffic and connections that are being transmitted are stopped. The change in status of the 622 Mbps module (from normal operation to reset status) is reported to the ATM Control Point and Switch.

Using the 622 Mbps for ATM Campus Networking

The 622 Mbps module can be used as a link to build an ATM campus network that:

- Interconnects ATM subsystems in the same or different ATM subnetworks
- Allows workstations, servers, and other ATM devices to communicate across the network

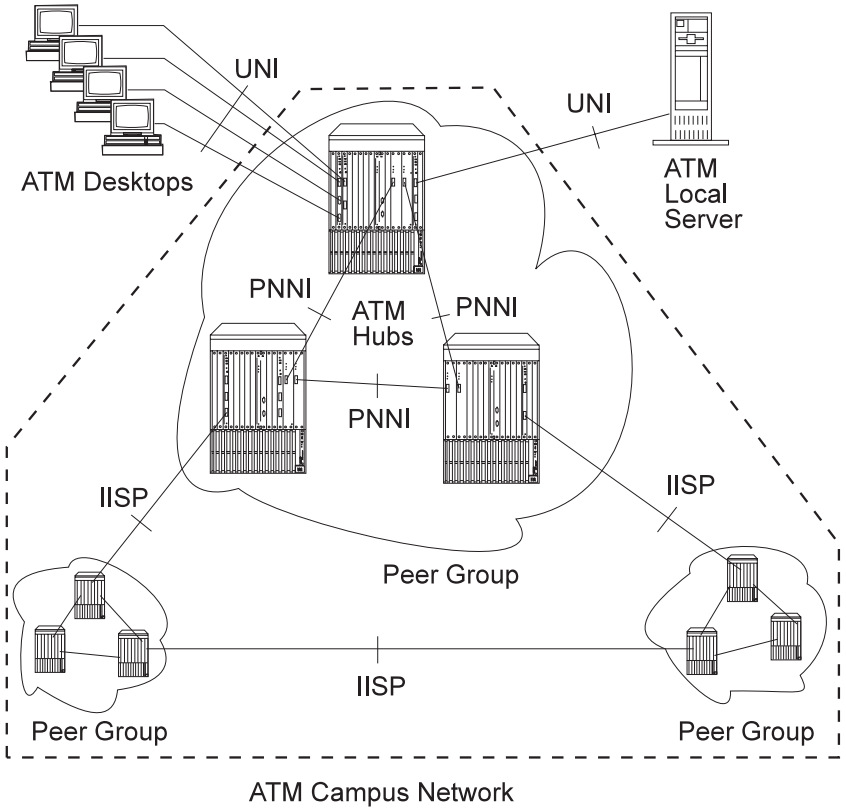


Figure 2. Using the 622 Mbps Module in ATM Campus Networking

ATM Traffic Management Using Reserved Bandwidth

The 622 Mbps module provides Reserved Bandwidth (RB) service **only** between 622 Mbps modules (on 8260 hubs). For RB traffic, the maximum bandwidth that can be reserved is 85% of the total throughput capacity of a VPC link.

In order to utilize the full bandwidth available for VPC links over the 622 Mbps module, you must define two VPCs: one for each slot. On each slot, the total reserved bandwidth available is 180 Mbps, and the maximum throughput capacity is 212 Mbps.

Note: If the 622 Mbps module is connected to a non-IBM 622 Mbps module, only Non-Reserved Bandwidth (NRB) service is supported, with a maximum throughput capacity of 212 Mbps for each slot.

Chapter 2. Setting Up Fiber Connections

This chapter describes the steps necessary for planning and setting up fiber cable links in an ATM network:

- Choosing the type of fiber cable to be used and understanding basic principles of optical power transmission (see “Before You Start: General Guidelines”)
- Laying out valid ATM links (port-to-port and port-to-device connections) by calculating the optical power budget and computing the optical power losses for each link (see “Planning Cabling Distances” on page 10)
- Maintaining the valid ATM connections that you create (see“Maintaining ATM Fiber Connections” on page 20).

In an ATM network, the 622 Mbps module is used to connect ATM devices (workstations, servers, concentrators, bridges, and so on) and ATM switches. For information on the cabling and connectors required, see Appendix A, “Technical Specifications” on page 45.

Before You Start: General Guidelines

Some general guidelines to follow when planning and setting up an ATM network using fiber as the backbone medium are as follows:

- When you use multimode fiber, IBM recommends that you use 62.5 micron fiber that conforms with IEEE 10BASE-F standards.
- When you use single mode fiber, IBM recommends that you use 9 micron fiber that conforms with IEEE 10BASE-F standards.
- Carefully note all sources of optical power loss, such as connectors, splices, patch panels, and type of cable used.
- Calculate the total power loss in each ATM fiber link and verify that the distance between the two 622 Mbps ports or between the 622 Mbps port and an ATM user device does not exceed the optical power budget.
- The power loss you calculate is valid for an ATM connection between two 622 Mbps ports or an 622 Mbps port and an ATM user device. **Each 622 Mbps port regenerates the optical signal at full strength as it was originally transmitted from the source end system in the connection**. Therefore, the difference between the total power loss and the optical power budget should be re-calculated at each port in the end-to-end connection.

Planning Cabling Distances

This section describes how to plan the cabling distance between two 622 Mbps ports (or between an 622 Mbps port and a user device) in a fiber network. To ensure that a link will be valid for data transmission, collect the following information:

- Type and length of fiber cable
- Type and number of connectors used
- Type and number of splices used
- Type and number of patch panels used
- Number of jumper cables used.
- Modal dispersion of the fiber (MHz/Km) when using the A1-SF622 with multimode fiber (MMF) cable.

Once you have the necessary information, you can plan the cabling distance between ATM ports by following these steps:

1. Determine the optical power budget for the 622 Mbps port and cable size using Table 4 on page 11.
2. Verify that the overall power loss in the link due to connectors, splices, fiber cable type, patch panels, and jumper cables is less than the optical power budget.

Each step is described in the following sections.

Notes:

1. As shown in Table 1 on page 2, when you use fiber cable, the (conservative) recommended distances between 622 Mbps ports and transceivers are:

   Multimode fiber 500 meters (1,640 feet) for 62.5/125 micron fiber

   200 meters (656 feet) for 50/125 micron fiber

   Single Mode fiber 15 kilometers (9.32 miles)

   If the distance is greater than 500 m (for 62.5/125 micron multimode fiber), 200 m (for 50/125 micron multimode fiber), or 15 km (for single mode fiber), you must carefully calculate the total power loss across the link to make sure that it does not exceed the total power budget.
2. If you have connected a Single Mode Fiber module to Multimode Fiber cable, see Table 1 on page 2.

Optical Power Budget

When validating cabling distances in 622 Mbps links, network planners and installers should calculate for maximum optical power losses in each end-to-end connection. Table 4 does this for you by taking the minimum amount of power transmitted and the minimum amount of power that should be received for different types of fiber cable.

The optical power budget for the 622 Mbps port-to-port or port-to-device connection is shown in the column on the far right-hand side of each table. By not exceeding this value, you can ensure the integrity of the ATM connections you create.

The Optical Power Budget value shows the amount of optical power left to compensate for power losses from connectors, splices, patch panels, and so on (see the following sections) in each link of an ATM connection. **In order for a link to transmit ATM data effectively, the optical power budget must be greater than the total power loss**. See “Calculating Power Loss in an ATM Connection” on page 17 for an example.

When taking the optical power budget for an ATM link between an 622 Mbps port and an end user device, be sure to use the values specified in the *ATM User-Network Interface (UNI) Specification V3.0*, ATM Forum. These values are shown in Table 4.

Table 4. Optical Power Budget (ATM Forum V3.0)

Fiber Cable: Type and Size	Minimum Transmitted Power (dBm)	Typical Transmitted Power (dBm)	Minimum Received Power (dBm)	Optical Power Budget (dBm)
Multimode 50/125 micron NA 0.20		–22.5	–21	1.5 (typical)
Multimode 62.5/125 micron NA 0.275	–20		–26	6 (worst case)[1]
Single Mode 9/125 micron	–15		–28	13 (worst case)[1]

Notes:

1. "worst case" = 622 Mbps module with worst case opto transceiver.

Optical Power Loss Through Connectors

When calculating optical power loss in ATM connections, you must take into account the number and types of connectors used. In your calculation, use the average power loss for connectors with physical and non-physical contacts as shown in Table 5.

IBM recommends that high-quality, low-loss connectors be used in your ATM connections.

Table 5. Optical Power Loss per Connector

Connector Type	Cable Size (microns)	Average Loss (dB)
Physical contact	62.5 to 62.5	0.4
	50 to 50	0.4
	62.5 to 50	2.0 (4.0 "worst case")
	50 to 62.5	0.0
	9 to 9	0.35 (0.8 "worst case")
Non-physical contact	62.5 to 62.5	0.7
	50 to 50	0.7
	62.5 to 50	5.0
	50 to 62.5	0.3

Optical Power Loss Through Splicing

If a fiber cable breaks, it is usually repaired by splicing the broken ends together. Two types of splice are normally used: mechanical and fusion. A fusion splice results in lower power loss, but requires expensive equipment. A mechanical splice is simple to perform on site when fusion splicing is not available.

If you repair a broken cable using either type of splice, make sure that the power loss in the cable does not exceed the value for "Maximum Received Power" in Table 4. Table 6 shows the average power loss for each splice type according to cable size.

When calculating the total power loss for ATM connections in your network, you should use the Maximum Loss values whenever possible as a "worst case" scenario. If a Maximum Loss value is not given for a certain splice type and cable size, use the Average Loss value.

