SA33-0326-01

IBM 8260 Nways Multiprotocol Switching Hub

ATM Control Point and Switch Module Installation and User's Guide

SA33-0326-01

IBM 8260 Nways Multiprotocol Switching Hub

ATM Control Point and Switch Module Installation and User's Guide

Note!

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

Second Edition (February 1996)

The information contained in this manual 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) 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

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 *ATM Control Point and Switch* complies with the following ATM standards:

- ATM User-Network Interface (UNI) Specifications V3.0 and V3.1, ATM Forum
- LAN Emulation over ATM Specifications V1.0, ATM Forum
- Q.2110 Service Specific Connection-Oriented Protocol (SSCOP), ITU, March 17, 1994
- Q.2130 Service Specific Coordination Function (SSCF) for support of signaling at the user-network interface, March 17, 1994.

The ATM Control Point and Switch (A-CPSW) 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.

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 Part 15 of the 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 the 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, denoted by an asterisk (*) in this publication, are trademarks or service marks of the IBM Corporation in the United States or other countries:

AIX
IBM
NetView for AIX
Nways
PS/2
RISC System/6000
Turboways

The term Trichannel, denoted by a double asterisk (**) in this publication, is a trademark of 3Com Corporation.

Safety

This product complies with IBM* safety standards.

For more information, see the *IBM Telecommunication Products Safety Handbook*, GA33-0126.

About this Book

This book presents information on how to install and configure the IBM 8260 ATM Control Point and Switch Module (Model Number A-CPSW) in the 8260 Switching Hub. It describes how to diagnose and solve problems associated with the operation of the A-CPSW module, and describes some of the principles of asynchronous transfer mode (ATM) technology on which the A-CPSW module is based.

This book also describes how to install and configure a management console for the A-CPSW module. The A-CPSW commands that you enter at the console to manage the ATM subsystem in the 8260 hub are described in the *IBM 8260 Nways Multiprotocol Switching Hub*, *IBM 8285 Nways ATM Workgroup Switch*, *ATM Command Reference Guide*, SA33-0385.

Who Should Use this Book

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

- ATM network administrator
- ATM network operator
- Hardware installer.

How to Use this Book

This book contains seven chapters and five appendixes:

Chapter 1, "Introduction to ATM" on page 1 gives an overview of the main functions of the A-CPSW module.

Chapter 2, "Installation" on page 15 describes how to install the A-CPSW module in an 8260 hub. It also describes how to connect a console to the A-CPSW module in order to perform configuration tasks.

Chapter 3, "ATM Addressing in the 8260 ATM Control Point and Switch" on page 29 describes the components of an ATM Campus network, guidelines for defining ATM addresses for the A-CPSW, how to set up trunk connections within and between networks, and how to use Permanent Virtual Connections (PVCs). an 8260 hub. It also describes how to connect a console to the A-CPSW module in order to perform configuration tasks.

Chapter 4, "Setting-Up and Using a Configuration Console" on page 41 describes how to set up and configure the A-CPSW management console, set an ATM address, and configure facilities for SNMP management and remote login.

Chapter 5, “Configuring the ATM Control Point and Switch” on page 53 describes how to configure the A-CPSW module after installing it in the 8260 hub.

Chapter 6, “Network and Switch Management” on page 79 provides guidelines for managing and maintaining the ATM Control Point and Switch.

Chapter 7, “Troubleshooting” on page 89 describes how to diagnose and solve problems associated with the installation and operation of the A-CPSW module, A-CPSW console, and ATM subsystem in the 8260 hub.

Appendix A, “A-CPSW Technical Specifications” on page 133 describes the technical specifications for the A-CPSW module.

Appendix B, “RS-232 Cable and Modem Requirements” on page 137 describes the RS-232 cable requirements and pin assignments for connecting a console or modem to the A-CPSW module's RS-232 Console port. It also describes how to configure a modem connection.

Appendix D, “Error and Information Codes” on page 151 describes the return codes displayed for the Q.2931 and TFTP protocols, and Maintenance mode.

Appendix C, “8260 ATM Address Formats” on page 147 describes the ATM addressing formats.

Appendix E, “Configuring AIX for Download and Upload Operations” on page 157 describes how to configure a server running AIX* for TFTP file transfers with ATM 8260 hubs.

“Glossary” on page 159 describes the terms and abbreviations used in this manual.

“Bibliography” on page 169 lists the publications that provide additional information regarding the functions and technology of the *ATM Control Point and Switch*.

“Index” on page 171 lists the concepts, terms, and tasks described in this manual and the page numbers on which you can find the information.

Prerequisite Knowledge

To understand the information presented in this book, you should be familiar with:

- Features and characteristics of the IBM 8260 Nways Multiprotocol Switching hub, as described in *IBM 8260 Multiprotocol Intelligent Switching Hub Product Description*, GA33-0315.
- Principles of asynchronous transfer mode (ATM) technology
- ATM Forum UNI Specifications V3.0 and V3.1.
- ATM Forum LAN Emulation Specifications V1.0.

Where to Find More Information

The publications for the A-CPSW module and associated product documentation are listed in the “Bibliography” on page 169.

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.raleigh.ibm.com`

Chapter 1. Introduction to ATM

This chapter presents an overview of the main principles and modes of operation of asynchronous transfer mode (ATM) technology on which the IBM 8260 ATM Control Point and Switch (A-CPSW) module is based. It also describes how ATM is implemented in the IBM 8260 hub and shows how an 8260-based ATM campus network can be built by interconnecting ATM subsystems.

IBM 8260 ATM Subsystem

By interconnecting IBM 8260 Nways Multiprotocol Switching hubs, you can build a private campus network that uses ATM to provide:

- The backbone structure, with possible extensions to the WAN
- New LAN capability for attaching workstations and servers with dedicated bandwidth and isochronous transmission.

ATM is implemented in the 8260 hub to permit existing LANs (such as Token-Ring) to coexist with the new ATM technology. The IBM 8260 currently supports connectivity to Ethernet, Token-Ring, and FDDI LANs. You can change a workstation connection from an existing LAN to ATM by unplugging a connector on a LAN module port and plugging it into another port on an ATM media module.

In the IBM 8260 hub, the ATM subsystem consists of the following components:

- An ATM backplane for interconnecting active ATM modules installed in any of the slots in the hub
- A 2-slot *ATM Control Point and Switch* (A-CPSW) module (two may be installed in A17 models)
- ATM media (for example, 100 Mbps Concentration) modules.

ATM Backplane

All data transmitted between modules in the ATM subsystem passes through the ATM backplane. Data is switched between ATM media modules in the ATM subsystem by an A-CPSW module. A-CPSW modules are installed in slot positions 9 and 10 in the ATM backplane of 10-slot 8260 models, and slot positions 9 and 10 and/or 11 and 12 in the ATM backplane of 17-slot models. These positions are shown in Figure 1.

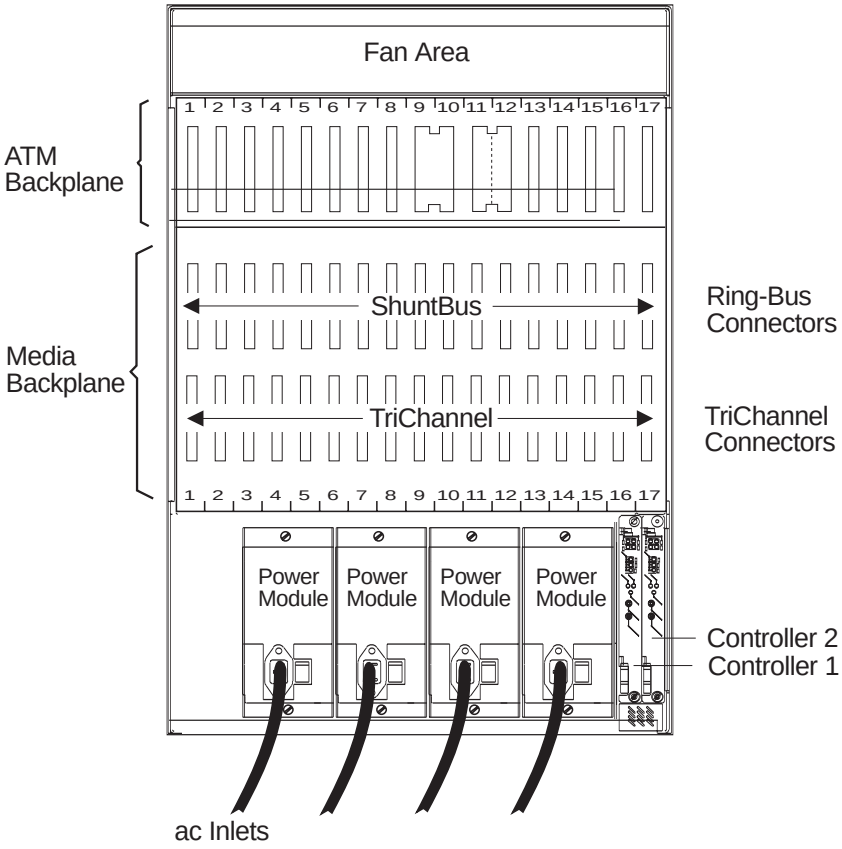

Figure 1. ATM Backplane in the 17-slot IBM 8260 Hub

Two A-CPSW modules may be installed in the 17-slot 8260 models. This allows for A-CPSW redundancy (see page “A-CPSW Redundancy” on page 12).

The major difference between the ATM backplane and other 8260 hub LAN backplanes is that each ATM media module has a dedicated set of connections to the A-CPSW module. This set of dedicated connections constitutes a wiring star topology in which ATM media modules are at the tips of the star and the A-CPSW module is at the center. The wiring topology used in the ATM backplane is shown in Figure 2.

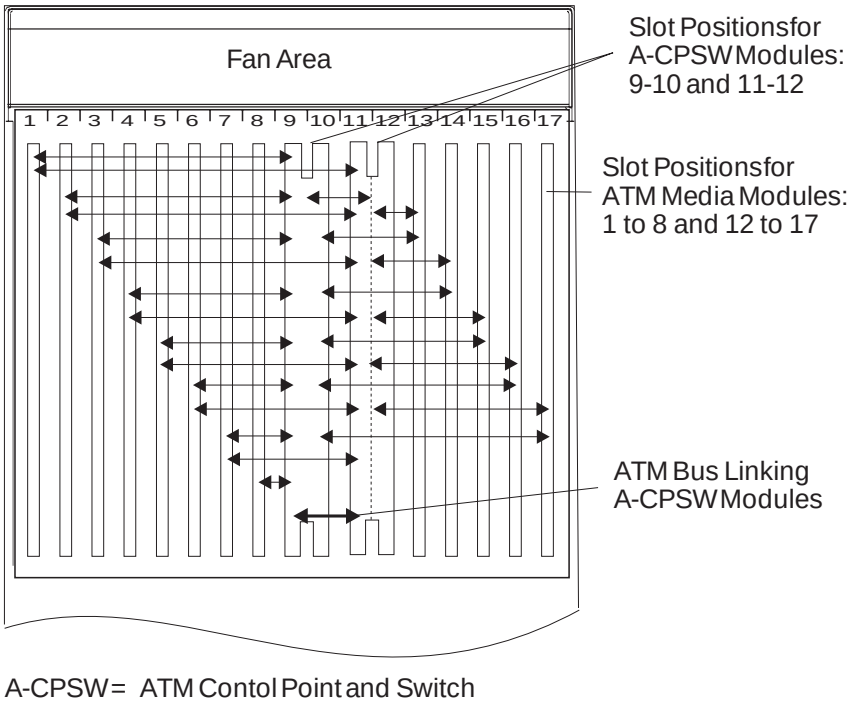

Figure 2. Wiring Star Topology in ATM Backplane (17-slot 8260)

The main characteristics of the ATM backplane are as follows:

- Modular structure
- Full floating ATM media modules
- Support of two A-CPSW modules for reliability and redundancy (in 17-slot models)
- Full coexistence with existing legacy LAN modules.

ATM media modules can be hot-plugged into any open slot. Also, you can remove an ATM module and re-insert it into another slot without disturbing the operation of other ATM modules and without causing a failure in ATM connections in the hub.

You can install an ATM media module in any one of slots 1 to 8 in a 10-slot model, and of slots 1 to 8 and 12 to 17 in a 17-slot model. Slots 9, 10, and 11 (in 17-slot models) are reserved for A-CPSW modules. After installing the module, you must configure it for operation by entering a series of commands from the A-CPSW local console or from a TELNET session. The commands are detailed in the *IBM 8260 Nways Multiprotocol Switching Hub, IBM 8285 Nways ATM Workgroup Switch, ATM Command Reference Guide*, SA33-0385 (hereafter referred to as the *IBM 8260/8285 ATM Command Reference Guide*).

ATM Control Point and Switch Module

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

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

  ATM cell switching is carried out by means of the Switch integrated circuit, a technology used by the Nways* switch. This single chip is a non-blocking 16-by-16 times 256 Mbps 8-bit parallel switch.

- The Control Point card houses a processor where the Control program resides.

The IBM 8260 ATM subsystem (as all ATM switching devices) requires a control program to perform the functions associated with the establishment and management of ATM circuits. These functions are integrated into the switching element of each A-CPSW module. This allows the 8260 ATM subsystem to use a distributed control system with the following advantages:

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

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

The Control Point supports an extensive set of ATM connections, including:

- Switched (SVC) and permanent (PVC)
- Point-to-point and point-to-multipoint
- Reserved Bandwidth (RB) and Available Bit Rate (ABR)

Note: The Available Bit Rate service will be available in future releases of the A-CPSW module.

Table 1. ATM Connections Supported in 8260 Hubs

Type of Virtual Connection	**Connection Type**	**Connection Class**	**Connection Mode**
Virtual Path Connection (VP)	Permanent	Reserved Bandwidth and Available Bit Rate	Point-to-point
Virtual Channel Connection (VC)	Switched	Reserved Bandwidth and Available Bit Rate	Point-to-point and point-to-multipoint
Virtual Channel Connection (VC)	Permanent	Reserved Bandwidth and Available Bit Rate	Point-to-point

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

Each IBM 8260 Control Point provides the following functions:

- Control plane:
  - Support of ATM signaling (SVCs) according to ATM Forum V3.0 and V3.1 specifications.
  - Switch-to-switch interface (SSI) based on an extension of the ATM Forum UNI V3.0 as stated in the ATM Forum P-NNI framework
  - Topology services and route computation based on TRS, with automatic bypass of failed nodes and links only for SSI connections (TRS is an extension of OSPF, Open Shortest Path First.)
  - Interconnection of local ATM networks over an ATM WAN that provides a permanent virtual path, allowing switched connections to be set up between end systems on both sides of the WAN (VP tunneling)
  - Internal SVC APIs to support node management and services over switched ATM connections
  - Support of permanent virtual path (VP) and permanent virtual channel (VC) point-to-point connections
  - Support of IP over ATM (RFC 1577) for node management and services (Classical IP); PING message: 916 bytes maximum.
  - Support of 802.3 LAN Emulation Client for node management and services (LAN emulation). PING and TELNET messages: maximum length depends on the maximum SDU size supported on the corresponding emulated LAN. See Table 2 on page 14

- Management plane:
  - Full SNMP support (get, getnext, set, and traps)
  - MIB-II support
  - IETF AToMIB
  - Full Interim Local Management Interface (ILMI) support at UNI and from the network management station
  - OSPF MIB support for managing topology and route computation
  - IBM extension
    - Hub-specific: switch, modules and ports
    - Enhanced PVC management (automatic route computation and recovery)
    - Signalling (Q.2931 and SAAL) configurations and statistics
    - ATM statistics
  - Services for local and remote administration.
- User Plane (hardware):
  - ATM layer (switching)
  - Support of Reserved Bandwidth (RB) connection.