Table 6. Optical Power Loss per Splice

Splice Type	Cable Size (microns)	Maximum Loss (dB)	Average Loss (dB)
Fusion	62.5 to 62.5	—	0.15
	50 to 50	—	0.15
	9 to 9	—	0.15
Mechanical	62.5 to 62.5	1.0	0.4
	50 to 50	1.0	0.4
	9 to 9	1.0	0.4

Optical Power Loss by Fiber Cable Type

Although fiber optic cable can carry light signals over long distances, optical power loss can reduce this capability. Table 7 shows the ranges and typical amounts of power loss for different types of fiber cables. To determine the power loss in your fiber cable, refer to the loss characteristic established by the cable manufacturer.

When calculating the total power loss for an ATM connection, be sure to use the highest value in the range given in the Power Loss column. In this way, your calculation covers a "worst case" scenario.

Table 7. Optical Power Loss by Cable Type

Type of Fiber Cable	Power Loss (dB/km)	Typical Loss (dB/km)
50/125 micron @ 1300 nm	0.5 to 2.5	1.0
62.5/125 micron @ 1300 nm	0.5 to 2	1.0
9/125 micron @ 1300 nm	—	0.5

Optical Power Loss Through Patch Panels

In fiber optic networks, patch panels are often used to allow for network expansion and topological changes. In an ATM network, a patch panel consists of a pair of female-to-female bulkhead barrel connectors which connect to the male fiber connectors from the 622 Mbps port.

The optical power loss through a patch panel includes the loss resulting from the two connectors and the bulkhead. Table 8 shows the ranges and typical amounts of power loss for different types of patch panels.

When calculating the total power loss for an ATM connection, be sure to use the highest value in the range given in the Power Loss column. In this way, your calculation covers a "worst case" scenario.

Table 8. Optical Power Loss per Patch Panel

Type of Patch Panel	Power Loss	Typical Loss
SC to MIC	0.1 to 1.0 dB	0.6 dB
ST to SC	0.1 to 1.0 dB	0.6 dB
SC to SC	0.1 to 1.0 dB	0.6 dB

Optical Power Loss Through Jumper Cables

When 8260 hubs are installed in patch panel racks, IBM jumper cables are often used to connect an 622 Mbps port in the hub to the patch panel. The use of jumper cables in this type of configuration is recommended in your ATM network because **each 622 Mbps port regenerates the optical signal at full strength as it was originally transmitted from the source end system in the connection**. For more information on IBM ATM jumper cables, see Appendix B, “ATM Components” on page 51.

The total power loss at each IBM jumper cable is shown in Table 9. Note that this value includes the combined power loss from the two connectors (622 Mbps and patch panel) and the length of the jumper cable itself.

Table 9. Optical Power Loss per IBM Jumper Cable

Type of Cable	Total Loss	By Component
Single Mode	0.75 dB	0.7 (0.35 × 2 connectors) + 0.05 (cable loss for 100 meters)
Multimode	1.5 dB	1.4 (0.7 × 2 connectors) + 0.1 (cable loss for 100 meters)

Calculating Power Loss in an ATM Connection

This section contains an example of how to calculate power loss in an 622 Mbps connection; that is, between two 622 Mbps ports and between the 622 Mbps port and ATM device on each end of the connection. The data used to calculate the distances is taken from the tables in the preceding sections:

- “Optical Power Budget” on page 11
- “Optical Power Loss Through Connectors” on page 12
- “Optical Power Loss Through Splicing” on page 13
- “Optical Power Loss by Fiber Cable Type” on page 14
- “Optical Power Loss Through Patch Panels” on page 15.

In the example shown in Figure 3 on page 18, two ATM desktops communicate across an ATM connection using the following optical fiber components:

- 622 Mbps modules for single mode fiber
- 9/125 fiber cable
- 100-meter cables to connect the desktops to the wall sockets
- Physical and non-physical contacts in the wall sockets
- 200-meter and 400-meter cables to connect the wall sockets to the patch panels
- Two jumper cables to connect each patch panel to an 622 Mbps port in the 8260 ATM hubs
- Two other jumper cables to connect another 622 Mbps port in each hub to the patch panels
- A 2-kilometer (1.24-mile) cable with a fusion splice to connect the two patch panels.

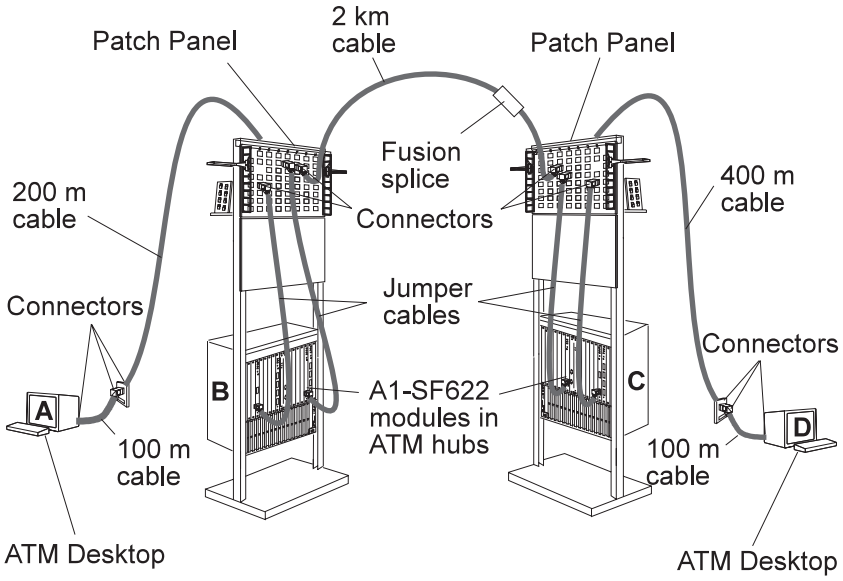


Figure 3. Links in an 622 Mbps Connection Between Two Desktops (Example)

In Figure 3, the ATM multimode fiber connection between Desktop A and Desktop D consists of three separate 622 Mbps links:

- Desktop A to the 622 Mbps port in Hub B
- 622 Mbps port in Hub B to 622 Mbps port in Hub C
- 622 Mbps port in Hub C to Desktop D.

To ensure the validity of the complete ATM connection (Desktop A to Desktop D), it is necessary to perform three separate calculations that verify the validity of each link. The power losses for the individual components in each link are shown in Table 10 on page 19. The number of the table from which each power loss value comes is shown in the Reference column.

Table 10. Power Loss for 622 Mbps Links (by Component)

622 Mbps Link	Component	Power Loss (dB)	Reference
Desktop A to Hub B	Cable connector (to ATM desktop)	0.7	Table 5
	100-meter cable	0.05 ("worst case")	Table 7
	Cable connector (to wall socket)	0.7	Table 5
	Wall socket (physical contact)	0.4	Table 5
	Wall socket (non-physical contact in wall)	0.7	Table 5
	200-meter cable (in wall)	0.1 ("worst case")	Table 7
	Cable connector (to patch panel)	0.7	Table 5
	Patch panel	1.0 ("worst case")	Table 8
	Jumper cable (from patch panel to hub B)	0.75	Table 9
Hub B to Hub C	Jumper cable (from hub B to patch panel)	0.75	Table 9
	Patch panel	1.0 ("worst case")	Table 8
	Cable connector (to one patch panel)	0.7	Table 5
	2-kilometer cable (between buildings)	5.0 ("worst case")	Table 7
	Fusion splice	0.15	Table 6
	Cable connector (to other patch panel)	0.7	Table 5
	Patch panel	1.0 ("worst case")	Table 8
	Jumper cable (from patch panel to hub C)	0.75	Table 9
Hub C to Desktop D	Jumper cable (from hub C to patch panel)	0.75	Table 9
	Patch panel	1.0	Table 8
	Cable connector (to patch panel)	0.7	Table 5
	400-meter cable (in wall)	0.2 ("worst case")	Table 7
	Wall socket (non-physical contact in wall)	0.7	Table 5
	Wall socket (physical contact)	0.4	Table 5
	Cable connector (to wall socket)	0.7	Table 5
	100-meter cable	0.05 ("worst case")	Table 7
	Cable connector (to ATM desktop)	0.7	Table 5

Verifying ATM Fiber Connections

To verify that a fiber connection is valid for ATM data transmission, you add up the power losses for the components in each 622 Mbps link and compare the sums with the optical power budget for each link. The results for the links in Figure 3 on page 18 are shown in Table 11.

Table 11. Power Loss Compared to Power Budget for Each 622 Mbps Link

622 Mbps Link	Total Power Loss (dBn)	Optical Power Budget (dBn)	Reference
Desktop A to 622 Mbps port in Hub B	5.1	13	Table 4
622 Mbps port in Hub B to 622 Mbps port in Hub C	10.05	13	Table 4
622 Mbps port in Hub C to Desktop D	5.2	13	Table 4

Since the total power losses are less than the optical power budget allotted for each 622 Mbps link, the links are valid and the ATM desktop-to-desktop fiber connection can be successfully made.

Maintaining ATM Fiber Connections

After calculating the optical power loss for 622 Mbps links and allowing for "worst case" scenarios, the data transmission in the ATM connections in your network should be reliable. To ensure that the optical power transmission does not exceed the optical power budget and disrupt the quality of data transmission for your current fiber configuration, IBM recommends that you:

- Do not install additional links (for example, patch panels or jumper cables) in each connection.
- Maintain the homogeneity of ATM links by using the same category of fiber cable (for example, 62.5/125) in each link of an ATM connection.
- When the margin between the total power loss on a connection and the optical power budget is less than or equal to 1 dB (≤ 1 dB check with your vendor to make sure you are using the power loss value set by the manufacturer for your cable type and recalculate the total power loss including the variance value for each component.

  The variance value of each optical fiber component (splices, connectors, cables, and so on) is shown in the tables in Appendix A of the *IBM 8250/8260/8285: Planning and Site Preparation Guide*.

Chapter 3. Installation and Configuration

This chapter describes how to install and connect ATM devices to the 622 Mbps module in an IBM 8260 Nways Multiprotocol Switching Hub. It also describes the commands necessary to:

- Configure the 622 Mbps module for use in an ATM subnetwork.
- Configure ATM clusters and subnetworks to allow them to communicate.

Installation and Configuration Summary

Before starting the installation procedure below, be sure the hub has been properly installed in an equipment rack or on a desktop and an A-CPSW module has been installed and configured as described in the *IBM 8260: Installation and Operation Guide*.

__ **1** Insert the 622 Mbps module into two adjacent empty slots in the 8260 hub and tighten the faceplate screws, by following the steps in “Procedure 1: Installing the Module” on page 22. The Reset LED lights (ON) briefly and then turns OFF.

__ **2** Set up the connection between the 622 Mbps port and other hubs or ATM devices by following the steps in “Procedure 2: Connecting ATM Devices” on page 24.

__ **3** Configure the 622 Mbps module by entering the ATM configuration commands at the console.

__ **4** Verify that the LEDs indicate normal operation by following the steps in “Procedure 4: Verifying Module Operation” on page 33.

__ **5** Record the configuration information on your complete ATM network, use the ATM cabling charts in Appendix A of the*IBM 8250/8260/8285: Planning and Site Preparation Guide*.

Procedure 1: Installing the Module

The 622 Mbps is a 'hot-pluggable' module, and may be installed in an 8260 hub either while the switch is running or when it is turned OFF.

To install an 622 Mbps module in an 8260 hub:

__ **1** Select two adjacent empty slots in positions 1 to 8 (or 12 to 17 in 17–slot models). (Slots 9, 10 and 11 are reserved for A-CPSW modules.) If necessary, remove the slot covers to expose blank slots.

__ **2** Make sure that the slots to be used are in Isolated mode by entering the following command from the A-CPSW console for **each of the slots**:

```
SET MODULE slot1 slot2 ISOLATED
```

where `slot1` and `slot2` specify the numbers of the two adjacent slots to be used.

__ **3** Insert the 622 Mbps module into the two selected slots as shown in Figure 4, matching the top and bottom board guides as you slide the module cleanly into place (by pressing evenly on the top and bottom of the faceplate). Do not attempt to push the module all the way into the hub until you have verified that both module ejectors are OPEN (see Figure 5 on page 23.)

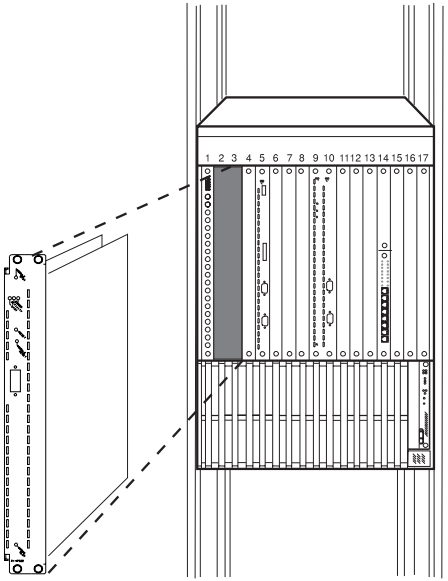


Figure 4. Installing the Module in an 8260 Hub

__ **4** Close the top and bottom ejectors simultaneously.

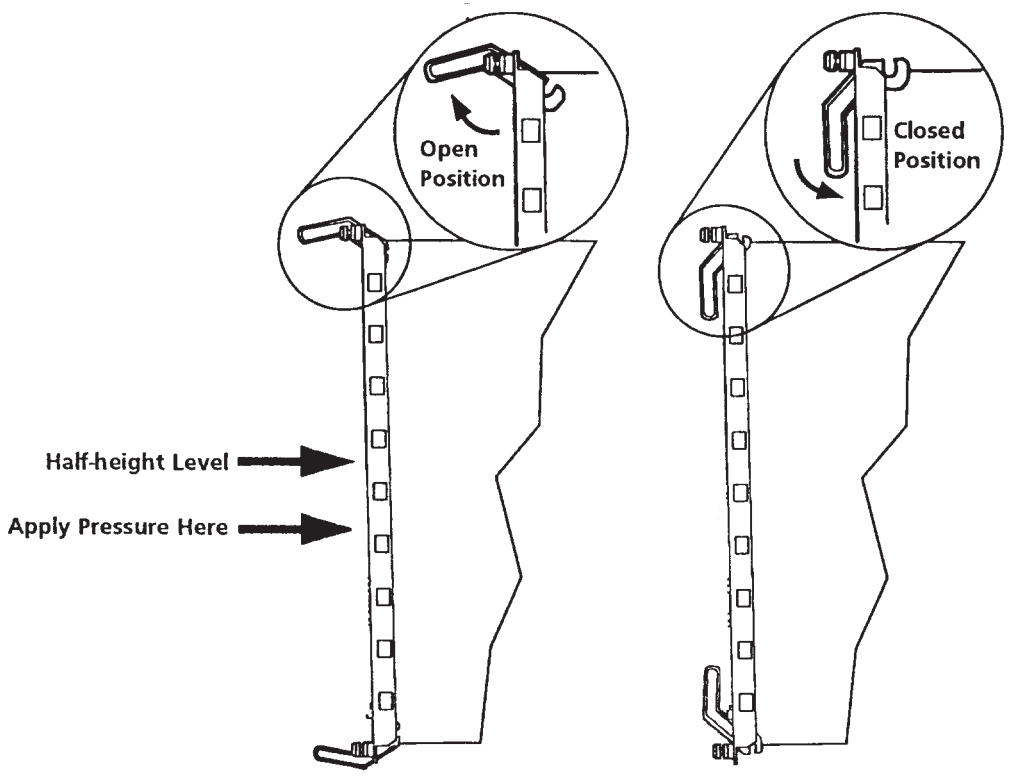


Figure 5. Module Ejectors

__ **5** The Reset LED should light (ON) briefly, and then turn OFF. Other LEDs may also light (ON) if the slots were previously configured for an 622 Mbps module.

__ **6** Fasten the spring-loaded screws on the front panel of the module to the hub using your fingers. Do not overtighten.

Procedure 2: Connecting ATM Devices

After inserting the 622 Mbps module, attach the fiber cables to the port.

Do not connect the port to an Ethernet, Token-Ring, or FDDI module in the 8260 hub or to any other product that is not compatible with the 622 Mbps module.

Make sure that transmit and receive cables are clearly marked or color coded before attaching them to the 622 Mbps port. Also, make sure that each cable has been properly cleaned with the appropriate fiber optic cleaning solution before you attach it. Then proceed as follows:

__ **1** Remove the plastic fiber optic covers from the 622 Mbps port.

__ **2** Attach a fiber cable to the port.

Make sure that you attach an ATM fiber cable that uses the same type of connectors as the port. For a single mode port, you must use 9/125 micron fiber cable[1]. For a multimode port, you must use 50/125 or 62.5/125 (preferred) micron fiber cable.

If you loop a fiber cable under the hub (as shown in Figure 6 on page 25), be sure not to exceed the bend radius of the cable. To find out the bend radius, refer to the cable's specifications.

__ **3** Attach the other end of the cable to an ATM device, such as a server, workstation, or a 622 Mbps module in another 8260 hub. Make sure that the transmit cable end connects to a receiver ATM port.

1 Except if you choose to connect a single mode module using 50/125 or 62.5/125 multimode fiber (see Table 1 on page 2).

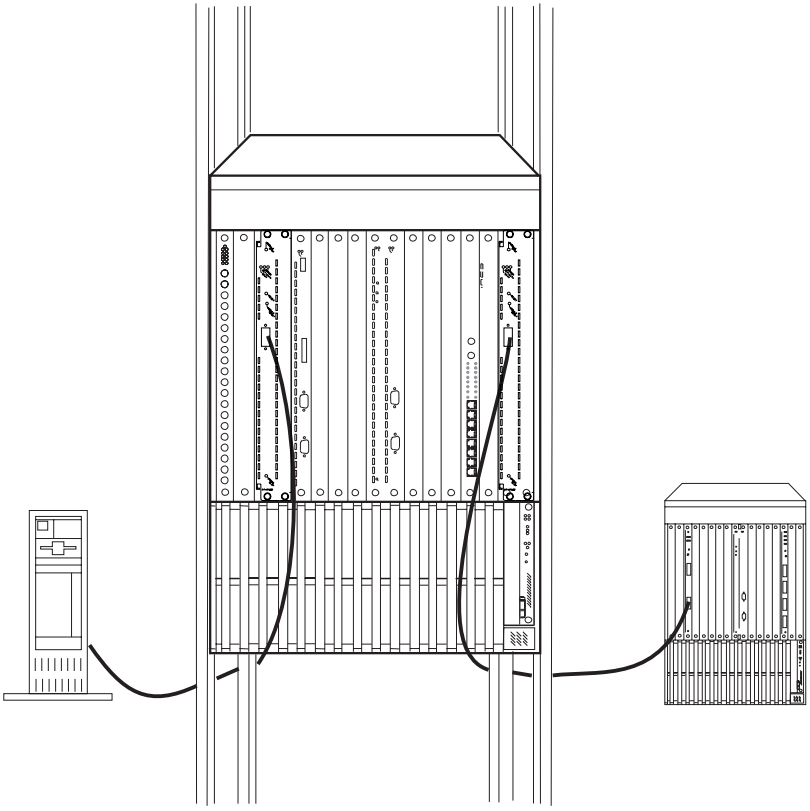


Figure 6. Attaching ATM Devices

Procedure 3: Configuring the Module

After installing the 622 Mbps module and attaching the fiber cable to an ATM device, you must configure the port from the configuration console as follows:

__ **1** Connect the 622 Mbps module to the network, as described in "Connecting the Module to the Network."

__ **2** Enable the port and configure its port parameters, as described in "Enabling the Port and Configuring Port Parameters" on page 27.