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

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

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

The ILMI (ATM Forum V3.0) is fully supported. End-systems can register their local address to the IBM 8260 and receive notification of their network address. ILMI messages are SNMP-formatted and conveyed using the AAL5 Adaptation layer.

ATM Subsystem Traffic Management

High-speed ATM networks support a variety of applications with different traffic and quality of service (QOS) requirements. For example, multimedia and time critical data applications require guaranteed levels of delay and throughput, while other applications can tolerate variations in delay and throughput (LAN traffic). This diversity requires different congestion management methods.

The IBM 8260 ATM subsystem supports the ATM Reserved Bandwidth (RB) service type of traffic.

In the **Reserved Bandwidth** (RB) service, an application needs to establish a traffic contract with the network before transmitting data. The traffic contract consists of a specified QOS class and a set of traffic descriptors. Through resource allocation, the network either provides the desired QOS for the ATM connection or refuses the call. For this method, the source must be accurately modelled and able to precisely describe its traffic pattern. The allocated bandwidth is usually less than the peak rate in order to benefit from statistical multiplexing gains which may cause congestion. A source policing scheme ensures that the source conforms itself to the contract by means of a "leaky bucket" rate control.

The use of selective and global backpressure for traffic management in the ATM subsystem gives the IBM 8260 ATM network an added value. **Selective backpressure** temporarily stops one virtual connection. **Global backpressure** temporarily stops an ATM link.

ATM Subsystem Chassis Management

Management of the ATM subsystem can be achieved in two ways:

- Via a Distributed Management Module (DMM) installed in the 8260 hub.
- Via the A-CPSW module, which contains a subset of DMM, when the 8260 hub is only running ATM. (Check the Release Notes for the level of A-CPSW code required).

Note: If a DMM module is present, or hot-inserted, in the hub, the DMM module will assume chassis management, and A-CPSW commands entered will not be effected. The required commands, in this case, should be entered from a DMM console, and not the local console.

Power management of the hub is provided by the SET POWER MODE and SHOW POWER commands. The power mode can be set so that if an additional power supply is available, the supply is kept in reserve, to be used in the event of failure. Power management information can be displayed to show the amount of power available, and the amount of power consumed by the hub. In addition, the power budget, power modes, and power information can be displayed for individual slots.

A complete inventory of the hub's contents, including fans and power supplies can be displayed via the SHOW HUB command.

The SHOW INVENTORY command allows you to display inventory information about the hub, including all modules, submodules, and controller module.

For more information, see the *IBM 8260/8285 ATM Command Reference Guide*.

A-CPSW Redundancy: By installing a second A-CPSW in a 17-slot 8260, a backup to the active A-CPSW is provided (check the Release Notes for the level of A-CPSW and the level of code required). If the active A-CPSW fails, the standby will take over control. The active A-CPSW continually updates the tables in the standby A-CPSW to ensure that the backup configuration is current, and reduce the impact should a switch to the standby be required. The active A-CPSW checks every one second to determine if the standby A-CPSW is present and up-to-date. The date and time are also updated to ensure network time consistency in case of switch-over.

The active A-CPSW also periodically requests that the standby A-CPSW perform diagnostics to ensure that it is capable of assuming control if required.

Which A-CPSW is to be active can be defined by the operator in both Maintenance and Administrator modes, via the SET ROLE or SET DEVICE ROLE command (see the *IBM 8260/8285 ATM Command Reference Guide* for details). This choice is considered at next reset when electing the active A-CPSW. Maintenance mode can be entered for the backup A-CPSW, but this mode will be ended should the active A-CPSW fail or enter Maintenance mode.

Note: The standby A-CPSW does not support Telnet. There are two console modes available, basic dialog mode and maintenance mode.

Benefits of Using ATM in the 8260 Hub

The use of ATM in the 8260 hub offers the following benefits:

- Use of ATM in local and wide area networks, and in both private and public networks
- ATM support for multimedia applications and mixed traffic, such as voice, video, and data
- Extension of current application solutions by providing bandwidth on demand and allowing applications to share bandwidth
- Support for current and future high-bandwidth applications and protocols
- Low transfer delay and support for both non-realtime and realtime applications by providing large peak bandwidth
- Coexistence of ATM with the existing LAN backplane allowing for the combined use of shared media LANs and ATM
- Integration of ATM into the 8260 hub management functions
- Distributed switching across 8260 hubs for greater network reliability
- Platform for providing ATM to the desktop and high media concentration
- Independent of physical interface type
- Simplified networking and architecture.

LAN Emulation Client (LEC)

The A-CPSW contains an integrated 'lite' LEC that provides basic LAN emulation client functions for use by an SNMP agent or for Internet FTP functions. Such functions include Netview, TELNET, and TFTP. The LEC implementation is fully ATM Forum compliant.

The maximum length of PING and TELNET messages depends on the maximum SDU size supported on the corresponding emulated LAN. Table 2 lists the correspondence (in bytes):

Table 2. Maximum PING and TELNET Message Lengths

802.3 ELAN max SDU	**PING/TELNET maximum length**
1516	1492
4544	4520
9234	9210
18190	18166

If a connection is lost between a LEC and a LAN emulation server (LES), the LEC will attempt to reconnect 5 times, at intervals of 5 seconds. If the connection is not re-established, the LEC will continue attempts to reconnect, at intervals of one minute.

Chapter 2. Installation

This chapter describes how to install the A-CPSW module. Before you unpack the module, please follow the precautions in “Before You Start.”

Before You Start

Take the following precautions before unpacking the A-CPSW module:

- Do not remove the A-CPSW module from its anti-static shielding bag until you are ready to insert it into the 8260 hub. This avoids the possibility of having electrostatic discharge damage static-sensitive devices in the A-CPSW cards.
- Always use a foot strap and grounded mat or wear a grounded static discharge wrist strap whenever you inspect or install the A-CPSW module. Or else, touch a grounded rack or another source of ground before handling the A-CPSW module.
- Verify that the A-CPSW module is the correct feature by matching the part number listed on the side of the shipping carton to the part number you ordered.

Unpacking the Module

To unpack the A-CPSW module, follow these steps:

1. Remove the A-CPSW module from the shipping carton.
2. Remove the A-CPSW module from the anti-static bag and inspect it for damage. Always handle the module by the faceplate being careful not to touch the internal components.

   If the module appears damaged, put it back in the anti-static bag, and put the bag back into the shipping carton. Then contact your local IBM dealer or IBM representative.

IBM suggests that you keep the shipping carton and the anti-static shielding bag which your A-CPSW module was delivered in, in case you later want to repackage the module for storage or shipment.

IBM also suggests that you record the serial number of your A-CPSW module and other information about the modules in your 8260 hub in the Slot Usage chart provided in the binder of the *IBM 8260 Multiprotocol Intelligent Switching Hub Reference Library* (Part Number 59G0022) that is shipped with the 8260 hub.

Installing the A-CPSW Module

To install an A-CPSW module in the 8260 hub, follow these steps:

1. Install the 8260 hub in its rack or on a desktop by following the instructions in the *IBM 8260 Multiprotocol Intelligent Switching Hub Installation Guide* (SA33-0251).
2. Insert the A-CPSW module into slots 9 and 10 (or slots 11 and 12 in A17 models) of the hub by 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 the top and bottom module ejectors are OPEN (see Figure 4 on page 18.)
3. Make sure that the module is plugged into the connectors on the ATM backplane.

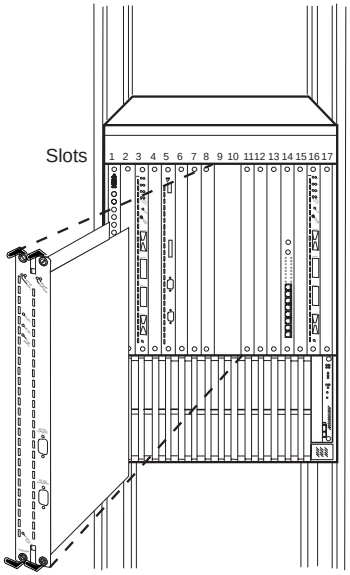

Figure 3. Installing the A-CPSW Module in an 8260 Hub

4. Close the top and bottom ejectors simultaneously.

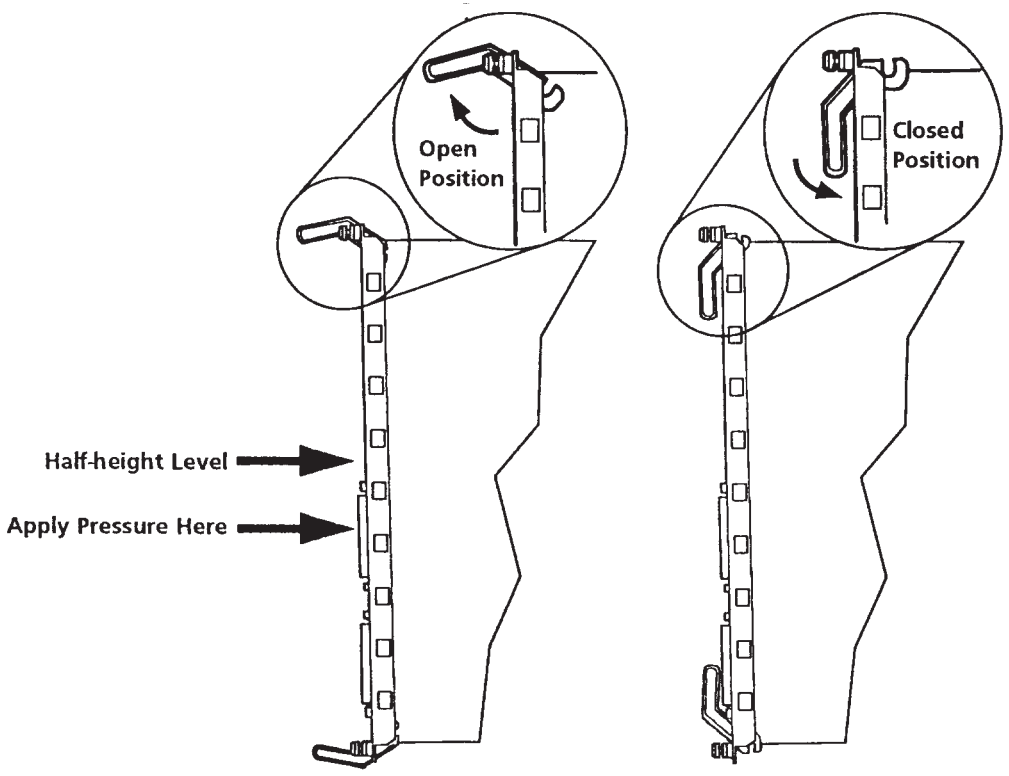

Figure 4. 8260 Module Ejectors

5. Fasten the spring-loaded screws on the front panel of the module to the hub using your fingers. Do not over-tighten.
6. (optional) Press the LED Test button on the Controller module to verify that all LEDs are functional.
7. If you want to use a local console to configure (out-of-band) the ATM subsystem, you must attach an ASCII-type terminal to the RS-232 Console port on the A-CPSW module. The connection can either be local or via modems.

   If you use the modem cables that are delivered with the 8260 hub, you must also use the null modem adapter supplied with the A-CPSW module.

   Verify that the console and modems (if used) meet the factory defaults of the A-CPSW module. If they are not compatible with the factory defaults, you will not be able to communicate with the module. The default A-CPSW settings are:

   - 9600 baud rate
   - 8 data bits
   - No parity
   - 1 stop bit.

   See Chapter 4, “Setting-Up and Using a Configuration Console” on page 41 for more information.
8. Attach one end of an RS-232 cable to the RS-232 **Console** port, the topmost RS-232 port on the front panel of the A-CPSW module. Loop the cable through the hub cable tray (if installed) and attach the other end to the RS-232 serial port connector on the console or personal computer.

   Note: The RS-232 cable can be a maximum of 200 feet (61 meters) in length. There are several RS-232 cable configurations available. Refer to Appendix B, “RS-232 Cable and Modem Requirements” on page 137 for more information on the exact RS-232 cable that you need.

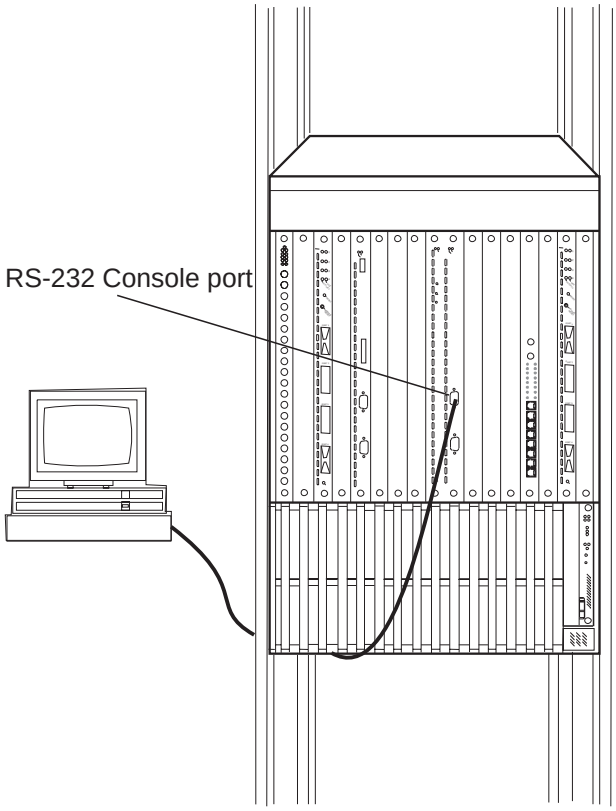

Figure 5. Attaching a Terminal to the A-CPSW RS-232 Console Port

9. Attach cables to the ATM media modules and ATM user devices you want to use. Then enter A-CPSW commands from the console (as described in Chapter 5, “Configuring the ATM Control Point and Switch” on page 53) to configure the ATM subsystem.
10. Enter the SAVE ALL command from the console once you have configured all ATM media modules. The A-CPSW module saves the configuration information in nonvolatile memory.

Verifying Normal A-CPSW Operation

After installing the A-CPSW module, you can verify that it is operating properly by checking the status of the LEDs and the message displayed on the console screen. The position of the LEDs is shown in Figure 6 on page 23.

- The RUNNING LED on the module should light (yellow).
- The ACTIVE LED should light (yellow) if the A-CPSW module is managing ATM media modules.
- The WRONG SLOT LED should not light.
- If the module is installed properly and if the RS-232 connection is made, the following message should display on the console screen when you press Enter:

  ```
  ATM Control Point and Switch Module
  (c) Copyright IBM Corp. 1994, 1996. All rights reserved.
  ```

Now you can enter A-CPSW commands from the local console to set up your system defaults and configure ATM media modules as explained in Chapter 5, “Configuring the ATM Control Point and Switch” on page 53. If you have problems while configuring your ATM subsystem, refer to Chapter 7, “Troubleshooting” on page 89.