__ **3** (*optional*) Configure VPCs for PNNI links, as described in "Configuring VPC Links for 622 Mbps Connections" on page 29.

This section describes the ATM commands you need to enter to configure each 622 Mbps module in the ways described above. For a complete description of all ATM commands, see the *Command Reference Guides*.

Connecting the Module to the Network

When you install an 622 Mbps module, it is by default set to Isolated mode and the port is disabled. When an 622 Mbps module is isolated, no network activity takes place on it and it cannot be accessed by the network. This is a security measure that protects your ATM network from unauthorized access and module dysfunction.

To establish the 622 Mbps module's connection to the network, enter the following command at the ATM console prompt:

```
8260> SET MODULE slot CONNECTED
```

where `slot` specifies the slot number of the 622 Mbps module's **left-hand** slot. This command will connect **both** slots to the ATM network. The Module Status LED should light.

Enabling the Port and Configuring Port Parameters

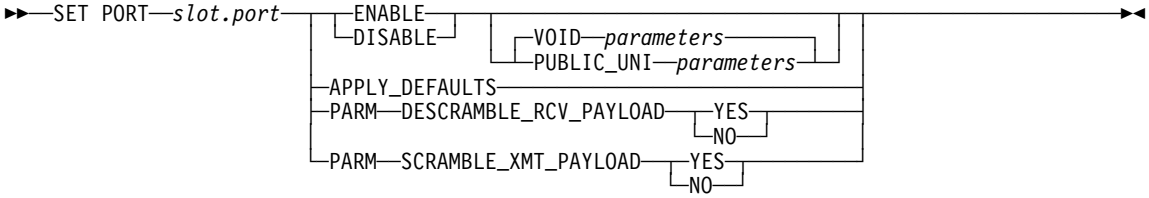
There are two types of interfaces used by the 622 Mbps module to receive and transmit ATM data:

- PUBLIC_UNI (Public User-to-Network)
- VOID

After you connect an 622 Mbps module to the ATM network (as described in “Connecting the Module to the Network” on page 26), you must:

- Enable the port.
- Set the type of ATM interface used on the port.
- Configure the port parameters (optional).

Use the SET PORT command with the following parameters to configure the 622 Mbps port.



slot Slot number of the 622 Mbps module's left-hand slot.

port ATM port number (1).

ENABLE | DISABLE
Enables and disables the selected port.

VOID | PUBLIC_UNI
Sets the interface type for the port (default = VOID).

For optional *parameters* available for these interface types, see the *Command Reference Guides*.

APPLY_DEFAULTS
Resets all port parameters to the defaults for the port's interface type (PUBLIC_UNI or VOID) and disables the port.

PARM DESCRAMBLE_RCV_PAYLOAD
The cell payload received by the 622 Mbps port is unscrambled by default.

PARM SCRAMBLE_XMT_PAYLOAD
The cell payload transmitted by the 622 Mbps port is scrambled by default.

For more information on the SET PORT command, see the *Command Reference Guides*.

Example: The following configures port 1 on slots 7 and 8 with VOID interface.

```
8260> set port 7.1 enable void
 7.01:Port set
8260>
```

Configuring VPC Links for 622 Mbps Connections

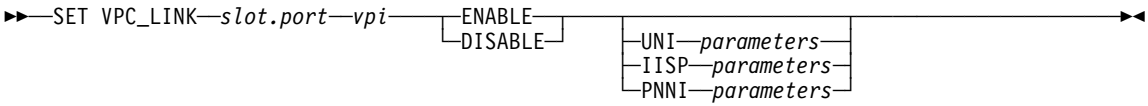
Creating VPCs extends the connectivity of the 622 Mbps module by permitting several VP tunnels across a single physical interface.

Each VPC can be of UNI, PNNI, or IISP type with the same functionality as the corresponding physical interface type. This means that ILMI, signalling and routing may be specified for each individual VPC.

VPCs may be created on either VOID or PUBLIC_UNI physical links. Each switch supports up to 64 VPCs.

Note: VPCs created on the 622 Mbps module must be defined with an **even** numbered VPI on the left slot, and an **odd** numbered VPI on the right slot.

Use the SET VPC parameters to define, enable, and disable a VPC on any VOID or PUBLIC_UNI ATM port, and to configure its interface.



slot One of the two slot numbers for the 622 Mbps module.

port ATM port number (1).

vpi Specifies the VPI for this VPC link.

The left slot must be assigned an **even** numbered VPI, and the right slot must be assigned an **odd** numbered VPI. If you enter an incorrect value, the message "`VPI value not allowed on this slot`" is displayed.

ENABLE | DISABLE
Enables and disables the selected VPC link.

UNI | IISP | PNNI
Sets the interface type for the selected VPC link (default = UNI).

For optional *parameters* available for these interface types, see the *Command Reference Guides*.

For more information on the SET VPC_LINK command, see the *Command Reference Guides*.

Example:

```
8260> set vpc_link 7.1 2 enable pnni bandwidth:10000
Accepted

8260> set vpc_link 8.1 3 enable pnni bandwidth:20000
Accepted

8260> show vpc_link all

       VPI :Type  Mode      Status
-------------------------------------------------------------------------------
 7.01     2:PNNI enable  UP
 8.01     3:PNNI enable  UP

8260> show module all

Slot Install Connect Operation General Information
-------------------------------------------------------------------------------
  1     n       n        n     -
  2     n       n        n     -
  3     n       n        n     -
  4     n       n        n     -
  5     n       n        n     -
  6     n       n        n     -
  7     Y       Y        Y     8260 ATM 622 Mbps Module
  8     Y       Y        Y     < Extension >
  9     Y       Y        Y     8260 ATM Control Point and Switch Module:Active
 10     Y       n        n     < Extension >
```

Saving Configuration Changes

After configuring 622 Mbps module and port settings, save your configuration changes by entering the SAVE MODULE_PORT command.

Displaying Configuration Changes

To display status information about an 622 Mbps module, enter one of the following commands:

- SHOW MODULE
- SHOW MODULE VERBOSE
- SHOW PORT
- SHOW PORT VERBOSE

For example, to display configuration information about the 622 Mbps module in slots 7 and 8, you would enter the following command:

```
8260> show module 7 verbose

Slot Install Connect Operation General Information
--------------------------------------------------------------------------------
  7     Y       Y        Y     8260 ATM 622 Mbps Module


status: connected / hardware okay
        enable  / Normal

ATM Carrier Module Informations:
--------------------------------
P/N:10J2496  EC level:E95696  Manufacture:VIME
Operational FPGA version : C31
     Backup FPGA version : C31

Type  Mode     Status                          Daughter Card Description
--------------------------------------------------------------------------------
 7.01:VOID enabled  UP                               ATM 622 Mbps


8260>
```

If the value for `port status` indicates that the port is inoperable or not functioning properly (for example, `NOT IN SERVICE` or `NO ACTIVITY`), refer to "Troubleshooting", in the *IBM 8260: Installation and Operation Guide*.

The following example shows how to display detailed information about the port on the 622 Mbps module in slots 7 and 8 (the port on an 622 Mbps module is always port 1):

```
8260> show port 7.1 verbose


     Type  Mode     Status                              Daughter Card Description
-------------------------------------------------------------------------------
 7.01:VOID enabled  UP                                  ATM 622 Mbps

No ILMI
VPI.VCI range        : 15.1023 (4.10 bits)
Connector            : SC DUPLEX
Media                : fiber
Port speed           : 622000 kbps
Remote device is active


ATM 622Mbps Module Informations:
--------------------------------
 Operational Status             : OKAY
 Number of Occupied Slots       : 2

Configuration Control:
----------------------
 Descrambling Payload (Rcv)     : Yes
 Scrambling Payload (Xmt)       : Yes

Diagnostics Control:
--------------------
 Internal Wrap                  : Disabled
 Reply Mode Wrap                : Disabled

Failure Status:
---------------
 Traffic Congestion             : Inactive
 Loss of Signal                 : Inactive
 Loss of Frame                  : Inactive
 Out of Frame                   : Inactive
 Alarm Indication Signal (AIS)  : Inactive
 Path AIS                       : Inactive
 Remote Defect Indication (RDI) : Inactive
 Loss of Framer Clock           : Inactive
 Loss of Line Clock             : Inactive

8260>
```

For more information on the SHOW MODULE and SHOW PORT commands, see the *Command Reference Guides*.

Procedure 4: Verifying Module Operation

After configuring and saving port and module settings, you can verify that the module is operating correctly by viewing the LEDs on the front panel:

__ **1** Check that the Module Status LED is ON.

__ **2** Check that the Port Status LED is ON.

__ **3** Check that the Port Activity LED is ON when traffic is present.

Table 3 on page 5 provides a full description of the front panel LEDs.

See Chapter 4, “Troubleshooting” on page 35 if you find any of the following operating conditions:

- The Module Status LED does not light.
- The Port Status LED does not light or is blinking.
- The Port Activity LED does not light when there is traffic.
- The Port Error LED is ON.
- The Reset LED is ON or is blinking.
- The Wrong Slot LED is ON.

Chapter 4. Troubleshooting

This chapter describes how to diagnose and solve problems that may arise with the operation of an 622 Mbps module. These problems are signaled by the following conditions:

- The Module Status LED does not light.
- The Port Status LED does not light or is blinking.
- The Port Activity LED does not light during data transmission.
- The Port Error LED is ON.
- The Reset LED is either ON or blinking.
- The Wrong Slot LED is ON.

Before you start troubleshooting, be sure to carry out the procedure described in “Verifying LED Operation.”

When instructed to replace an 622 Mbps module, proceed as described in “Replacing the Module” on page 37.

USA and Canada: If the problem is not resolved after following the troubleshooting procedures outlined in this chapter, call toll-free 800-IBM-SERV for IBM support.

Verifying LED Operation

Before troubleshooting an 622 Mbps module, verify that all LEDs on the module are functioning properly by pressing the LED Test button on the Fault-Tolerant Controller module in the 8260 hub. All LEDs should light ON. If not, replace the module. See page 37.

Determining the Failing Component Using a Wrap Test

In the troubleshooting procedures in this chapter, you are sometimes instructed to perform a wrap test in order to determine the failing component (for example, motherboard) that caused the problem.

To run a wrap test, follow these steps:

1. Make sure that the module is connected, and that the port to be tested is disabled. If the port is enabled, enter the `SET PORT slot.port DISABLE` command, where `slot` is the slot number of the 622 Mbps module's left-hand slot (1 to 8 or 12 to 17 in the 8260) and `port` is the number of the port (1). Then press Enter.
2. Disconnect the fiber cable from the port.

3. Check the port by entering the command `WRAP slot.1 INTERNAL`, using the left-hand slot number, and press Enter.
   - If you receive a return code of `KO Test Failed`, then the module is faulty and should be replaced.
   - If you receive a return code of `OK Test Successful`, continue with the next step.
4. Insert a wrap plug in the port.
5. Check the port by entering the command `WRAP slot.1 EXTERNAL`, using the left-hand slot number, and press Enter.

   If you receive a return code of `KO Test Failed`, the module is faulty and should be replaced.

   If you receive a return code of `OK Test Successful`, continue with the next step.
6. Remove the wrap plug and reattach the fiber cable to the port.
7. If the port in which you inserted the wrap plug is attached to a switch, disable the port on the remote hub by entering `SET PORT slot.port DISABLE` from the console attached to the remote hub. Then press Enter.
8. Enable the wrap procedure on the remote port by entering `WRAP slot.port REPLY_MODE ENABLE`. Then press Enter.
9. From the console attached to the local hub, enter `WRAP slot.port EXTERNAL`. This command sends a signal across the connection to the remote (wrapped) port on the attached switch. The test result appears on the console of the local hub.

   If you receive a return code of `KO Test Failed`, the cable is faulty and should be replaced. If you receive a return code of `OK Test Successful`, the cause of the problem is on the remote switch.
10. Disable the wrap procedure on the remote port by entering `WRAP slot.port REPLY_MODE DISABLE` from the console attached to the remote hub. Then press Enter.
11. Repeat step 1 through step 5 for the port on the remote switch in order to determine the failing component.

Replacing the Module

The troubleshooting procedures in this chapter sometimes instruct you to replace a failing 622 Mbps module. To do so, follow these steps:

1. Enter `SET MODULE slot ISOLATED` where `slot` is the left-hand slot number of the failed module. Then press Enter.
2. Remove the failed module and insert another 622 Mbps module in its slots.
3. Enter `SET MODULE slot CONNECTED`, using the left-hand slot number, and press Enter.

The new 622 Mbps module is automatically configured with the latest settings for the slots you specified.

When the Module Status LED Does Not Light

During normal operation, the Module Status LED of an 622 Mbps module should light. If the Module Status LED is off, the module is inoperable. Refer to Table 12 on page 38 to diagnose and solve the problem.

2 For more information, refer to the *IBM 8260: Distributed Management Module User's Guide*, SA33-0259.

Table 12. Problem Determination Using Module Status LED

Module Status LED	Module Status	Possible Cause	Corrective Action
OFF	Disabled or Isolated	Module is not receiving power.	1. From the configuration console, enter `SET MODULE slot CONNECTED`. 2. Check the Power Supply LEDs on the 8260 Fault-Tolerant Controller module. 3. Check the power budget by entering `SHOW POWER` from the Distributed Management Module (DMM) console (if DMM installed) or from the configuration console. 4. Remove and re-insert the 622 Mbps module in its slot.
		Power budget has been exceeded.	Check the power budget by entering `SHOW POWER` from the DMM console (if DMM installed) or from the configuration console.
		Module cannot connect to A-CPSW.	Check that the A-CPSW is correctly plugged into the slot.
		Status LED is burned out.	1. Check the Module Status LED by following the instructions in “Verifying LED Operation” on page 35. 2. If any LEDs do not light, replace the module.
		Module is faulty.	Replace the module.

When the Port Status LED Does Not Light or Is Blinking

When the Port Status LED does not light or is blinking, the port detects a possible problem. Refer to Table 13 to diagnose and solve the problem.

Table 13. Problem Determination Using Status LEDs

Port Status LED	Port Status	Possible Cause	Corrective Action
OFF	Disabled	Port is disabled.	Enable port.
		Module is not receiving power.	1. Check the Module Status LED by following the instructions in "Verifying LED Operation" on page 35. 2. Check the Power Supply LEDs on the Fault-Tolerant Controller module. 3. Remove and re-insert the 622 Mbps module in its slot.
		Status LED is burned out.	1. Check the Port Status LED by following the instructions in "Verifying LED Operation" on page 35. 2. If any LEDs do not light, replace the module.
		622 Mbps module is faulty.	Perform the wrap tests described in "Determining the Failing Component Using a Wrap Test" on page 35.
Blinking	Enabled	Cable attached to the port is faulty.	1. Change the cable. 2. Perform the wrap tests to determine the failing component. 3. Check the cable type.
		For fiber cables, the transmit and receive connectors on the cable are not plugged into the correct port connectors.	Unplug the cable connectors and plug them into the correct port connectors.
		Remote station attached to the port is either turned OFF or inoperable.	Check the remote station. If the station is turned OFF, turn ON the station. If the station is inoperable, restart the application that is running on it.
		Maximum link distance exceeded.	See Table 1 on page 2 for the maximum distances for valid connections.

When the Port Activity LED Does Not Light

If during continuous traffic the Port Activity LED does not light, refer to Table 14 to diagnose and solve the problem.

Table 14. Problem Determination Using Activity LEDs

Activity LED	Possible Cause	Corrective Action
OFF	Port is disabled.	Enter `SHOW PORT` command at the configuration console to see if port is enabled.
	Module is not receiving power.	1. Check the Module Status LED by following the instructions in "Verifying LED Operation" on page 35. 2. Check the Power Supply LEDs on the Fault-Tolerant Controller module. 3. Remove and re-insert the 622 Mbps module in the hub.
	Activity LED is burned out.	1. Check the Port Activity LED by following the instructions in "Verifying LED Operation" on page 35. 2. If any LEDs do not light, replace the module.
	Port is faulty.	Perform the wrap tests described in "Determining the Failing Component Using a Wrap Test" on page 35.
	There is a bad connection on the ATM backplane.	1. Remove the 622 Mbps module and re-insert it in the same slot. 2. If the problem persists, insert the module in another slot.
	Port is enabled but not in service.	From the ATM host, make sure that the station attached to the port has been assigned an ATM address and that the address is unique within the network.

When the Port Error LED Is ON

When the Port Error LED is ON, the port has entered into an error condition. Table 15 describes the possible problems that may occur and the corrective action to take for each problem.

Table 15. Problem Determination Using the Error LED

Error LED	Meaning	Possible Cause	Corrective Action
ON	Error condition on port	622 Mbps module is faulty.	Perform the wrap tests described in "Determining the Failing Component Using a Wrap Test" on page 35.
		Cable attached to the port is faulty.	1. Change the cable. 2. Perform the wrap tests to determine the failing component. 3. Check the cable type.
		Remote station attached to the port is either turned OFF or inoperable.	Check the remote station. If the station is turned OFF, turn ON the station. If the station is inoperable, restart the application running on it.
Blinking	Error condition due to bad transmission quality as a result of frame errors or HEC cell errors	Cable attached to the port is faulty.	1. Change the cable. 2. Perform the wrap tests to determine the failing component. 3. Check the cable type.
		Remote station attached to the port is either turned OFF or inoperable.	Check the remote station. If the station is turned OFF, turn ON the station. If the station is inoperable, restart the application running on it.

When the Reset LED Is ON or Starts Blinking

When the Reset LED of an 622 Mbps module is ON or starts blinking, the module has entered into an error condition. Table 16 describes the possible problems that may occur and the corrective action to take for each problem.

Table 16. Problem Determination Using the Reset LED

Reset LED	Meaning	Possible Cause	Corrective Action
ON	622 Mbps error condition	622 Mbps module is faulty.	Perform the wrap tests described in “Determining the Failing Component Using a Wrap Test” on page 35.
		There is a bad connection on the ATM backplane.	1. Remove the 622 Mbps module and re-insert it in the same slot. 2. If the problem persists, insert the module in another slot.
Blinking	622 Mbps error condition	622 Mbps module is either faulty or not securely plugged into the ATM backplane.	1. Remove the 622 Mbps module and re-insert it. 2. If the problem persists, replace the 622 Mbps module.
		There is a bad connection on the ATM backplane.	1. Remove the 622 Mbps module and re-insert it in the same slot. 2. If the problem persists, insert the module in another slot.

When the Wrong Slot LED Is On

When the Wrong Slot LED of an 622 Mbps module is ON, the module is not installed in the correct slots. Remove the module from the hub and re-insert it into any empty slots in positions 1 to 8 (or 12 to 17 in A17 model). Slots 9-10, and 11 in A17 model, are reserved for the A-CPSW module. Slot 12 in 17 slot models cannot be used if an A-CPSW module is installed in slot 11.