How to perform wrap tests on ATM ports is described in the *IBM 8260/8285 ATM Command Reference Guide*.

The next section describes the front panel of the A-CPSW module and the meaning of each LED.

Front Panel

The front panel of the A-CPSW module contains:

- Seven LEDs that show the operating state of the module
- 9-pin RS-232 Console port
- 9-pin RS-232 Auxiliary port (reserved for IBM service personnel)
- ATM Reset button that resets all ATM modules (A-CPSW and ATM media) in the 8260 hub.

The position of these components on the front panel is shown in Figure 6 on page 23

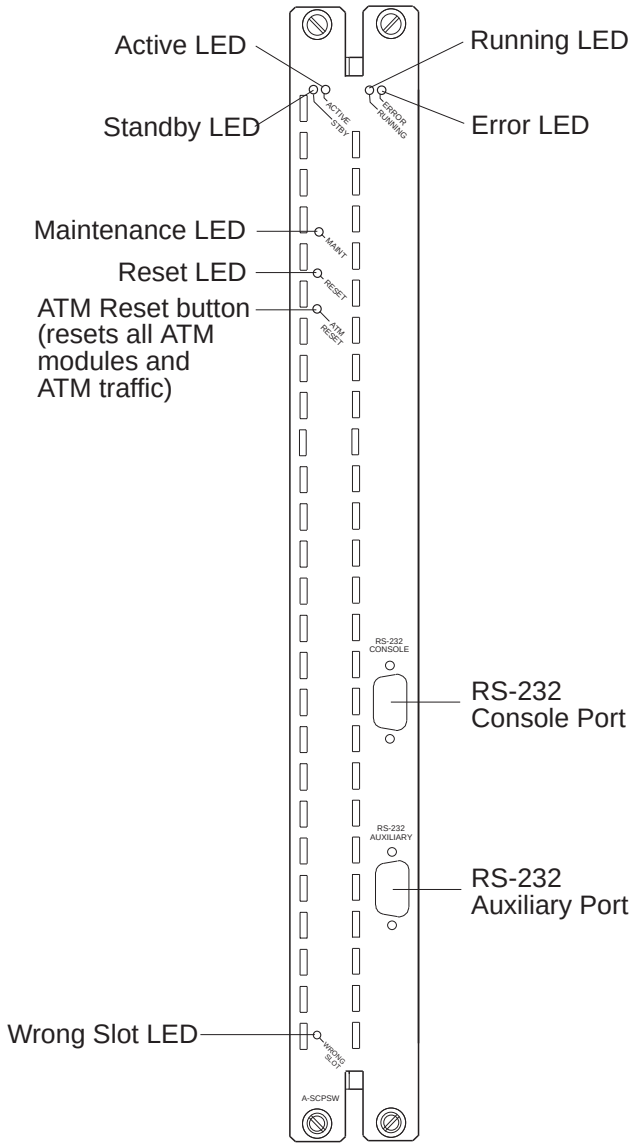

Figure 6. Front Panel of A-CPSW Module

Meaning of the LEDs

Table 3 shows the meaning of each LED on the front panel of the A-CPSW module.

Table 3. Meaning of the A-CPSW LEDs

LED Name	Color	State	Meaning
Active	Yellow	OFF	A-CPSW module is not able to control ATM traffic and ATM media modules.
		ON	A-CPSW module is able to control ATM traffic and ATM media modules.
Standby (STBY)	Yellow	OFF	Either a second A-CPSW module is not installed or, if a second A-CPSW is installed, it is not active.
		ON	The second A-CPSW module is installed and active.
Running	Yellow	OFF	A-CPSW software is not running. The Error LED or the Maintenance LED lights up.
		ON	A-CPSW software is started and running properly.
Error	Red	OFF	A-CPSW module is functioning properly.
		ON	A-CPSW module is not operational because of an error. See Chapter 7, “Troubleshooting” on page 89.
Maintenance (MAINT)	Yellow	OFF	A-CPSW module is functioning properly.
		ON	Maintenance mode is active.
Reset	Yellow	OFF	A-CPSW module is functioning properly.
		ON	A-CPSW and ATM media modules in hub are being reset.
Wrong Slot	Yellow	OFF	Normal operation.
		ON	A-CPSW module is not installed in the correct slots.

ATM Reset Button

The ATM Reset button resets the A-CPSW and all ATM media modules in the 8260 hub. All data traffic and connections in the ATM subsystem are stopped.

Press this button when instructed after you correct an error condition. Before pressing it, be sure to save any configuration settings entered in the current session with the SAVE command. When you press the ATM Reset button, all unsaved settings will be lost.

The button is recessed on the front panel to prevent it from being accidentally pressed. To press it, use a pen or a small screwdriver to hold the button down.

Pressing the ATM Reset button has the same effect as entering the RESET ATM_SUBSYSTEM FORCE command from the A-CPSW console.

RS-232 Console Port

The 9-pin RS-232 **Console** port (the topmost RS-232 port on the front panel) is a DTE male connector (DB-9) to which a console or modem is connected in order to:

- Initialize the A-CPSW module at installation.
- Enter A-CPSW network management commands (described in the *IBM 8260/8285 ATM Command Reference Guide*).
- Download new software versions.

Table 4. RS-232 Console Port Pin Assignments (DB9)

Pin Number	**Signal Name**
1	Carrier Detect (CD)
2	Receive Data (RX)
3	Transmit Data (TX)
4	Data Terminal Ready (DTR)
5	Signal Ground (GND)
6	Data Set Ready (DSR)
7	Request to Send (RTS)
8	Clear to Send (CTS)
9	No connection

An RTS signal is not continuously sent by an A-CPSW module. If you attach a terminal (such as an IBM 3151 or 3164) you should configure it with IPRTS (Induced Permanent RTS) for Line Control.

RS-232 Auxiliary Port

The 9-pin RS-232 **Auxiliary** serial port (the bottommost RS-232 port on the front panel) is also a DTE male connector (DB-9).

The RS-232 Auxiliary port is reserved for IBM service engineers. No device should be connected to it during normal hub operation.

Table 5. RS-232 Auxiliary Port Pin Assignments. The RS-232 Auxiliary port should be used only by IBM service engineers.

Pin Number	Signal Name
1	No connection
2	Receive Data (RX)
3	Transmit Data (TX)
4	No connection
5	Signal Ground (GND)
6	No connection
7	Request to Send (RTS)
8	Clear to Send (CTS)
9	No connection

Chapter 3. ATM Addressing in the 8260 ATM Control Point and Switch

This chapter describes:

- The components of an ATM Campus Network
- Guidelines for defining an ATM Address for the ATM Control Point and Switch
- How to set up trunk connections within and between subnetworks
- How to use Permanent Virtual Connections (PVCs).

ATM Campus Networks

The purpose of an ATM network is to set up connections between ATM user devices, the two endpoints of a connection.

IBM ATM subsystems can be interconnected in order to build a local, privately owned and administered ATM network called an **ATM Campus Network**.

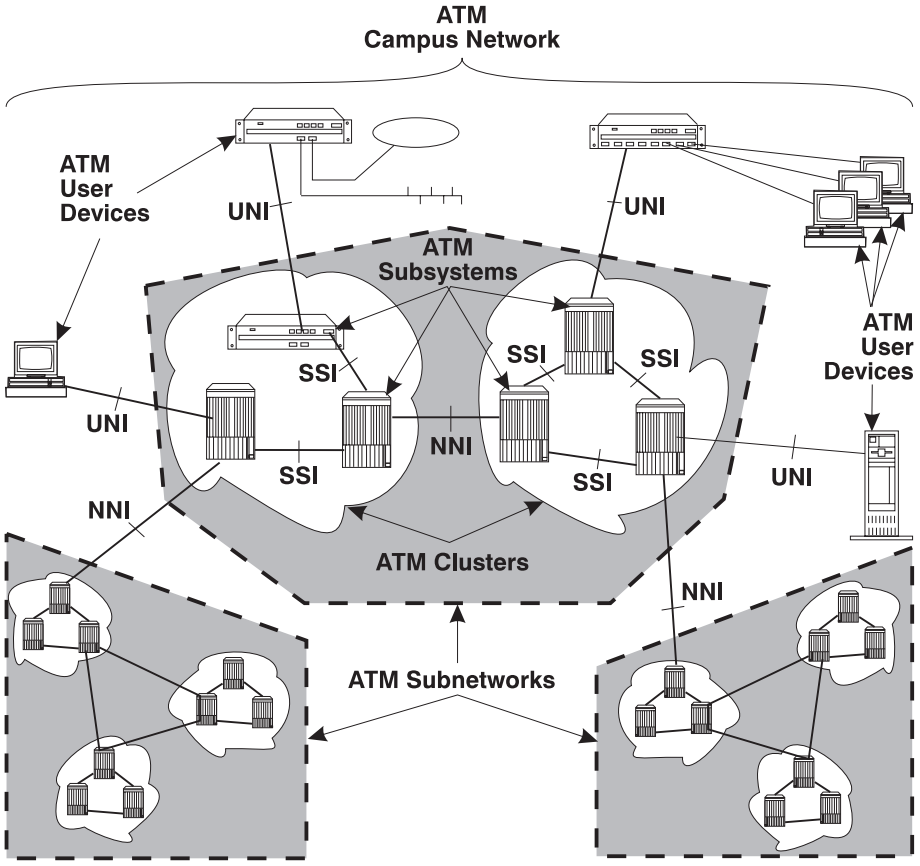

Figure 7. Components of an ATM Campus Network

Network Components

The various parts of the ATM address form a hierarchy of network components, as shown in Figure 8.

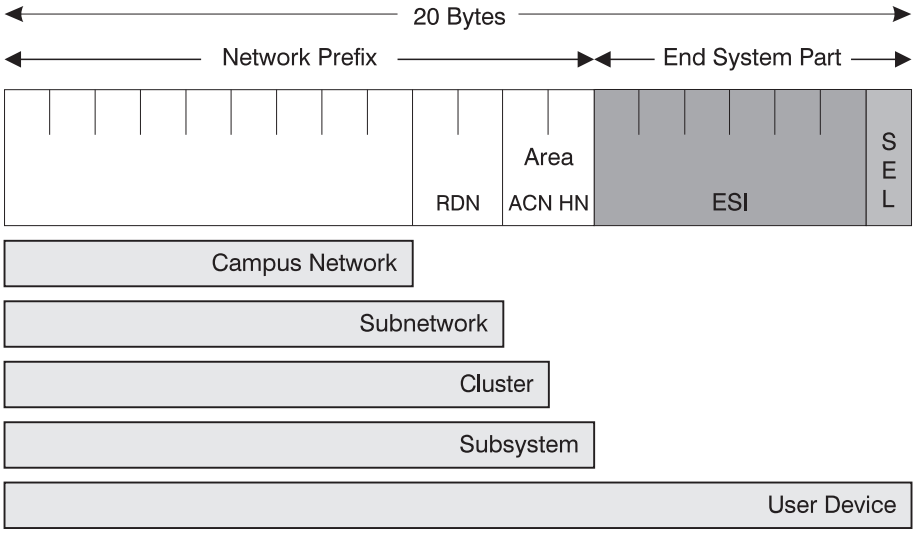

Figure 8. ATM Address Hierarchy

For a full description of the ATM address formats supported by the A-CPSW, see Appendix C, “8260 ATM Address Formats” on page 147.

The terms used to describe the components of an ATM Campus Network are defined here:

ATM Campus Network

One or more ATM subnetworks interconnected using NNI interfaces.

This set of subnetworks is controlled by one administrative domain and a single private owner using one network access protocol (UNI).

An ATM Campus Network is identified by:

- The first 9 bytes of the unique network prefix.

ATM Subnetwork

One or more ATM clusters interconnected using NNI interfaces.

An ATM subnetwork is identified by:

- The first 9 bytes of the network prefix, which are the same for all subnetworks in a Campus Network, plus
- A 2-byte routing domain number (**RDN**), which is unique within the ATM Campus Network.

ATM Cluster One or more ATM subsystems interconnected using SSI interfaces.

An ATM Cluster is identified by:

- The first 11 bytes of the network prefix, which are the same for all clusters in an ATM subnetwork, plus
- A 1-byte ATM Cluster Number (**ACN**), unique within the ATM subnetwork, which ranges from 0 to 255.

ATM Subsystem The components of the ATM subsystem in the hub include:

- Integrated ATM Control Point and Switch functions
- Devices connected to the ATM ports
- ATM media modules installed in the 8260
- ATM interfaces: user-to-network (UNI), switch-to-switch (SSI), network-to-network (NNI).

An ATM Subsystem is identified by:

- The first 12 bytes of the network prefix, which are the same for all subsystems in a cluster, plus
- A 1-byte Hub Number (**HN**), unique within the ATM Cluster, which ranges from 0 to 255.

ATM User Device An end system that encapsulates data into ATM cells and forwards them to the 8260 ATM subsystem across a UNI interface. Examples of ATM user devices are:

- Servers and workstations equipped with ATM adapters
- ATM concentrators or workstations equipped with ATM adapters
- Routers with ATM adapters
- LAN ATM bridges.

An ATM User Device is identified by:

- The first 13 bytes of the network prefix, which are the same for all user devices attached to an ATM subsystem, plus
- A 6-byte End System Identifier (**ESI**), unique within the ATM Subsystem, plus
- A 1-byte Selector field that may be used by the user device.

The A-CPSW passes the network prefix of an ATM address to attached end systems using the Interim Local Management Interface (ILMI) protocol.

Network Interfaces

ATM standards define three protocols used across the interfaces connecting the components of an ATM campus network:

UNI Defines the interface between an ATM User Device (such as a terminal, router, bridge, server, workstation, or concentrator equipped with an ATM adapter) and the ATM network. The ATM subsystem supports the private UNI defined by the ATM Forum UNI Specification V3.1.

SSI Defines the interface between two ATM switches (8285 Workgroup Switches or 8260 hubs) in the same ATM Cluster.

The SSI fully supports networking functions without the need of operator intervention, such as routing, node failure and node recovery, backup, and topology management by the Topology Routing Service (TRS) program.

You can define multiple SSI connections between two ATM switches. The SSI has been developed from the Public-NNI for use in IBM ATM subnetworks.

NNI Defines the interface between two ATM switches belonging to different ATM Clusters in the same subnetwork or in different subnetworks.

Operator intervention is required in order to manage networking functions such as routing, backup, topology changes, and so on.

You can define only one NNI connection between two ATM switches.

Defining the ATM Address of the A-CPSW

A default ATM address is provided with the A-CPSW. You can continue to use this default address only if you use your A-CPSW as a stand-alone ATM switch.

If you want to connect the A-CPSW to other ATM subsystems, the ATM address must be defined as follows:

AFI-RDN The first (leftmost) 11 bytes of the Network Prefix is the address of the ATM subnetwork to which this A-CPSW belongs.

If the ATM campus network is connected to a public carrier, this address is assigned by the appropriate administrative authority.

ACN If the ATM subnetwork contains multiple ATM clusters, this byte specifies the number of the cluster to which this A-CPSW belongs.

HN If the ATM cluster contains multiple ATM subsystems, this byte specifies the number of this A-CPSW in the cluster.

This address is assigned to the A-CPSW using the SET DEVICE ATM_ADDRESS command, which automatically saves the ATM address and resets the ATM subsystem.