Appendix A. Technical Specifications

General

Feature Codes	5101 (Multimode)
	5201 (Single Mode)
Face Plate Marking	A1-MF622 (Multimode)
	A1-SF622 (Single Mode)
Number of Ports	1
Connectors	SC fiber

Electrical

Power Requirement	45 Watts for +5V
	0.12 Watts for +12V
Power Consumption	9 Amps for +5V
	0.010 Amps for +12V
Fuses	20 Amps for +5V
	2 Amps for +12V

Environmental

Operating Temperature	0°C to 50°C (32°F to 122°F)
Storage Temperature	–10°C to +60°C (14°F to 140°F)
Humidity	0–95% RH

Mechanical

Dimensions	2 in. (5 cm) Width
	10.7 in. (27 cm) Length
	15.2 in. (38.5 cm) Height
Weight	5.5 lbs (2.5 kg)

Optical Specifications

This section describes the optical specifications for 622 Mbps transmitters and receivers with SC single mode and SC multimode connectors.

Additional information on transmitter and receiver parameters is given in the notes at the end of each section. Relevant notes are indicated by a superscript number following the parameter name.

SC Single Mode Transmitters

- Light Source: LASER at 1300 nm wavelength.
- Power coupled into fiber cable includes SC connector loss.

Table 17. SC Single Mode Transmitters: Optical Specifications

Parameter	Minimum	Typical	Maximum	Unit
Optical Power Output (P_O): 9/125 micron cable[1]	–15	—	–8	dBm avg
Wavelength (λ)	1274	1300	1356	nm

Notes:

1. These optical power values are measured with the following conditions:
   - At the Beginning Of Life (BOL).
   - Over the specified operating voltage and temperature ranges.
   - With HALT Line State (12.5 MHz square-wave) input signal.
   - At the end of one meter of noted optical fiber with cladding modes removed.

   The average power value can be converted to a peak power value by adding 3 dB.

SC Single Mode Receivers

Table 18. SC Single Mode Receivers: Optical Specifications

Parameter	Minimum	Typical	Maximum	Unit
Optical Power Input: Minimum at Window Edge[1] ($P_{IN\ Min}$):	−28	—	−7	dBm avg
Wavelength (λ)	1274	1300	1356	nm

Notes:

1. This specification is intended to indicate the performance of the receiver section of the transceiver when Input Optical Power signal characteristics are present per the following definitions. The Input Optical Power dynamic range from the minimum level (with a window time-width) to the maximum level is the range over which the receiver is guaranteed to provide output data with a Bit Error Rate (BER) better than or equal to 2.5×10^{-10}.

SC Multimode Transmitters

- Light Source: GaA1As LED at 1300 nm wavelength.
- Power coupled into fiber cable includes SC connector loss.

Table 19. SC Multimode Transmitters: Optical Specifications

Parameter	Minimum	Typical	Maximum	Unit
Optical Power Output (P_O): 62.5/125 micron cable Minimum at Window Edge[1] ($P_{IN\ Min}$):	–20	—	–14	dBm avg
Optical Power Output (P_O): 50/125 micron cable Minimum at Window Edge[1] ($P_{IN\ Min}$):	—	–22.5	–14	dBm avg
Wavelength (λ)	1270	1300	1380	nm

Notes:

1. These optical power values are measured with the following conditions:
   - At the End Of Life (EOL).
   - Over the specified operating voltage and temperature ranges.
   - With HALT Line State (12.5 MHz square-wave) input signal.
   - At the end of one meter of noted optical fiber with cladding modes removed.

   The average power value can be converted to a peak power value by adding 3 dB.
2. This parameter complies with the FDDI PMD requirements for the tradeoffs between center wavelength, spectral width, and rise/fall times. The temperature coefficient of the center wavelength is typically +0.37 nm/°C.

SC Multimode Receivers

Table 20. SC Multimode Receivers: Optical Specifications

Parameter	Minimum	Typical	Maximum	Unit
Optical Power Input Minimum at Window Edge[1] ($P_{IN\ Min}$): 62.5/125 micron	–26	—	–14	dBm avg
Optical Power Input Minimum at Window Edge[1] ($P_{IN\ Min}$): 50/125 micron	–24	—	–14	dBm avg
Wavelength (λ)	1270	1300	1380	nm

Notes:

1. This specification is intended to indicate the performance of the receiver section of the transceiver when Input Optical Power signal characteristics are present per the following definitions. The Input Optical Power dynamic range from the minimum level (with a window time-width) to the maximum level is the range over which the receiver is guaranteed to provide output data with a Bit Error Rate (BER) better than or equal to 2.5×10^{-10}.

Appendix B. ATM Components

Table 21 lists the part numbers of ATM components (wrap plugs, adapters, cables, and so on) that can be ordered for use with the 622 Mbps module.

Table 21. Part Numbers of ATM Components

ATM Component	IBM Part Number
SC wrap plug (MMF)	19G5609
SC wrap plug (SMF)	78G9610
SC-to-SC Coupler	33G2744
MIC-to-SC 62.5/125 micron ATM jumper cable, 2 m (6.5 ft)	19G6707
MIC-to-SC 62.5/125 micron ATM jumper cable, 4 m (13 ft)	19G4797
MIC-to-SC 62.5/125 micron ATM jumper cable, 6 m (20 ft)	19G4798
MIC-to-SC 62.5/125 micron ATM jumper cable, 10 m (33 ft)	19G4799
MIC-to-SC 62.5/125 micron ATM jumper cable, 20 m (66 ft)	19G4800
MIC-to-SC 62.5/125 micron ATM jumper cable, 40 m (135 ft)	19G4801
MIC-to-SC 62.5/125 micron ATM jumper cable, custom lengths	19G4796
SC-to-SC 62.5/125 micron ATM jumper cable, 2 m (6.5 ft)	19G6706
SC-to-SC 62.5/125 micron ATM jumper cable, 4 m (13 ft)	19G4864
SC-to-SC 62.5/125 micron ATM jumper cable, 6 m (20 ft)	19G4865
SC-to-SC 62.5/125 micron ATM jumper cable, 10 m (33 ft)	19G4866
SC-to-SC 62.5/125 micron ATM jumper cable, 20 m (66 ft)	19G4867
SC-to-SC 62.5/125 micron ATM jumper cable, 40 m (135 ft)	19G4868
SC-to-SC 62.5/125 micron ATM jumper cable, custom lengths	19G4863
Optical fiber cleaning kit	5453521

Appendix C. Notices

References in this publication to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates.

Any reference to an IBM product, program, or service is not intended to state or imply that only IBM's product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any of IBM's intellectual property rights may be used instead of the IBM product, program, or service. Evaluation and verification of operation in conjunction with other products, except those expressly designated by IBM, is the user's responsibility.

IBM may have patents or pending patent applications covering subject matter in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to the IBM Corporation, IBM Director of Licensing, 500 Columbus Avenue, Thornwood, New York 10594, U.S.A.

Product Page/Warranties

The following paragraph does not apply to the United Kingdom or to any country where such provisions are inconsistent with local law.

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore this statement may not apply to you.

Industry Standards Reflected in This Product

The IBM 8260 Nways ATM 622 Mbps (622 Mbps) module complies with the ATM User-Network Interface (UNI) Specification V3.0 and V3.1, ATM Forum.

The 622 Mbps module is designed according to the specifications of the following industry standards as understood and interpreted by IBM as of September 1994:

- RFC854 - TELNET protocol
- RFC1350 - Trivial File Transfer Protocol (TFTP)
- RFC1577 - Classical IP and ARP (Address Resolution Protocol) over ATM
- SNMP:
  - RFC1155 - Structure and Identification of Management Information (SMI) for TCP/IP based Internet.
  - RFC1156 - Management Information Base (MIB) for network management of TCP/IP based Internets (MIB-I)
  - RFC1157 - Simple Network Management Protocol (SNMP)

- RFC1212 - Concise MIB definitions
- RFC1213 - Management Information Base (MIB) for network management of TCP/IP based Internets (MIB-II)
- RFC1215 - Convention for defining traps for use with SNMP

- ANSI SONET STS-12C (SONET lite)

The 622 Mbps single mode and multimode fiber modules operate at a nominal wavelength of 1300 nm, and the interface conforms to the ATM Forum for OC-12 Single Mode LANs.

The laser in the 622 Mbps single mode module is a Class 1 Laser Product. The compliance label on the 622 Mbps single mode module is shown in Figure 7.

Figure 7. Class 1 Laser Label

This product complies with US regulations on lasers (CFR 21-J).

For more information, see the *IBM Telecommunication Products Safety Handbook*

European Union (EU) Statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM can not accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

Electronic Emission Notices

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Compliance Statement

This Class A digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

Avis de conformité aux normes d'Industrie Canada

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Japanese Voluntary Control Council For Interference (VCCI) Statement

This equipment is in the 1st Class category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council for Interference by Information Technology Equipment aimed at preventing radio interference in commercial and industrial areas.

Consequently, when used in a residential area or in an adjacent area thereto, radio interference may be caused to radios and TV receivers, and so on.

Read the instructions for correct handling.

Korean Communications Statement

Please note that this device has been approved for business purpose with regard to electromagnetic interference. If you find this is not suitable for your use, you may exchange it for a non-business one.

New Zealand Radiocommunications (Radio) Regulations

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Trademarks and Service Marks

The following terms, indicated by an asterisk (*) in this publication, are trademarks or service marks of the IBM Corporation in the United States or other countries:

IBM Nways

Safety

Safety of Information Technology Equipment

The 622 Mbps single mode and multimode modules comply with the following general safety standards:

IEC 950	1991	International Standard
Amdt 1	1992	
Amdt 2	1993	
EN 60 950	1992	CENELEC deviation to IEC 950
Amdt 1	1992	
Amdt 2	1993	

For more information, see the *IBM Telecommunication Products Safety Handbook*.