Setting-Up ATM Trunk Connections

To configure a trunk between two ATM subnetworks or two ATM clusters in the same subnetwork over a virtual path (VP) service provider, you must configure a logical link between a pair of ATM ports. The ATM ports must both use a network-to-network (NNI) interface and be on the boundary hub of each subnetwork or cluster.

Figure 9 shows an example of logical links between pairs of ATM clusters from a boundary hub in each cluster.

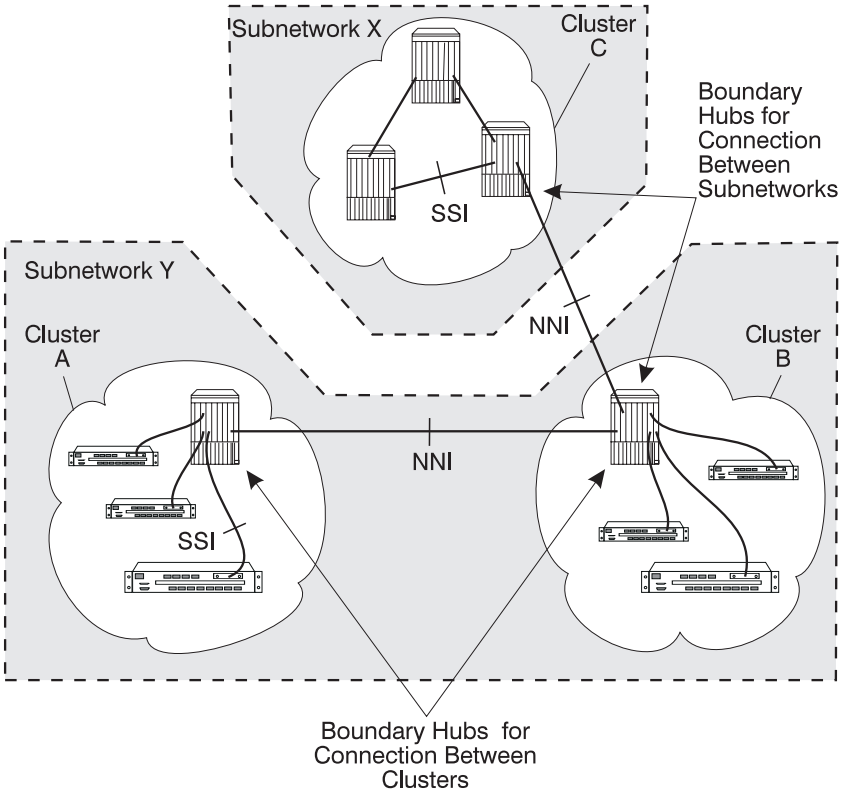

Figure 9. ATM Logical Links Used to Connect ATM Clusters

You can configure multiple logical links over the same physical port. However, you can only configure one logical link (using one pair of ATM ports) for each ATM cluster-to-cluster or subnetwork-to-subnetwork connection.

Using Static Routes

In 8260/8285 ATM network, you can only set a logical link to a cluster number (ACN) that is defined within your own ATM subnetwork. In order to set up a logical link with a remote cluster outside your own subnetwork, you must use the SET STATIC_ROUTE command to assign an ACN to the network prefix of the boundary hub of each remote cluster to which you want to link. The SET LOGICAL_LINK command then will be able to set up a connection to this logical hub using its assigned ACN.

Trunks Within a Single Cluster/Subnetwork

To define a logical link between switches within the same cluster or subnetwork, use the SET LOGICAL_LINK command to set the following parameters for each port in each switch:

- Virtual Path Identifier (VPI) number
- ATM cluster number (ACN) for the remote switch
- Bandwidth available on the virtual path
- Signalling role for Q.2931 protocol.

Trunks Between Subnetworks

In order to define a logical link between switches in different subnetworks, you must also use the SET STATIC_ROUTE command to associate the address of the boundary hub in the remote cluster with a locally defined ACN.

The SET LOGICAL_LINK command then uses this ACN to establish the logical link with the remote cluster.

Example: Configuring a Connection Between User Devices

When configuring a connection between two ATM user devices attached to different subnetworks (for example, between Workstation D and Workstation E in Figure 10 on page 38), you must:

- Configure the route between the clusters in the first subnetwork; for example, between Clusters A and B in subnetwork Y.
- Configure the route between the clusters in both subnetworks; for example, from Cluster B in subnetwork Y to Cluster C in subnetwork X.

To configure the route from Workstation D to Workstation E, you would start from hub F, the entry point to Cluster A in subnetwork Y:

1. From hub F, enter the SET STATIC_ROUTE command with the ACN for Cluster C.
2. From hub G (boundary hub), enter the SET LOGICAL_LINK command with the ACN for Cluster C.
3. From hub H (the entry point in Cluster B), enter the SET STATIC_ROUTE command with the ACN for Cluster C.
4. From hub H (which is also a boundary hub), enter the SET LOGICAL_LINK command with the ACN for Cluster C.

   The ATM address of Workstation E is known in Cluster C by the updates received at each ATM switch by the Topology Routing Service (TRS).

To configure the route for communication in the opposite direction, from Workstation E to Workstation D, you would start from Hub J, the entry point to Cluster C in subnetwork X:

1. From hub J, enter the SET STATIC_ROUTE command with the ACN for Cluster A.
2. From hub I (boundary hub), enter the SET LOGICAL_LINK command with the ACN for Cluster A.
3. From hub H (entry point), enter the SET STATIC_ROUTE command with the ACN for Cluster A.
4. From hub H (boundary hub), enter the SET LOGICAL_LINK command with the ACN for Cluster A.

   The ATM address of Workstation D is known in Cluster A by the TRS updates.

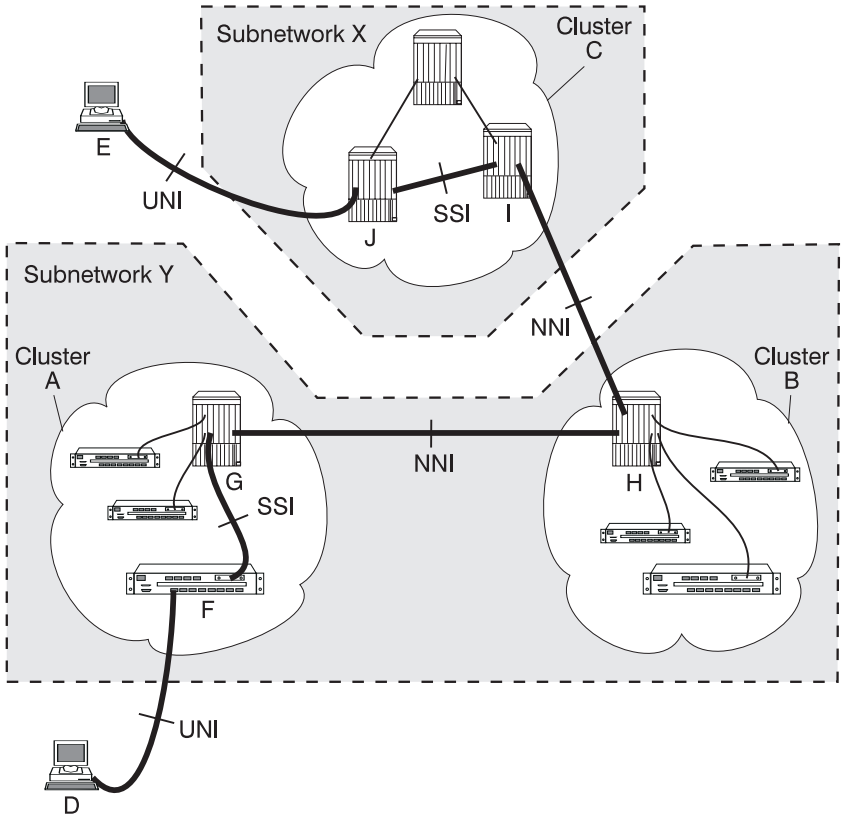

Figure 10. Using Static Route Mappings to Connect User Devices Across Subnetworks

Using Permanent Virtual Connections

Permanent virtual connections (PVCs) for virtual channel and virtual path connections are created via the SET PVC command. See the *IBM 8260/8285 ATM Command Reference Guide* for details.

Chapter 4. Setting-Up and Using a Configuration Console

This chapter describes:

- How to enter commands and get help on the A-CPSW configuration console
- How to set up the A-CPSW configuration console in Normal (ASCII) mode
- How to set up the A-CPSW configuration console via a SLIP protocol connection
- How to access the A-CPSW from a remote console via TELNET
- How to reconfigure configuration console settings.

Overview

The commands for configuring the A-CPSW are entered using a configuration console (ASCII terminal or workstation) connected to the console port. The console can communicate in one of two ways:

Normal (ASCII) mode

In normal mode, commands are entered directly from the configuration console.

See “Setting Up a Configuration Console in Normal (ASCII) Mode” on page 45 for instructions on connecting a configuration console to the A-CPSW in Normal mode.

SLIP mode

In SLIP mode, commands are entered via a TELNET session between an IP workstation and the A-CPSW.

If your workstation supports TFTP, it can also be used as a TFTP server to perform DOWNLOAD and UPLOAD operations between your workstation and the 8260. (See “Uploading and Downloading Operations” on page 83.)

Note: If no activity takes place for a period of 20 minutes, the console is automatically returned to normal mode.

This method requires an initial connection in Normal mode to set up the IP addresses and change the port protocol.

See “Setting Up a Configuration Console in SLIP Mode” on page 46 for instructions on connecting a configuration console to the A-CPSW in SLIP mode.

After the switch has been initially configured, it is also possible to configure and manage the switch:

- From a remote TELNET sessions, as described in “TELNET Sessions Via a Remote Switch” on page 49.
- Using an SNMP management application, as described in Chapter 6, “Network and Switch Management” on page 79.

Before You Start

The following section describes keystrokes and the command syntax to use to enter A-CPSW commands from a configuration console. For a complete description of all A-CPSW configuration commands, see the *IBM 8260/8285 ATM Command Reference Guide*.

Entering A-CPSW Commands

By entering commands at the prompt on the A-CPSW configuration console, you can configure various functions of the A-CPSW. The management prompt appears as follows:

```
8260ATM>
```

A-CPSW commands are not case-sensitive. The system interprets `ABC` (uppercase) the same as `abc` (lowercase).

The values you enter for certain command **parameters** are, however, case-sensitive and must be typed exactly as shown in the *IBM 8260/8285 ATM Command Reference Guide*. For example, if you enter `RWTRAP` and `rwtrap` for the `com_name` parameter in two separate SET COMMUNITY commands, you will create two different community names.

Keyboard Functions

When entering A-CPSW commands the following keyboard functions are available:

Keystroke	Function
BS or Backspace	Moves the cursor one space backward and deletes the character.
Enter	Runs the command or prompts you to enter missing parameters.
Space bar	Types the complete A-CPSW command.
Ctrl + C	Cancels the command that is currently running and returns you to a blank command line.
Ctrl + R	Retypes the last command you entered on the command line. The last 10 commands you entered can be retyped in this way.
Ctrl + L	Types the currently edited command on the next line.
?	Displays a list of available commands.

Getting Help

To get help on available A-CPSW commands, type ? on the command line and press Enter. For example, to see what commands start with the word SAVE, you would enter:

```
8260ATM> save ?       [ENTER]
```

The following response is displayed:

```
Possible completions:
   alert
   all
   community
   device
   lan_emul
   module_port
   static_route
   terminal
   tftp
```

If you logged on as the system administrator, you can enter ? to display a list of all active A-CPSW commands. An example is shown here:

```
8260ATM> ?        [ENTER]

   clear
   download
   dump
   logout
   maintain
   ping
   reset
   revert
   save
   set
   swap
   telnet
   upload
   wrap
```

Command Completion

The A-CPSW management command line accepts abbreviated command input with a facility called **command completion**. Command completion lets you enter a command and its parameters by typing the minimum number of characters to uniquely identify the command or a parameter.

For example, to enter the SAVE command, you only need to type `SA` and press the space bar:

```
8260ATM> sa
```

The system automatically fills in the rest of the command:

```
8260ATM> save
```

To enter a parameter, such as `COMMUNITY`, with the SAVE command, you can type the first few letters (for example, `COMM`) and press the space bar:

```
8260ATM> save comm
```

The rest of the parameter is automatically entered:

```
8260ATM> save community
```

If you enter an insufficient number of letters (for example, only `S` or `C`) for the system to determine the command or parameter (for example, `Set`, `Show`, `Save` and so on), the word is not completed and you are prompted to enter the rest of the command. The system also prompts you if you forget to enter a mandatory parameter.

Setting Up a Configuration Console in Normal (ASCII) Mode

The following procedure sets up the configuration console in Normal mode and logs you on as the system administrator with full access to all A-CPSW commands:

1. Connect an ASCII-type terminal to the RS-232 console port on the front panel of the A-CPSW.
2. In the terminal's user guide, locate the procedure for setting parameters for baud rate, data bits, parity, and stop bits.
3. Configure these configuration console settings to the values used by the A-CPSW so that the configuration console and the A-CPSW can communicate. The factory-set default settings for the A-CPSW are as follows:

Baud rate	9600
Data bits	8
Parity	None
Stop bits	1

4. Press Enter. The following message is displayed:

```
ATM Switch/Control Module
(c) Copyright IBM Corp. 1994, 1996. All rights reserved.

Password:
```

5. Enter `8260ATM` as the password and press Enter. (The password is not displayed on the screen.) The Welcome screen is displayed:

```
Password:

Welcome to system administrator service on 8260.
8260ATM>
```

You can now proceed to configure the A-CPSW, as described in Chapter 5, "Configuring the ATM Control Point and Switch" on page 53.

Setting Up a Configuration Console in SLIP Mode

The procedure that follows sets up the configuration console in SLIP mode and logs you on as the system administrator with full access to all A-CPSW commands.

Note: A typical workstation includes two serial ports (COM1, COM2):

- One dedicated to an ASCII-terminal emulator,
- The other dedicated to an IP stack and supported via the SLIP protocol.

Both ports are needed for this procedure.

1. Connect your workstation to the RS-232 console port on the front panel of the A-CPSW from the 'ASCII-terminal' serial port.
2. Configure the terminal in Normal mode and logon as administrator as described in "Setting Up a Configuration Console in Normal (ASCII) Mode" on page 45.
3. If a data transmission rate **other than 9600** is required, use the SET TERMINAL BAUD command to configure a data transmission rate.

```
8260ATM> set terminal baud 19200        [ENTER]
```

4. Set the local IP address (A-CPSW) and remote IP address (workstation) for the SLIP protocol using the SET TERMINAL SLIP_ADDRESSES command.

```
8260ATM> set terminal slip_addresses       [ENTER]
Enter local ip address : 9.100.86.139      [ENTER]
Enter remote ip address : 9.100.86.138     [ENTER]
8260ATM>
```

5. Switch the configuration console port operating mode to SLIP using the SET TERMINAL CONSOLE_PORT_PROTOCOL command.

```
8260ATM> set terminal console_port_protocol slip        [ENTER]
```

6. Unplug the cable from the 'ASCII-terminal' serial port and plug it into the 'IP-stack' serial port of your workstation.
7. Configure the IP stack SLIP with the IP address of the A-CPSW and verify the A-CPSW-to-workstation connectivity by issuing a PING request.

```
C:\ping 9.100.86.138        [ENTER]
```

8. Start a TELNET session to the A-CPSW.

```
8260ATM> telnet 9.100.86.139        [ENTER]
```

9. Logon as administrator. The Welcome screen is displayed:

```
Password:

Welcome to system administrator service on 8260.
8260ATM>
```

You can now proceed to configure the A-CPSW, as described in Chapter 5, “Configuring the ATM Control Point and Switch” on page 53.