Safety of Laser Products

A combination of novel optical subassembly design and careful control of the characteristics of the laser chip creates a laser emission that complies with Class 1 specifications. As a result, the laser transmitter provided on the 622 Mbps single mode module is eye-safe

The 622 Mbps single mode module complies with the following laser product safety standards:

IEC 825-1	1993	Equipment Classification, Requirements, and User's Guide
IEC 825-2	1993	Safety of Optical Fiber Communications Systems
EN 60825-1	1993	European CENELEC IEC 825 Standard
EN 60825-2	1993	European CENELEC IEC 825 Standard

Bibliography

For supplementary information on the functions and technology in the 622 Mbps Module, please refer to the following documents:

IBM 8260/8285: ATM Command Reference Guide, SA33-0385

IBM 8260/8285 ATM Control Point Version 3: Command Reference Guide, SA33-0453

IBM 8260/8285 ATM Control Point Version 3: User's Guide, SA33-0452

IBM 8260: ATM Control Point and Switch Module, Installation and User's Guide, SA33-0326

IBM 8260: Installation and Operation Guide, GA33-0251

IBM 8250/8260/8285: Planning and Site Preparation Guide, GA33-0285

IBM 8260: Distributed Management Module User's Guide, SA33-0259

IBM 8260: Distributed Management Module Commands Guide, SA33-0275

Case, J., Fedor, M., Scoffstall, M., and Davin, J., *The Simple Network Managemnet Protocol*, University of Tennessee at Knoxville, Performance Systems International and the MIT Laboratory for Computer Science, May 1990.

De Prycker, M., *Asynchronous Transfer Mode — Solution for Broadband ISDN*, Ellis Horwood, 1991.

Handel, R. and Huber, M.N., *Integrated Broadband Networks — An Introduction to ATM-Based Networks*, Addison-Wesley, 1991.

The ATM Forum, *ATM User-Network Interface Specification — Version 3.0 & V3.1*.

Glossary

This glossary defines terms and abbreviations used in this manual. It includes terms and definitions from the *IBM Dictionary of Computing* (New York; McGraw-Hill, Inc., 1994).

(A) Identifies definitions from the *American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI). Copies can be purchased from the American National Standards Institute, 1430 Broadway, New York, New York 10018.

(E) Identifies definitions from the *ANSI/EIA Standard - 440A: Fiber Optic Terminology*, copyright 1989 by the Electronics Industries Association (EIA). Copies can be purchased from the Electronic Industries Association, 2001 Pennsylvania Avenue N.W., Washington, DC 20006.

(I) Identifies definitions from the *Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC JTC1/SC1).

(T) Identifies definitions from draft international standards, committee drafts, and working papers being developed by ISO/IEC JTC1/SC1.

The following cross-references are used in this glossary:

Contrast with
This refers to a term that has an opposed or substantively different meaning.

See
This refers the reader to multiple-word terms in which this term appears.

See also
This refers the reader to terms that have a related, but not synonymous, meaning.

Synonym for
This indicates that the term has the same meaning as a preferred term, which is defined in the glossary.

If you do not find the term you are looking for, refer to the index or to the *IBM Dictionary of Computing*.

A

A. ampere.

ac. Alternating current.

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

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.

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

Asynchronous Transfer Mode (ATM). A transfer mode in which the information is organized into cells. It is asynchronous in the sense that the recurrence of cells containing information from an individual user is not necessarily periodic.

ATM. Asynchronous Transfer Mode.

ATM campus network. A union of privately-owned, interconnected ATM subnetworks.

ATM device. An end system that encapsulates data into ATM cells and forwards them to the ATM subsystem in the 8260 hub across a UNI interface.

ATM subnetwork. A set of ATM subsystems interconnected by ATM interfaces (UNI, IISP, PNNI).

ATM subsystem. The ATM components in an ATM switch.

attach. To make a device a part of a network logically. Contrast with *connect*, which implies physically connecting a device to a network.

attenuation. Level of optical power loss expressed in units of dB.

B

backbone. A set of nodes and their interconnecting links providing the primary data path across a network. In a wide area network, a high-speed link to which nodes or data switching exchanges (DSEs) are connected.

backbone network. A central network to which smaller networks, normally of lower speed, connect. The backbone network usually has a much higher capacity than the networks it helps interconnect or is a wide-area network (WAN) such as a public packet-switched datagram network.

bandwidth. 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). 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.

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

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

byte. A string that consists of a number of bits, treated as a unit, and representing a character. (T) A binary character operated upon as a unit and usually shorter than a computer word. (A) A string that consists of a particular number of bits, usually 8, that is treated as a unit, and that represents a character.

C

C. Celsius.

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

CCITT. Comité Consultatif International Télégraphique et Téléphonique. The International Telegraph and Telephone Consultative Committee.

Class A network. In Internet communications, a network in which the high-order (most significant) bit of the IP address is set to 0, and the host ID occupies the three low-order bytes.

Class B network. In Internet communications, a network in which the two high-order (most significant and next-to-most significant) bits of the IP address are set to 1 and 0, respectively, and the host ID occupies the two low-order bytes.

Class C network. In Internet communications, a network in which the two high-order (most significant and next-to-most significant) bits of the IP address are both set to 1, and the next high-order bit is set to 0. The host ID occupies the low-order byte.

configuration. 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) The devices and programs that make up a system, subsystem, or network.

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

connection. In data communication, an association established between functional units for conveying information. (I) (A) In Open Systems Interconnection architecture, an association established by a given layer between two or more entities of the next higher layer for the purpose of data transfer. (T) In TCP/IP, the path between two protocol applications that provides reliable data stream delivery service. In Internet, a connection extends from a TCP application on one system to a TCP application on another system. The path between two protocol functions, usually located in different machines, that provides reliable data delivery service. A logical association between a call participant (party) and a switch. A party's connection represents that party's participation in a telephone call.

D

data transfer rate. The average number of bits, characters, or blocks per unit of time passing between equipment in a data-transmission system. (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 telecommunication means. (I)

dB. Decibel.

dBm. Decibels based on 1 milliwatt.

dc. Direct current.

decibel (dB). One tenth of a bel. A unit that expresses the ratio of two power levels on a logarithmic scale. 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.

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, condition, value, or option that is assumed when none is explicitly specified. (I)

destination. Any point or location, such as a node, station, or particular terminal, to which information is to be sent.

device. A mechanical, electrical, or electronic contrivance with a specific purpose. An input/output unit such as a terminal, display, or printer.

diagnostics. Modules or tests used by computer users and service personnel to diagnose hardware problems.

dump. To record, at a particular instant, the contents of all or part of one storage device in another storage device. Dumping is usually for the purpose of debugging. (T) Data that has been dumped. (T) To copy data in a readable format from main or auxiliary storage onto an external medium such as tape, diskette, or printer. To copy the contents of all or part of virtual storage for the purpose of collecting error information.

E

EIA. Electronic Industries Association.

Electronic Industries Association (EIA). An organization of electronics manufacturers that advances the technological growth of the industry, represents the views of its members, and develops industry standards.

enable. To make functional.

equipment rack. Synonym for *rack*.

Ethernet. A local area network that allows multiple stations to access the transmission medium at will without prior coordination, avoids contention by using carrier sense and deference, and resolves contention by using collision detection and delayed retransmission.

F

F. Fahrenheit.

FCC. Federal Communications Commission (USA).

FDDI. Fiber Distributed Data Interface.

fiber. Synonym for *optical fiber*.

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. It uses token-ring architecture with optical fiber as the transmission medium over distances of several kilometers.

fiber optic cable. Synonym for *optical cable*.

fiber optics. The technology whereby optical signals from light-generating transmitters are propagated through optical fiber waveguides to light-detecting receivers.

H

hardware. Physical equipment as opposed to programs, procedures, rules, and associated documentation. (I) (A)

host computer. The primary or controlling computer in a multi-computer installation or network. In a network, a processing unit in which resides a network access method. Synonymous with *host processor*.

Hz. Hertz; frequence in cycles/second.

I

IEC. International Electrotechnical Commission.

IEEE. Institute of Electrical and Electronics Engineers.

IISP. Interim inter-switch protocol.

I/O. Input/output.

ILMI. Interim Local Management Interface.

input/output (I/O). Pertaining to input, output, or both (A). Pertaining to a device, process, or channel involved in data input, data output, or both.

Institute of Electrical and Electronics Engineers (IEEE). A professional society accredited by the American National Standards Institute (ANSI) to issue standards for the electronics industry.

interface. A shared boundary between two functional units, defined by functional characteristics, signal characteristics, or other characteristics, as appropriate. The concept includes the specification of the connection of two devices having different functions. (T) Hardware, software, or both, that links systems, programs, or devices.

interim inter-switch protocol. The interface between ATM subsystems.

International Organization for Standardization (ISO). An organization of national standards bodies from various countries established to promote development of standards to facilitate international exchange of goods and services, and develop cooperation in intellectual, scientific, technological, and economic activity.

International Telecommunication Union (ITU). The specialized telecommunication agency of the United Nations, established to provide standardized communication procedures and practices, including frequency allocation and radio regulations worldwide.

internet. A collection of networks interconnected by a set of routers that allow them to function as a single, large network. See also *Internet*

Internet. The internet administered by the Internet Architecture Board (IAB), consisting of large national backbone networks and many regional and campus networks all over the world. The Internet uses the Internet suite of protocols.

Internet address. See *IP address*.

Internet Protocol (IP). A protocol that routes data through a network or interconnected networks. IP acts as an interface between the higher logical layers and the physical network. This protocol, however, does not provide error recovery, flow control, or guarantee the reliability of the physical network. IP is a connectionless protocol. A protocol used to route data from its source to its destination in an Internet environment.

interoperability. The capability to communicate, execute programs, or transfer data among various functional units in a way that requires the user to have little or no knowledge of the unique characteristics of those units. (T)

Inverse Address Resolution Protocol (InARP). A protocol for converting a physical network address (for example, an ATM address) into a higher level protocol address (for example, an IP address).

IP. Internet Protocol.

IP address. The 32-bit address defined by the Internet Protocol, standard 5, Request for Comment (RFC) 791. It is usually represented in dotted decimal notation.

ISO. International Organization for Standardization.

ITU. International Telecommunication Union.

J

jumper cable. Synonym for *patch cable*.

K

Kbps. Kilobits per second.

kilobit (Kb). For processor storage, real and virtual storage, and channel volume, 2^{10} or 1024 bits. For disk storage capacity and communications volume, 1000 bits.

kilobyte (KB). For processor storage, real and virtual storage, and channel volume, 2^{10} or 1024 bytes. For disk storage capacity and communications volume, 1000 bytes.

L

LAN. Local area network.

LED. Light-emitting diode.

local. Pertaining to a device accessed directly without use of a telecommunication line. Contrast with *remote*.

local area network (LAN). A computer network located on a user's premises within a limited geographical area. 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) A network in which a set of devices are connected to one another for communication and that can be connected to a larger network. See also *Ethernet* and *token ring*. Contrast with *metropolitan area network (MAN)* and *wide area network (WAN)*.

M

m. meter

MAN. Metropolitan area network.

Management Information Base (MIB). A tree-like data structure for the definition and use of information.

Mb. Megabit; 1 048 576 bits.

Mbps. One million bits per second.

megabyte (MB). For processor storage and real and virtual memory, 2^{20} or 1 048 576 bytes. For disk storage capacity and transmission rates, 1 000 000 bytes.

megabit (Mb). For processor storage and real and virtual memory, 2^{20} or 1 048 576 bits. For disk storage capacity and transmission rates, 1 000 000 bits.

MIB. Management Information Base.

MIC. Media Interface Connector.

mm. Millimeter, millimeters.

motherboard. Synonym for *system board*.

multimode optical fiber. A graded-index or step-index optical fiber that allows more than one bound mode to propagate. (E) Contrast with *single mode optical fiber*. In FDDI, 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.

N

network. A configuration of data processing devices and software connected for information interchange. An arrangement of nodes and connecting branches. Connections are made between data stations. (T)

network administrator. A person who manages the use and maintenance of a network.

node. A generic term applying to an active element in an ATM network (station or concentrator).

O

optical cable. A fiber, multiple fibers, or a fiber bundle in a structure built to meet optical, mechanical, and environmental specifications. (E)

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. Synonym for *optical cable*.

optical fiber connector. A hardware component that transfers optical power between two optical fibers or bundles and is designed to be repeatedly connected and disconnected.

P

parameter. A variable that is given a constant value for a specified application and that may denote the application. (I) (A) Data passed between programs or procedures.

parity. A transmission error-checking scheme in which an extra bit is added to some unit of data, usually a byte, in order to make the total number of one bits even or odd. No-parity means that no parity bit is sent or expected. Mark and space mean that the parity position is always set to one or zero, respectively, and that received parity is not checked. The state of being either even-numbered or odd-numbered.

parity (even). A condition when the sum of all of the digits in an array of binary digits is even.

parity (odd). A condition when the sum of all of the digits in an array of binary digits is odd.

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. In a network, any route between any two nodes. (T) The route traversed by the information exchanged between two attaching devices in a network.

private network-network interface (PNNI). The interface between two network nodes.

PNNI. Private network-network interface.

port. An access point for data entry or exit. A connector on a device to which cables for other devices such as display stations and printers are attached. Synonymous with *socket*. 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.

power budget. Synonym for *fiber budget*.

protocol. A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication. (I) A specification for the format and relative timing of information exchanged between communicating parties.

R

rack. Synonym for *equipment rack*.

receiver (optical). An optoelectronic circuit that converts an optical signal to an electrical logic signal.

remote. Pertaining to a system, program, or device that is accessed through a telecommunication line. Contrast with *local*.

Request for Comments (RFC). In Internet communications, the document series that describes a part of the Internet suite of protocols and related experiments. All Internet standards are documented as RFCs.

reset. To put all or part of a data processing device back into a prescribed state. (I) (A) On a virtual circuit, reinitialization of data flow control. At reset, all data in transit are eliminated.

RH. Relative humidity.

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*.

RX. Receive.

S

server. A device, program, or code module on a network dedicated to providing a specific service to a network. On a LAN, a data station that provides facilities to other data stations. Examples are a file server, print server, and mail server.

signaling. Establishment of an ATM connection from a call set up by an end device.

Simple Network Management Protocol (SNMP). In the Internet suite of protocols, a network management protocol that is used to monitor routers and attached networks. SNMP is an application layer protocol. Information on devices managed is defined and stored in the application's Management Information Base (MIB).

single mode optical fiber. An optical fiber in which only the lowest-order bound mode (which can consist of a pair of orthogonally polarized fields) can propagate at the wavelength of interest. (E) Contrast with *multimode optical fiber*.

SNMP. Simple Network Management Protocol.

static route. The route between hosts, networks, or both that is manually entered into a routing table.

station. A communication device attached to a network. The term most often used in LANs is an *attaching device* or *workstation*. An input or output point of a system that uses telecommunication facilities.

STP. Shielded twisted pair.

subnet. Synonym for *subnetwork*.

subnetwork. See *ATM subnetwork*

system board. A circuit board that contains connectors for other circuit boards. Synonymous with *motherboard*. See also *daughterboard*.

SVC. Switched virtual connection.

T

TCP/IP. Transmission Control Protocol/Internet Protocol

Telnet. In TCP/IP, an application protocol that allows a user at one site to access a remote system as if the user's display station were locally attached. Telnet uses the Transmission Control Protocol as the underlying protocol.

TFTP. Trivial File Transfer Protocol.

topology. The physical or logical arrangement of nodes in a computer network. Examples include ring topology and bus topology.

Transmission Control Protocol (TCP). A communications protocol used in the Internet. TCP provides a reliable host-to-host protocol between hosts in packet-switched communications networks and in interconnected systems of such networks. It uses the Internet Protocol (IP) as the underlying protocol.

Transmission Control Protocol/Internet Protocol (TCP/IP). A set of communications protocols that support peer-to-peer connectivity functions for both local and wide area networks.

transmission medium. A physical carrier of electrical energy or electromagnetic radiation. The physical medium that conveys data between data stations; for example, twisted-pair wire, optical fiber, coaxial cable. (T)

transmit. The action of a station in generating a token, frame, or other symbol sequence and placing it on the outgoing medium. 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.

trunk. A physical topology, either open or closed, employing two optical fiber signal paths, one in each direction (that is, 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.

twisted pair. A transmission medium that consists of two insulated conductors twisted together to reduce noise. (T)

TX. Transmit.

U

UNI. User-network interface.

UNIX operating system. An operating system developed by Bell Laboratories that features multiprogramming in a multiuser environment. The UNIX operating system was originally developed for use on minicomputers, but has been adapted for mainframes and microcomputers.

Note: The AIX operating system is IBM's implementation of the UNIX operating system.

user-network interface (UNI). Physical and logical definition of the interface between an ATM user device and the ATM network.

UTP. Unshielded twisted pair.

V

V. Volt.

V ac. Volts alternating current.

VPC. Virtual Path Connection.

W

WAN. Wide area network.

wide area network (WAN). A network that provides communication services to a geographic area larger than that served by a local area network or a metropolitan area network, and that may use or provide public communication facilities. (T) A data communications network designed to serve an area of hundreds or thousands of miles; for example, public and private packet-switching networks and national telephone networks. Contrast with *local area network (LAN)* and *metropolitan area network (MAN)*.

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.

workstation. A functional unit at which a user works. A workstation often has some processing capability. (T) One or more programmable or nonprogrammable devices that allow a user to do work. A terminal or microcomputer, usually one that is connected to a mainframe or to a network, at which a user can perform applications.

Index

P

R

S

T

U

V

W

Readers' Comments — We'd Like to Hear from You

8260 Nways Multiprotocol Switching Hub
ATM 622 Mbps Module
Installation and User's Guide

Publication No. SA33-0438-00

Please send us your comments concerning this book. We will greatly appreciate them and will consider them for later releases of the present book.

If you prefer sending comments by FAX or electronically, use:

- FAX: 33 4 93 24 77 97
- E-mail: FRIBMQF5 at IBMMAIL
- IBM Internal Use: LGERCF at LGEPROFS
- Internet: rcf_lagaude@vnet.ibm.com

In advance, thank you.

Your comments:

Name

Address

Company or Organization

Phone No.

Readers' Comments — We'd Like to Hear from You
SA33-0438-00

Cut or Fold
Along Line

Fold and Tape | **Please do not staple** | Fold and Tape

PLACE
POSTAGE
STAMP
HERE

IBM France
Centre d'Etudes et Recherches
Service 0798 - BP 79
06610 La Gaude
France

Fold and Tape | **Please do not staple** | Fold and Tape

SA33-0438-00

Cut or Fold
Along Line

Printed in Denmark.

SA33-0438-00

DSMMOM397I '.EDFTABL' WAS IMBEDDED AT LINE 2863 OF 'C1QIUC00'
+++EDF151E More ARRANGE values than COLS or CWIDTHS defined on the TABLE tag. (Page 56 File: C1QIUC00 SCRIPT)
DSMMOM397I '.EDFTABL' WAS IMBEDDED AT LINE 2907 OF 'C1QIUC00'
DSMBEG323I STARTING PASS 3 OF 3.
+++EDF151E More ARRANGE values than COLS or CWIDTHS defined on the TABLE tag. (Page 56 File: C1QIUC00 SCRIPT)
DSMMOM397I '.EDFTABL' WAS IMBEDDED AT LINE 2863 OF 'C1QIUC00'
+++EDF151E More ARRANGE values than COLS or CWIDTHS defined on the TABLE tag. (Page 56 File: C1QIUC00 SCRIPT)
DSMMOM397I '.EDFTABL' WAS IMBEDDED AT LINE 2907 OF 'C1QIUC00'