Returning to Normal Mode

To switch the configuration console port back to Normal mode, use the SET TERMINAL CONSOLE_PORT_PROTOCOL command.

```
8260ATM> set terminal console_port_protocol normal        [ENTER]
```

Note: An A-CPSW RESET restores the configuration console port to NORMAL operating mode.

SLIP Support

The SLIP function is supported on:

- TCP/IP for AIX version 3.2.5
- TCP/IP V2.1.2 for IBM DOS V7 (no TFTP support)
- TCP/IP V2.0 for OS/2 V3 (WARP)
- ChameleonNFS V4.0 for Windows

Using TCP/IP for AIX version 3.2.5

1. Enter `smitty mkinet`
2. Enter `serial line INTERNET Network Interface`
3. Configure the local and remote IP addresses
4. The mask is not required
5. Do not fill in the baud rate and the dial string
6. PING the IP address of the remote A-CPSW.

Using TCP/IP V2.1.2 for IBM DOS V7 (no TFTP support)

1. Use `Custom` command, then SLIP interface
2. Select `SL0` and enable the interface
3. Select COM1 and 9600 modem speed
4. Configure the local and remote IP addresses
5. The mask is not required
6. PING the IP address of the remote A-CPSW.

Using TCP/IP V2.0 for OS/2 V3 (WARP)

1. Configure the SLIP connection using the TCPIPCFG icon then SLIP.
2. Enable the SLIP interface on the correct COMM port.
3. Keep VJ compression **off** and use 1000 as MTU size.
4. Configure the local and remote IP addresses.
5. The mask is not required.
6. Configure FTFP server using TCPIPCFG icon thru *AUTOSTART*. This is required in the FTFP server for A-CPSW downalod and upload operations.
7. Set terminal speed with the `mode com1` command.
8. PING the IP address of the remote A-CPSW.

Using ChameleonNFS V4.0 or V4.1 for Windows

1. Configure the SLIP connection using the Custom icon under ChameleonNFS
2. Select COM1 and no flow control PORT option
3. Do not select a modem under the Modem option
4. Configure the local and remote IP addresses
5. The mask is not required.
6. Enter the appropriate hostname in the **services/host** table.
7. Use the TELNET icon under ChameleonNFS to connect to terminal dialog via VT220 emulation.

TELNET Sessions Via a Remote Switch

The A-CPSW's remote login feature allows you to log on to an A-CPSW from a remote configuration console or network workstation that supports the TELNET protocol.

You can remotely log on to only one A-CPSW at a time.

Minimum Local Configuration

Before you can log on to the A-CPSW from a remote switch, you must perform a minimum configuration using a configuration console (in either Normal or SLIP mode). The minimum configuration that is required depends on the type of subnetwork you will use for the TELNET session:

Classical IP

- Set the ATM address of the A-CPSW
- Enable the port that connects to the ARP server
- Get the ATM address of the ARP server
- Set the ARP server ATM address in the A-CPSW
- Set the IP address of the A-CPSW
- Enable the port that will be used for the TELNET session.

LAN Emulation

- Set the ATM address of the A-CPSW
- Start the LEC.

These steps are described in Chapter 5, "Configuring the ATM Control Point and Switch" on page 53.

Logon Procedure

You specify the A-CPSW by entering its IP address with the TELNET command:

```
C:\ telnet 123.94.202.9                [ENTER]
```

Once you are connected to the remote switch, you must log on by entering the correct password. Afterwards all the commands you enter are run on the remote module as if entered from a local A-CPSW session.

To log off from a TELNET session, enter the LOGOUT command. The LOGOUT command disconnects the TELNET connection and reconnects you to the local A-CPSW accessed through your configuration console. The following message is displayed with the local management prompt:

```
ATM2 logout                             [ENTER]

Bye

Remote session completed
C:\
```

Figure 11 shows an example of an A-CPSW remote login. Note that once you are connected to A-CPSW A, you can remotely log on and manage the A-CPSW modules in either hub B or hub C.

Note: The TELNET protocol is not routable.

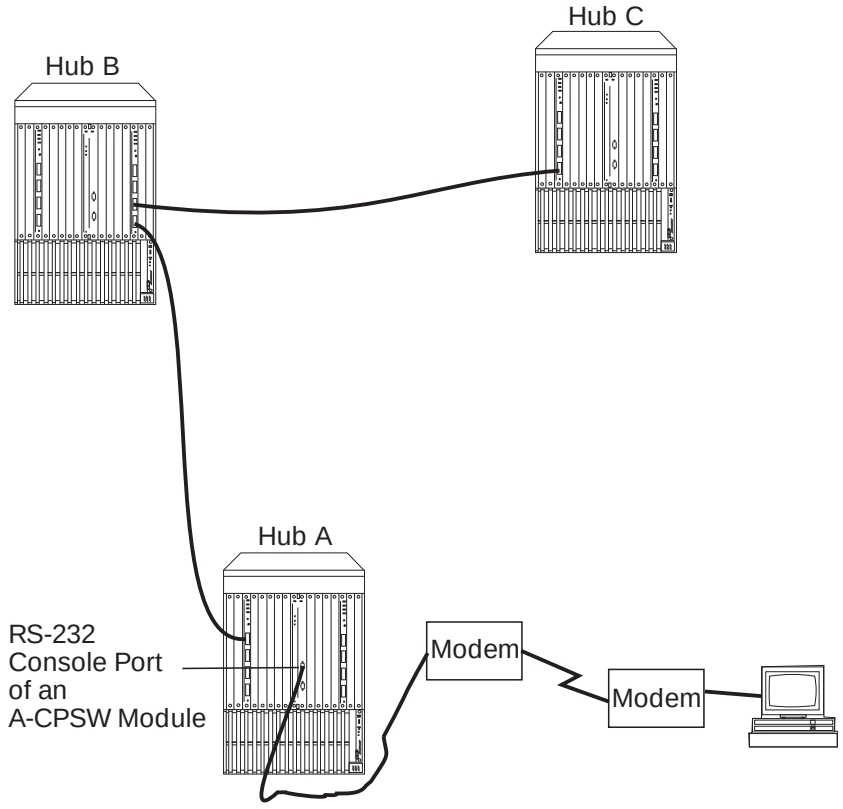

Figure 11. Working in Remote A-CPSW Sessions

You can set a timeout period for a remote A-CPSW by entering the SET TERMINAL TIMEOUT command. When this value is exceeded, the system automatically logs you off the remote A-CPSW session and returns you to your local session.

Although any unsaved configuration changes are still active, they will be lost the next time you reset or reboot the remote A-CPSW. To save these changes, you must re-establish the remote session and enter the SAVE command.

Reconfiguring A-CPSW Configuration Console Settings

Carry out the procedures in this section only if you need to connect another device (besides the A-CPSW configuration console) to the A-CPSW, and if the other device runs at a slower baud rate, uses a different parity, or has a different data bit value than the A-CPSW's pre-configured factory settings.

For example, if you want to connect a 4800 baud modem to the A-CPSW to remotely manage the hub, you must change the factory-set default baud rate from 9600 to 4800. To do so, you would enter the following command:

```
8260ATM> set terminal baud 4800  [ENTER]
```

See the *IBM 8260/8285 ATM Command Reference Guide* for information on the SET TERMINAL commands that allow you to reconfigure configuration console settings.

Saving Reconfigured Configuration Console Settings

After you use the SET TERMINAL command to reset the baud rate, the parity, or the data bit value for the A-CPSW, the change is activated immediately and you lose communication with the configuration console. The new configuration console setting is not, however, permanently saved.

In order to save the configuration console parameters that you reconfigure with the SET command, you must connect the new configuration console to the A-CPSW, log on, and enter the SAVE TERMINAL command. Once saved in this way, the new configuration console settings remain stored in memory after you log off and in case of a power failure.

For more information on how to reconfigure and save configuration console settings, see the sections describing the SET TERMINAL commands in the *IBM 8260/8285 ATM Command Reference Guide*.

Automatic Modem Hangup

If you use a modem to connect to the A-CPSW, you can use the SET TERMINAL HANGUP command to automatically hang up the modem connection when you log off the A-CPSW. If you do not hang up the modem connection, an unauthorized user can pick up your open session and work in it.

The following command shows what to enter to automatically hang up the modem after you log off the A-CPSW. The command is set by default to `disable` so that the modem does not automatically hang up.

```
8260ATM> set terminal hangup enable  [ENTER]
```

Chapter 5. Configuring the ATM Control Point and Switch

This chapter describes:

- How to enter the commands needed to configure the A-CPSW
- How to save, modify and revert configuration settings
- How to use A-CPSW commands for fault management.

Before beginning the procedures listed below, make sure that:

1. You have installed the A-CPSW module correctly (see Chapter 2, “Installation” on page 15)
2. You have set up a configuration console and logged on as administrator (see Chapter 4, “Setting-Up and Using a Configuration Console” on page 41).

Configuration Summary

To configure the A-CPSW, follow the steps listed below. Each of these steps is described in a subsequent section of this chapter.

1. Set the A-CPSW user and administrator passwords.
2. Set the internal clock.
3. Set the local A-CPSW parameters such as:
   - Switch name
   - Switch location
   - Service contact information
   - Console prompt
   - Console timeout
4. Define the ATM address of the A-CPSW. This resets the ATM subsystem.
5. Enable the ports that will be used, and define their interface type type (UNI, SSI, or NNI).
6. If you will connect the 8260 to one or more clusters or subnetworks in an 8260/8285-based network, you must create trunks (logical links) to the other ATM switches in the network.

   If the switches you will connect to are outside the local subnetwork, you must also define static routes to those switches.
7. Enable the ATM media modules that are installed in the hub.
8. If you want to use SNMP to manage the A-CPSW, configure the SNMP parameters.

   The parameters you configure depend on the type of subnetwork you will use for network management:
   - Classical IP
   - LAN Emulation

   Note: You may select only **one** of the subnetworks to be used for the Default Gateway.
9. If you want external LAN Emulation Configuration Server (LECS) support, configure the LECS ATM address or fixed PVC, depending on the configuration requirements of the LECS and external LECs (workstations, bridges, and so on).
10. Save all the configuration settings for the A-CPSW.

Some of these procedures are **mandatory**; others are recommended. They are summarized in Table 6 on page 55. For a detailed description of each A-CPSW configuration command, see the *IBM 8260/8285 ATM Command Reference Guide*.

Table 6. A-CPSW Configuration Commands

Procedure	A-CPSW Command	Priority
Set user and administrator passwords	SET DEVICE PASSWORD	Mandatory
Set the internal clock	SET CLOCK	Recommended
Set A-CPSW name	SET DEVICE NAME	Recommended
Set hub location	SET DEVICE LOCATION	Recommended
Set contact information	SET DEVICE CONTACT	Recommended
Set A-CPSW console prompt	SET TERMINAL PROMPT	Optional
Set console timeout value	SET TERMINAL TIME_OUT	Optional
Set A-CPSW ATM address	SET DEVICE ATM_ADDRESS	Mandatory
Connect ATM media modules	SET MODULE	Mandatory
Enable ports and set ATM interfaces	SET PORT	Mandatory
Set up trunks between switches within a subnetwork	SET LOGICAL_LINK	Mandatory to link to other ATM switches
Define static routes for switches in other subnetworks	SET STATIC_ROUTE	Mandatory to link to ATM switches in another subnetwork
Set SNMP parameters - Classical IP	SET DEVICE IP_ADDRESS SET DEVICE DEFAULT_GATEWAY SET DEVICE ARP_SERVER SET COMMUNITY SET ALERT	Mandatory to manage the A-CPSW from a Classical IP subnetwork
Set SNMP parameters - LAN emulation	SET DEVICE LAN_EMULATION_CLIENT SET DEVICE DEFAULT_GATEWAY SET COMMUNITY SET ALERT	Mandatory to manage the A-CPSW from an 802.3 LAN Emulation subnetwork
Set LECS ATM address	SET LAN_EMUL CONFIGURATION_SERVER	Optional
Save your configuration settings	SAVE ALL	Mandatory

Setting A-CPSW Passwords

It is necessary to set two levels of A-CPSW passwords:

- **Administrator** password that provides access to **all** A-CPSW commands with read-write (configuration) access
- **User** password that provides access to a **subset** of A-CPSW commands including most SHOW commands, PING and TELNET.

See the &crg. for more information on access to A-CPSW commands.

Administrator Password

1. At the console prompt, type the SET DEVICE PASSWORD ADMINISTRATOR command:

   ```
   8260ATM> set device password administrator
   ```

   Then press Enter.

2. In the next three fields displayed, enter your current password and the new password (up to fifteen characters) twice as shown below. For security purposes, the values you enter are not displayed on the screen.

   ```
   Enter current administrator password: {old password}
   New password:                         {new password}
   Re-enter password:                    {new password}
   ```

   Then press Enter. You are prompted when your password is accepted:

   ```
   Password changed.
   ```

3. To save your new password, type the SAVE DEVICE or the SAVE ALL command:

   ```
   8260ATM> save device
   ```

   Then press Enter.

You will need to enter the new administrator password the next time you log on to the A-CPSW. Note that you have only ten seconds to enter a password when the Password prompt is displayed. If you do not enter a password, a Timeout message is displayed. To redisplay the Password prompt and start again, press Enter.

User Passwords

1. Log on to A-CPSW using the administrator password.
2. At the management prompt, type the SET DEVICE PASSWORD USER command:

   ```
   8260ATM> set device password user
   ```

   Then press Enter.
3. In the next three fields displayed, enter the administrator password and the new user password (up to fifteen characters) twice as shown here:

   ```
   Enter current administrator password: {admin password}
   New password:                         {new user password}
   Re-enter password:                    {new user password}
   ```

   Then press Enter. You are prompted when the password is accepted:

   ```
   Password changed.
   ```
4. To save your new user password, type the SAVE DEVICE or the SAVE ALL command:

   ```
   8260ATM> save device
   ```

   Then press Enter.

Setting the Internal Clock

You need to set the A-CPSW's 24-hour internal clock only once, when you install the A-CPSW. When you set the internal clock, you establish a starting time, date, and day.

- To set the internal clock, enter the SET CLOCK command and specify the time and date parameters. Then press Enter.

For example, the following command sets the internal clock to 4:44 p.m. on September 30, 1996:

```
8260ATM> set clock 16:44 1996/09/30        [ENTER]
```

The A-CPSW internal clock uses its own battery and functions even when the A-CPSW fails to operate.

Setting Local A-CPSW Parameters

The A-CPSW is pre-configured with default settings that may need to be changed before you can use the switch. To modify these A-CPSW parameters, you must log on using the system administrator password. Then use the SET command to change the values for any of the following:

- A-CPSW name
- Contact name and location
- Console prompt
- Console timeout value.

A brief description of each parameter is given in the following sections. For more detailed information, see the *IBM 8260/8285 ATM Command Reference Guide*.

Switch Name

In order to simplify the command parameters you need to enter to perform certain ATM tasks, you can assign a unique name to each A-CPSW. You can then use this name instead of the IP address to identify the A-CPSW.

To set a unique name for the A-CPSW, enter the SET DEVICE NAME command and press Enter.

```
8260ATM> set device name [A-CPSW name]        [ENTER]
```

Service Contact Information

After installing and logging on to the A-CPSW, you should enter the location of the A-CPSW and the name of the appropriate person to contact in case of a failure in the ATM subsystem or with the A-CPSW

To do so, enter the following commands:

- SET DEVICE LOCATION to specify where the A-CPSW is installed
- SET DEVICE CONTACT to specify the name of the service personnel to contact.

Console Prompt

IBM also recommends that you customize the prompt used by each A-CPSW console. This helps you to easily recognize the A-CPSW to which you are connected when you are logged on to a remote switch.

The default prompt is:

```
8260ATM>
```

Suggestion: To make it easier to recognize an A-CPSW by its command prompt, set the prompt to the name of the A-CPSW used in the SET DEVICE NAME command. See the *IBM 8260/8285 ATM Command Reference Guide* for more information.

To customize an A-CPSW management prompt, use the SET TERMINAL PROMPT command.

```
8260ATM>set terminal prompt ATM2        [ENTER]
ATM2>
```

Console Timeout

The TERMINAL TIMEOUT parameter is a safety precaution that lets you specify how long you can remain logged on to the A-CPSW console without entering any data from the keyboard. This prevents unauthorized users from accessing the A-CPSW if you forget to log off the system. If no keystroke is entered for the time period specified by SET TERMINAL TIMEOUT, the system automatically logs you off.

The default value for SET TERMINAL TIMEOUT is `0`. This means that no timeout period is set and that you cannot be automatically logged off from the system.

To specify a timeout value (in minutes), use the SET TERMINAL TIMEOUT command.

```
8260ATM>set terminal timeout 2        [ENTER]
```

Setting the ATM Address of the A-CPSW

A default ATM address is provided with the A-CPSW. You can use this default address only for a stand-alone (isolated) A-CPSW. For all other A-CPSW configurations, a new ATM address must be defined. See “Defining the ATM Address of the A-CPSW” on page 34 for more information.

To set the ATM address for an A-CPSW, you use the SET DEVICE ATM_ADDRESS command:

```
8260ATM> set device atm_address        [ENTER]
8260ATM>Enter ATM address: 39.11.FF.22.99.99.99.00.00.00.00.01.49.11.11.11.11.11.
11.49        [ENTER]
```

The SET DEVICE ATM_ADDRESS command automatically saves the new address and resets the ATM subsystem.

Connecting ATM media Modules

After setting the ATM address, you must connect the ATM media modules to the network. This is necessary because the factory default setting isolates them from receiving network traffic.

To connect an ATM media module, you use the SET MODULE command:

```
8260ATM> set module 3 connected        [ENTER]
```

Afterwards, you can enable individual ports on the module and configure an ATM interface for each port. This requires the SET PORT command and is described in the next section, “Enabling ATM Ports and Interfaces” on page 62.

Enabling ATM Ports and Interfaces

Before you can use the devices attached to the ATM media ports in the A-CPSW, you must enable each port and configure the type of interface used by the port to receive and transmit ATM data. For example, to enable port 2 (‘slot’ 1) as a UNI port:

```
8260ATM> set port 1.2 enable uni        [ENTER]
```

You can set a port to any of the ATM interfaces:

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

See “Network Interfaces” on page 33 for more information on ATM network interfaces.

Disabling an ATM Port

You could use the SET PORT command to disable an ATM port that is connected to a failing device as follows:

```
8260ATM> set port 1.2 disable        [ENTER]
```

Setting Up Trunks (Logical Links)

To connect the A-CPSW to another ATM switch, you must create a trunk using the SET LOGICAL_LINK command.

See “Setting-Up ATM Trunk Connections” on page 35 for a description of the strategy for setting up trunk links in an ATM network.

The &crg. also gives an example of the SET LOGICAL_LINK command.

Static Routes for Other Subnetworks

If a switch to which you want to connect resides in another ATM subnetwork, you must also assign a local ATM cluster number (ACN) to the static route for that subnetwork. The ACN you assign is used in the SET LOGICAL_LINK command to establish the logical link between the two subnetworks.

For example, to map the static route ‘45337741531200010204’ to ACN 3:

```
8260ATM> set static_route 45337741531200010204   3        [ENTER]
```

The static route you enter with the SET STATIC_ROUTE command can be up to 19 bytes.

Setting SNMP Parameters

Carry out the procedures in this section only if you want to manage your ATM subsystem from an SNMP workstation.

If you want to manage the ATM subsystem in an A-CPSW from an SNMP workstation, you may access the A-CPSW through either a Classical IP subnetwork or a LAN Emulation subnetwork.

The steps required to set the SNMP parameters depend on the type of subnetwork you will use:

Classical IP subnetwork (IP)

- Set Set IP Address and Subnetwork Mask
- Set Default Gateway
- Set ARP server
- Set Community Table
- Set Alerts

802.3 LAN Emulation subnetwork (LE)

- Set LAN Emulation Client parameters (including IP Address and Subnetwork Mask)
- Set Default Gateway
- Set Community Table
- Set Alerts

These steps are described in the following sections.

Note: Although it is expensive, nothing prevents you from using both subnetworks at the same time, each subnetwork being independent from the other (no communication between them). In the latter case an ARP server and an 802.3 LES are required. A single subnetwork must be chosen for the Default Gateway.

IP Address and Subnetwork Mask (IP only)

In order for SNMP to run properly, every device in the network must have a unique IP address and subnetwork mask. In a classical IP subnetwork, you must use the SET DEVICE IP_ADDRESS command to assign a unique IP address and subnetwork mask to the A-CPSW

For example, the following command sets a unique IP address for a Classical IP over ATM subnetwork on the A-CPSW and a subnetwork mask for an ATM class C device:

```
8260ATM> set device ip_address atm 195.44.45.48 FF.FF.FF.00       [ENTER]
```

The subnetwork mask is specific for each type of Internet class. In general, the subnetwork mask is the group of common characters to the left of the IP address. (These characters are also called the network ID.) The host address is the group of unique characters to the right of the IP address.

The following command sets the subnetwork mask for an ATM class B device:

```
8260ATM> set device ip_address atm 195.44.45.48 FF.FF.00.00       [ENTER]
```

LAN Emulation Client (LE only)

In order for SNMP to run properly, every device in the network must have a unique IP address and subnetwork mask. In a LAN emulation subnetwork, you must use the SET DEVICE LAN_EMULATION_CLIENT command to assign a unique IP address and subnetwork mask to the A-CPSW

To configure the LEC, use the SET DEVICE LAN_EMULATION_CLIENT with the following parameters:

- LAN type
- IP address
- Subnetwork Mask
- Individual MAC address
- Associated LES ATM address

Notes:

1. The MAC address must be in a 802.3 format. Local and universal administrated MAC addresses are supported.
2. The associated LES ATM address is the address of a LES monitoring the 802.3 emulated LAN. The LES must be a LE Forum compliant LES, connnected to an 8260.
3. The LEC does not support a LECS connection.
4. The maximum frame size and emulated LAN name are provided by the associated LES.
5. The SET DEVICE LAN_EMULATION_CLIENT command automatically starts the LEC.
6. No command to stop the LEC is available.

For example, to configure the LEC with IP address 9.100.20.55:

```
8260ATM>set device lan_emulation_client eth ip_address 9.100.20.55    [ENTER]

Client starting.
8260ATM>
```

After the `eth` parameter, the other parameters may be entered in any order.

The first time the SET DEVICE LAN_EMULATION_CLIENT ETH is used, you must configure all four parameters before saving the configuration settings (no default values are provided). Once the configuration settings have been saved, it is possible to change only one parameter at a time using the SET DEVICE LAN_EMULATION_CLIENT command.

Default Gateway (IP & LE)

The default gateway is the IP address of the gateway that will receive and forward packets whose addresses are unknown to the ATM subnetwork. The default gateway is useful when sending A-CPSW alert packets to a management workstation that is on a different network and is accessible via a router.

For example, the following command defines the gateway with the address `195.44.45.26` as the default gateway:

```
8260ATM> set device default_gateway 195.44.45.26        [ENTER]
```

ARP Server (IP only)

The ARP (Address Resolution Protocol) server is used in a classical IP over ATM network to map IP addresses to ATM addresses. This is necessary to permit communication between an ATM network and SNMP stations in a Classical IP subnetwork.

The following command defines the ATM address for an ARP server:

```
8260ATM> set device arp_server 39.11.FF.22.99.99.99.00.00.00.00.01.49.11.11.11.
11.11.11.49        [ENTER]
```

Community Table (IP & LE)

The Community table defines which SNMP stations in the network can access information from the A-CPSW, and which station(s) will receive a trap from the A-CPSW when the detects an error.

To create an entry in the Community table, you use the SET COMMUNITY command. For example, the following command specifies that a community name called ATMMGMT with an IP address of 195.44.45.244 has read-write access to the A-CPSW:

```
8260ATM> set community ATMMGMT 195.44.45.244 read_write     [ENTER]
```

The community name parameter is case-sensitive. Be sure, therefore, to enter the community name in uppercase or lowercase letters exactly as you want it to appear. To display a list of existing community names, use the SHOW COMMUNITY command.

Alerts (IP & LE)

To enable or disable the function for sending alerts via SNMP traps to the A-CPSW local console and network management stations, you use the SET ALERT command. See the *IBM 8260/8285 ATM Command Reference Guide*. for information on the different types of alerts you can enable and disable with this command.

For example, the following command enables an alert to be sent when a configuration change is made to the hub:

```
8260ATM> set alert change trap        [ENTER]
```

Setting the LECS ATM Address

To set the ATM address of the LAN emulation configuration server (LECS) enter the SET LAN_EMUL CONFIGURATION_SERVER command. This is to support LECs which get their associated LES ATM address from a LECS. LECs have three possible ways to establish a connection to the LECS:

- During ILMI, the LEC gets the unicast ATM address that is available from the ILMI MIB (atmSrvcATMAddress). LECS ATM addresses can be defined to be returned to the LEC during ILMI exchange. These LECS ATM addresses must be defined in all 8260/8285 ATM switches that deal with LECs requesting the LECS ATM address from the ILMI MIB.
- The LEC connects to the LECS using the well known address. You can define an LECS ATM address to be substituted by the well known address. This address must be defined in all 8260/8285 ATM switches that are dealing with LEC connection requests referring to the well known address.
- The LEC connects to the LECS using a fixed PVC with `vpi.vci` equal to 0.17. When defining a PVC for virtual channel connection (VCC), the allowed range for VCI values includes the value 17.

```
8260ATM>set lan_emul configuration_server active_wka|inactive_wka
8260ATM>Enter ATM address: 39.99.99.99.99.99.99.00.00.99.99.01.02.00.80.05.A9.92.
9F.00       [ENTER]

Entry set.
8260ATM>
```

ACTIVE_WKA The LECS address table is to contain an ATM address to be substituted to the well known address (WKA). There can be only one ACTIVE_WKA entry in the LECS table. The ATM address you specify will be the one selected to be substituted with the WKA (WKA active). If an ACTIVE_WKA entry already exists in the LECS address table, it will no longer be used as the WKA substitution address. If the ACTIVE_WKA option is used, the latest LECS address entry configured with ACTIVE_WKA is used to route the LECS setup to the LECS WKA.

INACTIVE_WKA The LECS address table is to contain an ATM address which must not be substituted for the well known address.

atm_address The ATM address of an ATM Forum compliant LAN Emulation Configuration Server.

Note: Any LECS ATM address configured by this command (either with ACTIVE_WKA or INTACTIVE_WKA) is stored in the ILMI MIB 'atmSrvcATMAddress' fields and so may be returned to LECs issuing get ILMI commands on 'atmSrvcATMAddress' fields.

Saving Configuration Settings and Logging Off

Use the SAVE command to save the last configuration changes made to any of the following parameters:

- Alert
- All
- Community
- Device
- LAN_emul
- Module_port
- Static_route
- Terminal
- TFTP.

When you make changes with the SET command, they are activated immediately but are not saved permanently. You must use the SAVE command in order to permanently store the new parameter values. When the A-CPSW is reset, only the parameter values that have been permanently saved are loaded.

By entering the SAVE ALL command, you save the last configuration changes made to all ATM parameters:

```
8260ATM> save all                          [ENTER]
```

To save the changes made to an individual parameter, enter the parameter name in the SAVE command. For example, if you changed the type of interface used on an ATM port, you would save this setting as follows:

```
8260ATM> set port 1.3 enable UNI           [ENTER]

Port set

8260ATM> save module_port                  [ENTER]

8260ATM>
```

Note that if you changed configuration settings for the DEVICE or TERMINAL, these values are **not** saved using the SAVE MODULE_PORT command. To save these settings, you must use the SAVE DEVICE and SAVE TERMINAL commands.

When all your configuration changes are saved, log off the console by entering the LOGOUT command and pressing Enter. The system prompts you when you are logged off:

```
8260ATM> logout                  [ENTER]

Bye
```

If, when logging off, you have changed A-CPSW configuration parameters but forgotten to save them, the following message appears:

```
8260ATM> logout                  [ENTER]

WARNING: Save unsaved changes before logout.
```

The system prompt is redisplayed. You must then either save your changes (using the SAVE command) or cancel them (using the REVERT command) before you can log off.

Note: You can log off and keep the configuration changes you last made by entering `logout force`. The `force` parameter allows you to keep and reuse your current configuration settings until you reset or reboot the A-CPSW. The next time you reset or reboot, these settings are lost.

Working With Configuration Settings

The following sections describe how to:

- Revert to previously saved configuration settings
- Display the current configuration settings
- Modify the current configuration settings.

Reverting Configuration Changes

Use the REVERT command to restore the configuration parameters that were active at the time of the last SAVE. Any changes made using the SET command since the last SAVE are lost.

The REVERT command has the same options as the SAVE command:

- Alert
- All
- Community
- Device
- Module_port
- Static_route
- Terminal
- TFTP.

For example, when working remotely, you may want to change the console prompt used in your local A-CPSW session to more easily identify it.

```
8260ATM> set terminal prompt atm2:                [ENTER]
```

By using the REVERT TERMINAL command, you can later revert the prompt setting back to the default:

```
atm2: revert terminal                             [ENTER]

Reverting terminal configuration.
8260ATM>
```

Note that when you enter the REVERT TERMINAL command, you revert **all** TERMINAL parameters, such as BAUD, DATA_BITS, HANGUP, PARITY, STOP_BITS, and TIMEOUT.

Displaying Configuration Settings

The A-CPSW lets you display your currently configured settings for:

- Alerts
- ATM_ESI
- Clock
- Community
- Device
- LAN_emul
- Logical_link
- Module
- Static_route
- Port
- PVC
- Terminal
- TFTP
- Trace.

To do so, use the SHOW command. For example, to view information on the status of the ports in the hub, use the SHOW MODULE ALL command:

```
8260ATM> show module all       [ENTER]

Slot  Install  Connect  Operation  General Information
-------------------------------------------------------------------
 1       Y        n         n      -
 2       n        n         n      -
 3       n        n         n      -
 4       Y        Y         Y      8260 ATM 100 Mbps Module
 5       n        n         n      -
 6       n        n         n      -
 7       n        n         n      -
 8       n        n         n      -
 9       Y        Y         Y      8260 ATM Switch/Control Point
10       Y        n         n      -
11       n        n         n      -
12       Y        n         n      -
13       Y        Y         Y      8260 ATM 100 Mbps Module
14       Y        n         n      -
15       Y        n         n      -
16       n        n         n      -
17       n        n         n      -
8260ATM>
```

The following example shows the output of a SHOW MODULE n VERBOSE for an A4-FB100 module and an A2-MB155 module.

```
8260ATM> show module 4 verbose       [ENTER]

Slot Install Connect Operation General Information
--------------------------------------------------
  4     Y       Y        Y     8260 ATM 100 Mbps Module

status: connected / hardware OK
        enable / normal

P/N: 58G9611  EC level: C38844 Manufacture: VIME
Operational FPGA version : 7
     Backup FPGA version : 7


     Type  Mode      Status
-------------------------------------------------------------------------------
 4.01:UNI enabled  UP-OKAY
 4.02:UNI enabled  UP-OKAY
 4.03:SSI enabled  UP-OKAY
 4.04:UNI enabled  UP-NO ACTIVITY

8260ATM> show module 2 verbose       [ENTER]

Slot Install Connect Operation General Information
--------------------------------------------------
  2     Y       Y        Y     8260 ATM 2 Ports 155 Mbps Module

status: connected / hardware OK
        enable / normal

P/N: 58G9878  EC level: D55931 Manufacture: VIME
Operational FPGA version : 6
     Backup FPGA version : 6


     Type  Mode      Status
-------------------------------------------------------------------------------
 2.01:NNI enabled  UP-OKAY
 2.02:UNI enabled  UP-NO ACTIVITY

8260ATM>
```

Modifying Configuration Settings

Using the SET command, you can change the configuration settings for any of the following parameters:

- Alert
- ATM_ESI
- Clock
- Community
- Device
- LAN_emul
- Logical_link
- Module
- Static_route
- Port
- PVC
- Terminal
- TFTP
- Trace.

Important: Remember that (except for SET CLOCK, ATM_ESI, PVC, TRACE, and LAN_EMUL CONFIGURATION_SERVER) the changes you make with the SET command are not saved permanently in nonvolatile memory. To do so, you must use the SAVE command before logging off. See “Saving Configuration Settings and Logging Off” on page 70 for more information.

Isolating and Reconnecting ATM Media Modules

Use the SET MODULE command to:

- Isolate and reconnect ATM media modules to the ATM network.
- Enable and disable ATM media modules that are connected to the network.

When you isolate an ATM media module from the network, it remains in Reset mode and no activity takes place on it. Its current configuration settings cannot be accessed by the network. In order to use the module for ATM data transmission, you must reconnect it to the network and enable it.

Fault Management

The A-CPSW fault management function allows the administrator to report information on ATM media modules and ports.

For example, to display the status of all ATM ports in the A-CPSW, you enter:

```
8260ATM> show port all       [ENTER]

Port display for module 8260 ATM 100 Mbps Module

Port   Type   Mode      Status
--------------------------------------
4.01   UNI    disabled  UP-OKAY
4.02   NNI    enabled   UP-OKAY
4.03   UNI    disabled  UP-NO ACTIVITY
4.04   UNI    disabled  UP-OKAY

----- more -----

Port display for module 8260 ATM 100 Mbps Module

Port   Type   Mode      Status
--------------------------------------
12.01  NNI    enabled   UP-OKAY
12.02  UNI    enabled   UP-NOT IN SERVICE
12.03  SSI    disabled  UP-NO ACTIVITY
12.04  SSI    disabled  UP-OKAY

8260ATM>
```

As another example, to display the complete status of ATM port 10, enter:

```
8260ATM> show port 1.10 verbose             [ENTER]

 1.10:SSI enabled  UP-OKAY

SSI Bandwidth        : 25000 kbps
Connector            : RJ45
Media                : none
Remote device is active
IX status            : IX OK
Port speed           : 25000 kbps

8260ATM>
```

Chapter 6. Network and Switch Management

This chapter gives an overview of the management options for the 8260 hub:

- The three methods for managing the A-CPSW
- Guidelines for SNMP network management
- Procedures for uploading and downloading operations.

Managing the ATM Subsystem

You can manage the ATM subsystem in any of the following ways:

- From an ASCII terminal with a character-based, command-line interface that is directly connected to the RS-232 Console port on an A-CPSW.

  This is an inexpensive solution well-suited for a workgroup installation.

- Remote login from A-CPSW consoles via TELNET. Management traffic flows via the network. You can start only one remote session on an A-CPSW.

  This is ideal for small and medium installations with remote occasional monitoring.

- From a network management station running IBM Nways Campus Manager ATM or another network management application that supports SNMP protocols and the 8260 SNMP-compliant Management Information Base (MIB) extensions.

  This is suited for medium and large installations with remote permanent monitoring.

  For information on the SNMP functions supported, see “SNMP Support” on page 80. For instructions on how to access the Internet library to view the available MIB commands, see “Accessing MIB Files” on page 81.

SNMP Support

In a campus environment managed by the Simple Network Management Protocol (SNMP), the A-CPSW module acts as an SNMP agent allowing you to configure all ATM modules in the hub using SNMP.

A-CPSW software contains a community table with up to ten IP addresses. Each IP address has one of the following access attributes assigned:

- Read-only
- Read-write
- Read-trap
- Trap
- All (read-write and trap).

The A-CPSW module sends alerts to the IP addresses in the community table that have either `trap`, `read-trap`, or `all` assigned. The A-CPSW and ATM media modules can be configured via SNMP from stations whose IP addresses have either `read-write` or `all` assigned. The A-CPSW module can be monitored from stations whose IP addresses have `read-write`, `read-trap`, `read-only`, or `all` assigned.

After the IP address of an SNMP station is entered in the A-CPSW community table, the A-CPSW module can send SNMP alarms and alerts to the SNMP station.

Accessing MIB Files

For information on the commands that can be used to manage the ATM subsystem from SNMP via an A-CPSW module, refer to the Management Information Base (MIB) documents for ATM.

MIB documents are available over Internet and intended to help you with Configuration and Performance management. MIBs are stored in files on an anonymous FTP server. The MIB files are regularly updated.

To access the MIB files on Internet, proceed as follows:

1. FTP to `venera.isi.edu` or `128.9.0.32`.
2. Enter `anonymous` as the login name.
3. Enter your full Internet E-Mail address as the password.
4. Change to the MIB directory by entering `cd /mib` and pressing Enter.
5. Display the contents of the MIB directory by entering `ls -l` and pressing Enter.
6. Copy IBM MIB files to your current directory by entering the appropriate command; for example, `get ibm-hub-mib.txt`.
7. To exit the FTP session, enter `quit` and press Enter.

If you have a problem accessing the Internet library, please contact your IBM representative.

Security Control

To prevent unauthorized access to an ATM subsystem, the A-CPSW module provides two password levels to protect against network tampering and unauthorized access to the A-CPSW console.

The **administrator password** allows full use of all A-CPSW commands; the **user password** allows use of a limited set of A-CPSW commands that does not let you change configuration settings. See the *IBM 8260/8285 ATM Command Reference Guide* for more information.

The ports of an ATM media module are disconnected the first time you install the module in an 8260 hub. This is an additional security feature to prevent unauthorized access to the ATM subsystem. You must then enable the ATM ports using A-CPSW commands. All other ATM functions are set to their default values.

Accessing Microcode and Picocode Updates

Microcode and picocode updates may be downloaded via the Internet or the IBM Bulletin Board System:

Internet

You may access updated versions of the software through FTP or the World Wide Web.

- FTP: lansupport.raleigh.ibm.com
- WWW: http://www.raleigh.ibm.com/ - This is the IBM Networking home page. From here, you can access product announcements, publications information, and information regarding hardware and software updates.

IBM Bulletin Board System

Using a modem you can access the IBM BBS to obtain latest versions of software. Set your modem and communications software to 8 data bits, no parity, and 1 stop bit. Dial one of the following numbers:

- United States: (919) 517-0001
- Toronto: (905) 316-4255
- Toronto: (416) 956-7877
- Vancouver: (604) 664-6464
- Montreal: (514) 938-3022
- Halifax: (902) 420-0300

For information about IBM's Automatic Update Service (AUS), see page 88.

Uploading and Downloading Operations

The picocode or microcode for your A-CPSW and ATM media modules can be upgraded by inband, manual, and out-of-band operations. Data such as error logs, traces, and dumps can also be uploaded to the host. These operations are shown in Figure 12.

For more information on the commands used to start these operations, see the *IBM 8260/8285 ATM Command Reference Guide*.

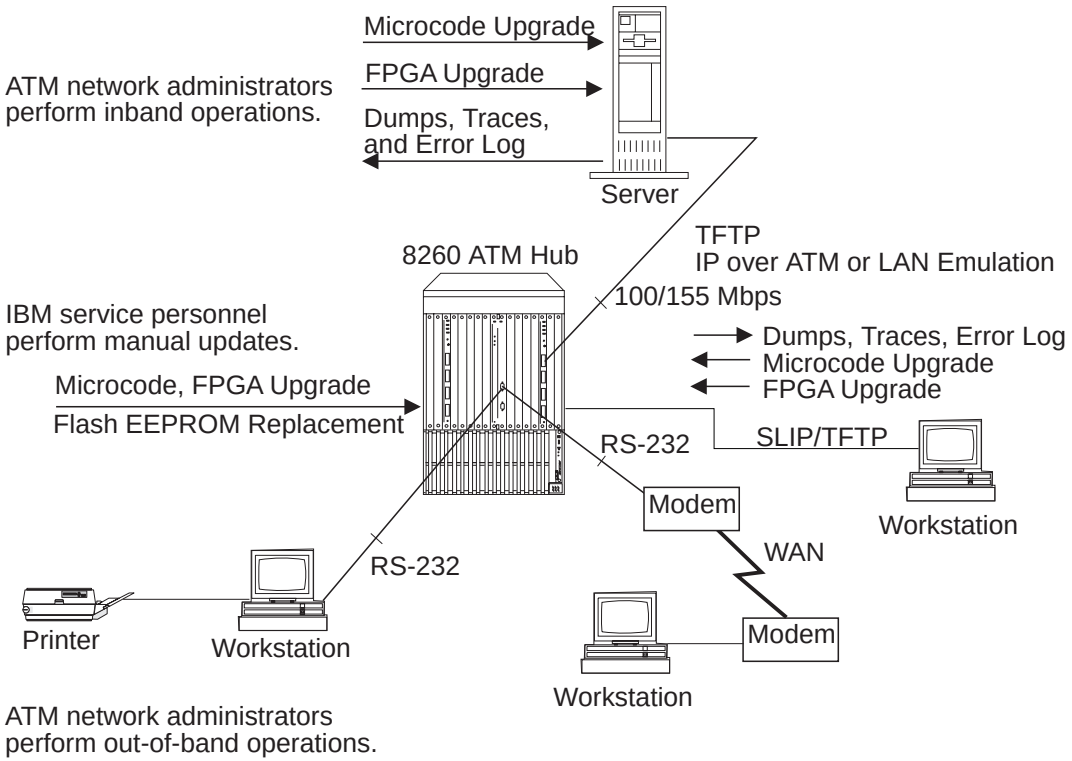

Figure 12. Upgrade Operations for ATM Microcode

Inband Operations

To upgrade ATM microcode, ATM network administrators perform inband operations from a server connected to an 8260 hub, using a workstation connected to the A-CPSW module as the A-CPSW console. After locating the directory where the microcode updates are stored, log on using the administrator password and perform one of the following operations:

- Upgrade A-CPSW microcode.
- Upgrade hardware picocode in the Field Programmable Gate Array (FPGA) of the A-CPSW and ATM media modules.

Upgrading A-CPSW Microcode: To upgrade A-CPSW microcode, enter the following A-CPSW commands:

1. SET TFTP SERVER_IP_ADDRESS (to define the server where the microcode is stored)
2. SET TFTP FILE_NAME (to define the path name of the file on the server)
3. SET TFTP FILE_TYPE (to specify boot or operational microcode)
4. DOWNLOAD INBAND (to load the A-CPSW microcode).
5. SWAP MICROCODE (to reboot the A-CPSW module with the new code).

Upgrading FPGA Picocode in ATM Modules: To upgrade hardware picocode in the FPGA of A-CPSW and ATM media modules, enter the following commands at the directory prompt:

1. SET TFTP SERVER_IP_ADDRESS (to define the server where the picocode is stored)
2. SET TFTP FILE_NAME (to define the file on the server)
3. SET TFTP FILE_TYPE (to specify FPGA)
4. SET TFTP TARGET_MODULE (to specify the slot number of the A-CPSW or ATM media module)
5. DOWNLOAD INBAND (to load new hardware picocode)
6. SWAP FPGA_PICOCODE (to change the picocode in the module). This causes an automatic reset of the ATM subsystem.

Uploading Dumps: To upload a dump to the host, enter the following A-CPSW commands at the directory prompt:

1. DUMP TRS (to take a dump of the topology of the network)
2. SET TFTP SERVER_IP_ADDRESS (to define the server connected to the A-CPSW module)
3. SET TFTP FILE_NAME (to define the path name of the file on the host)
4. SET TFTP FILE_TYPE (to specify a dump)
5. UPLOAD INBAND (to upload the dump).

Uploading Traces: To upload a trace log to the host, enter the following A-CPSW commands at the directory prompt:

1. SET TRACE (to enable and disable trace recording)
2. SET TFTP SERVER_IP_ADDRESS (to define the server connected to the A-CPSW module)
3. SET TFTP FILE_NAME (to define the path name of the file on the host)
4. SET TFTP FILE_TYPE (to specify the trace type)
5. UPLOAD INBAND (to upload the trace).

Uploading the Error Log: To upload the error log to the host, enter the following A-CPSW commands at the directory prompt:

1. SET TFTP SERVER_IP_ADDRESS (to define the server connected to the A-CPSW module)
2. SET TFTP FILE_NAME (to define the path name of the file on the host)
3. SET TFTP FILE_TYPE (to specify the error log)
4. UPLOAD INBAND (to upload the error log).

Manual Operations

To upgrade ATM microcode and picocode, IBM service personnel can perform manual upgrades (such as replacing the flash EEPROM or upgrading the FPGA) by following these steps:

1. Remove an ATM module and upgrade the microcode manually.
2. Replace the failing component in the module and then re-insert the module in the hub.
3. Enter the RESET ATM_SUBSYSTEM command to reboot all ATM modules.

Out-of-band Operations

ATM network administrators can upgrade A-CPSW microcode (but not ATM media modules) using an out-of-band operation with an RS-232 plug. To do this, you must attach a workstation with an emulated VT100 protocol to the A-CPSW module.

After locating the directory where the microcode updates are stored, use the workstation as the A-CPSW console. Log on using the administrator password and enter the following commands:

1. MAINTAIN (to activate Maintenance mode)
2. DOWNLOAD OUT_OF_BAND (to specify boot or operational code and to load it in the flash EEPROM of the A-CPSW module).

   Start the file transfer in the workstation using the Xmodem protocol. The transfer takes approximately 6 minutes for the boot code, 22 minutes for the operational code, at 9600 bps (the time is halved if the transfer is done at 19200). bps).

   If you enter DOWNLOAD OUT_OF_BAND BOOT, you automatically quit Maintenance mode and activate the new BOOT microcode.
3. BOOT (to restore normal operation), if you did not enter DOWNLOAD OUT_OF_BAND BOOT in Step 2.

Automatic Update Service

The *Automatic Update Service (AUS)* subscription is a simple and effective way of ensuring that your hardware modules are up-to-date with the latest code functions and improvements. AUS is a free service offered for 8260 hubs and covers all feature modules with independently upgradable microcode components. With AUS subscription, you automatically receive the newest versions of code when they are made available.

To subscribe to AUS from outside the U.S.A., fill out the form that came in the A-CPSW package and return it to the IBM address indicated. A-CPSW software updates will then be sent to you at the address you specify. If you reside in the U.S.A., it is not necessary to fill out the form in order to receive A-CPSW software updates.

Improved Decision Making

Since you always have the latest version of management modules, fewer planning considerations are required when ordering new media and interconnect modules.

Asset Protection

The automatic distribution of the latest code versions ensures that your hardware is always up-to-date with the latest set of functions, thereby expanding the life of your network, and reducing compatibility problems.

Connectivity Improvements

With the latest version of code in place, your management and interconnect modules are automatically upgraded with the latest performance and configuration improvements, as well as new bridging or routing features.

Network Operations Productivity

The AUS subscription ensures that the modules (of a given type) in your network are kept at the same level of code, therefore making network operations simpler and more consistent. Also, with the latest version of the management module installed, the network manager can perform configuration and problem management for all the newly announced hub components and modules without restrictions.

For more information about the *Automatic Update Service*, contact your IBM marketing representative or your authorized reseller.

Chapter 7. Troubleshooting

This chapter describes how to diagnose and solve problems associated with the installation and operation of the A-CPSW and ATM media modules. Troubleshooting operations are described according to the phase in which they are necessary.

Phase 1 Problems that occur during installation, after turning ON the hub, and after resetting the ATM subsystem. This phase ends when the A-CPSW ACTIVE LED lights ON (yellow).

Phase 2 Problems that occur from when the ACTIVE LED lights ON (yellow) to when all the configuration tasks described in Chapter 5, “Configuring the ATM Control Point and Switch” on page 53 are complete. No ATM devices are connected to the ports. This phase ends when the status of all ATM media ports is `NO ACTIVITY`.

Phase 3 Problems that occur from when the ATM subsystem is successfully configured and the A-CPSW console is attached to when all ATM devices are connected to ATM media ports in the hub. There is still no ATM traffic in the network. This phase ends when the status of all ATM media ports is `OKAY` and ATM traffic begins.

Phase 4 Problems that occur after all ATM devices are successfully attached to ATM media ports and ATM traffic is started in the network. The problems in this phase concern interruptions to the normal operation of the network.

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.

Phase 1: Installation and Power Problems

This section describes the troubleshooting operations for problems that occur after you turn ON the 8260 hub and wait for the A-CPSW ACTIVE LED to light ON (yellow). "Verifying Normal A-CPSW Operation" on page 21 describes the other LED conditions.

Phase 1 problems concern the installation tasks described in Chapter 2, "Installation" on page 15 and are divided as follows:

- Prerequisites for diagnosing normal operation of the ATM subsystem.
- Problems indicated by the ATM media LEDs
- Problems indicated by the A-CPSW LEDs
- Power supply problems.

After solving Phase 1 problems, the A-CPSW ACTIVE LED lights ON (yellow). A yellow ACTIVE LED indicates that the A-CPSW module is ready to control the ATM subsystem and that you can begin configuring the ATM subsystem in the 8260 hub as described in Chapter 5, "Configuring the ATM Control Point and Switch" on page 53.

Prerequisites for ATM Troubleshooting

In order to determine the cause of a problem during installation of A-CPSW and ATM media modules or after turning ON the hub:

- The correct microcode must be installed.
- A-CPSW LEDs must function properly.
- A-CPSW and ATM media modules must be plugged into the hub.

To ensure that these conditions are satisfied, follow these steps:

1. From the Distributed Management Module (DMM), enter `show module 18.1 verbose` and verify that the level of the Redundancy Controller (RCTL) code is at least 1.01. If it is not, the hub slots in which ATM media modules are installed may not receive power.
2. Make sure that the A-CPSW and ATM media modules are properly inserted in their slots and are plugged into the connectors in the ATM backplane of the hub.
3. Verify that all A-CPSW and ATM media LEDs are functioning properly by pressing the LED Test button on the Remote Controller (RCTL) module. If one or more LEDs on an A-CPSW or ATM media module do not light ON, replace the module(s).

Diagnosing Problems from the ATM Media LEDs

The following table problems that can occur with ATM media modules.

Table 7. Diagnosing Problems from the ATM media LEDs

Problem	Steps to Take
A) WRONG SLOT LED is ON.	1) The ATM media module has been inserted in an incorrect slot (slot 9, 10, or 11), which is reserved for A-CPSW modules.
	2) The ATM backplane is not installed in the 8260. Check that the backplane is installed (in the upper part of the 8260).
B) No LED is ON.	1) This is the default behavior when you installed an ATM media module that has never been used; the ports are disabled so no light is on.
	2) Module is not connected to the backplane correctly. Unplug the module, then plug it back in carefully. When you feel that the module is almost inserted, use the levers to push it in completely. (see Figure 4 on page 18.)
	3) Ports not enabled. From the console, check that the module is working correctly by issuing the SHOW MODULE and SHOW PORT commands.
	4) Power budget exceeded. Before adding a power supply, check that this is the real cause, by issuing the SHOW POWER BUDGET command. If a DMM module is installed, this command must be issued from the DMM console. If necessary, add a power supply. Refer to the *IBM 8260 Multiprotocol Intelligent Switching Hub Installation and Operation Guide* (SA33-0251) to see if there is a problem associated with the power budget.
	5) The power of the slot has been disabled. Issue the command SHOW POWER SLOT ALL to determine if that is the real cause. If this is the cause, issue the SET POWER SLOT n ENABLE command. If a DMM module is installed, this command must be issued from the DMM console.

Diagnosing Problems from the A-CPSW LEDs

After installing the A-CPSW module, the following should occur when you turn ON the 8260 hub:

- All seven LEDs on the front panel light (ON) and then turn OFF, except for the RUNNING LED.
- The RUNNING LED stays lit (yellow).
- After 7 seconds, the ACTIVE LED lights up and stays lit (yellow).

  If the diagnostics are disabled, the ACTIVE LED lights up immediately and stays lit.

Some of the common problems that may arise with the A-CPSW module after you turn ON the 8260 hub and the actions to take to solve them are shown in Table 8. If you find that the ACTIVE LED still does not light ON after diagnosing these possible problems, continue troubleshooting with "Diagnosing Problems with the Power Supply" on page 95.

Table 8 (Page 1 of 2). Diagnosing Problems from the A-CPSW LEDs

Problem	Steps to Take
A) WRONG SLOT LED is ON.	A-CPSW module is inserted in the wrong slots. Re-insert it in slots 9 and 10. or in slots 11 and 12. **Note:** Slots 11-12 on model A17 are used by the backup A-CPSW. To use them, make sure that slots 9-10 have an A-CPSW installed.
B) After turning ON the hub, no LED stays lit except for the WRONG SLOT LED which lights (ON) and then turns OFF.	1) Refer to the *IBM 8260 Multiprotocol Intelligent Switching Hub Installation and Operation Guide* (SA33-0251) to see if there is a problem associated with the power budget.
	2) Refer to the Power Management chapter in the *IBM 8260 Multiprotocol Intelligent Switching Hub, Distributed Management Module User's Guide* (SA33-0259).
C) Power is ON but the RUNNING LED does not light (yellow).	1) Press the TEST LED button on the power supply module to verify that the RUNNING LED is not burned out.
	2) Verify that the A-CPSW module has been installed correctly by following the installation procedure in Chapter 2, "Installation" on page 15.
	3) Press the ATM Reset button on the A-CPSW module.
	4) If the RUNNING LED still does not light, call your IBM dealer or your IBM representative.
D) ERROR LED lit (red) to indicate a severe error.	Follow the steps listed for problem C.
E) ACTIVE LED is not lit.	1) If the diagnostics are enabled and running, wait at least 7 seconds.
	2) See if the A-CPSW module installed in slots 11 and 12. If it is, re-insert it in slots 9 and 10.
	3) Follow the steps listed for problem C.

Table 8 (Page 2 of 2). Diagnosing Problems from the A-CPSW LEDs	
Problem	**Steps to Take**
F) MAINT LED is lit and you have not entered the MAINTAIN command.	1) Make sure that the console cable is plugged into the topmost RS-232 port on the front panel of the A-CPSW module.
	2) Enter the BOOT command.
G) MAINT LED is lit, 8260 stays in Maintenance Mode.	1) The A-CPSW is badly plugged. Replug the A-CPSW. When you feel that the module is almost inserted, use the levers to push it in completely. (see Figure 4 on page 18.)
	2) A pin is bent on one of the A-CPSW connectors. Check the rear of the A-CPSW.
	3) A backplane pin is bent. Check the backplane.
	4) Hardware failure on the board. Record the error code of the prompt in the Maintenance Mode (for example, >>0020>, then refer to “Maintenance Codes” on page 154.

Diagnosing Problems with the Power Supply

If, during installation or after turning ON the hub, you suspect that power is not reaching all ATM modules in the hub, see if the problem is caused by one of the conditions described in Table 9. If you cannot solve the problem and if the A-CPSW ACTIVE LED does not light ON, contact an IBM service representative before configuring the ATM subsystem.

Table 9. Diagnosing Problems with the Power Supply

Problem	**Steps to Take**
A) There is a power supply failure due to poor power prioritization (configured with the SET POWER command from the Distributed Management Module).	Refer to the *IBM 8260 Multiprotocol Intelligent Switching Hub Installation and Operation Guide* (SA33-0251).
B) An ATM module is not in service.	1) Use the SHOW PORT command to verify that the module's status is `hardware KO` and `failure`.
	2) Replace the module.
C) The power load capacity has been set to a higher value than the power supply capability.	Refer to the *IBM 8260 Multiprotocol Intelligent Switching Hub Installation and Operation Guide* (SA33-0251).

Phase 2: Problems During ATM Configuration

The problems in this phase occur after you turn ON the 8260 hub and the A-CPSW ACTIVE LED lights ON (yellow). This indicates that the A-CPSW module is ready to control the ATM subsystem.

Phase 2 problems concern the configuration tasks described in Chapter 5, “Configuring the ATM Control Point and Switch” on page 53 and are divided as follows:

- Problems concerning the operation of the A-CPSW console
- Problems concerning the configuration of A-CPSW and ATM media modules
- Problems concerning the configuration of ATM media ports.

After you solve Phase 2 problems, the status of all ATM media ports (as displayed with the SHOW PORT command) should be `NO ACTIVITY`. There are still no ATM devices or external wrap plugs attached to the ports.

If you cannot solve a Phase 2 problem and if the status of an ATM media port does not change to `NO ACTIVITY`, contact an IBM service representative before attaching an ATM device.

Diagnosing Problems Concerning the A-CPSW Console

Table 10 describes the problems that may arise after attaching the local console to the A-CPSW module through the RS-232 Console port. If you find that the problem does not concern the A-CPSW console, continue troubleshooting with “Diagnosing Problems with ATM Modules” on page 99.

Table 10 (Page 1 of 2). Diagnosing Problems Concerning the A-CPSW Console

Problem	Steps to Take
A) No prompt appears on your console screen when you press ENTER.	1) Check that the RS-232 cable meets the specifications described in Appendix B, “RS-232 Cable and Modem Requirements” on page 137.
	2) Check that the RS-232 cable is securely plugged into the A-CPSW module and the console in the correct ports.
	3) The terminal parameters do not match the 8260 communications parameters. 1. Use Telnet to modify the terminal parameters, using the SET TERMINAL command. 2. Use the SHOW DEVICE command to check the A-CPSW IP address and subnet mask, and the SET DEVICE IP_ADDRESS command to change them, provided that the ARP-server address has already been set in the A-CPSW. If you have a DMM module installed, the above commands must be entered from the DMM console.
	4) Try using the default settings on the terminal (the default parameters are: 9600 bauds, 8 data bits, 1 stop bit, no parity). If this does not work, try different settings until you find the right configuration.
B) Characters appear on the screen but they are not legible.	1) Make sure that the attached console is an ASCII terminal.
	2) Check the terminal parameters, especially the baud-rate, parity, and data bits. The default parameters are: 9600 bauds, 8 data bits, 1 stop bit, no parity. If these values do not work, try different settings until you find the right configuration.
	3) Replace the ASCII terminal.
C) You cannot enter commands reserved for the ATM network administrator, or the SET commands do not work.	Make sure that you are logged on as the administrator.
D) After you enter the first part of an A-CPSW command and press the space bar, the rest of the command is not automatically filled in.	Enter more letters in the command in order to distinguish it from other commands that are written similarly. Then press the space bar again.
E) Random characters are lost.	Set the flow control on the console to XON/XOFF.

Table 10 (Page 2 of 2). Diagnosing Problems Concerning the A-CPSW Console	
Problem	**Steps to Take**
F) Some characters are lost when you are connected to the A-CPSW module through a modem.	Make sure that the STOP_BITS parameter on the console is set to 1.
G) The passwords do not work or you forgot a password.	Enter `force` at the password prompt. Then press the ATM Reset button on the front panel of the A-CPSW module within 3 seconds. This will reboot the A-CPSW to the factory default settings.
H) When you turn ON the hub, your last configuration settings are not loaded. A different configuration is activated.	Re-enter the configuration settings and save them using the SAVE command.
I) The >> prompt appears on the screen and you have not entered the MAINTAIN command.	The A-CPSW module is running in maintenance mode. To return to normal operation mode, enter the BOOT command. This resets the ATM subsystem.
J) The >>*abcd*>> prompt appears, where *a,b,c,d* are 4 hexadecimal digits.	The A-CPSW entered maintenance mode because of an error, which is indicated by the error-code prompt. Refer to “Maintenance Codes” on page 154 for the meaning of the code, and take the corrective steps required.

Diagnosing Problems with ATM Modules

If the cause of a Phase 2 problem is not due to the A-CPSW console connection, make sure that all ATM modules are operational by following these steps:

1. Enter the SHOW MODULE ALL command as described in the *IBM 8260/8285 ATM Command Reference Guide*.
2. Check that each module is installed, connected, and functioning properly. Normal operation is indicated when `Y` appears in the `Install`, `Connect`, and `Operation` columns for all slot numbers except the row where `<extension>` appears. In the row for this slot, normal operation is indicated by `Y` in the `Install` column and `n` in the `Connect` and `Operation` columns.
3. If `n` appears for `Install`, make sure that the module is properly plugged into the backplane connectors in the hub.

   If `n` appears for `Connect`, use the SET MODULE command to reconnect the module for ATM traffic.

   If `n` appears for `Operation`, the module, slot, or backplane may be faulty. Insert the module into other slots to see if the slot or backplane is the cause.

   If the problem persists, enter the SHOW MODULE VERBOSE command to display more detailed information on the module's status.
4. If the status of the module in the SHOW MODULE VERBOSE screen is `hardware KO` and `permanent failure`, reset the module. If the problem persists and if the module's status does not change to `hardware okay` and `normal`, replace the module.

   If the module's status continues as `under recovery` for a long time, reset the module. If the problem persists, replace the module.

Diagnosing Problems with ATM Ports

If all ATM modules are operational (`connected`, `hardware okay`, and `normal` displayed with SHOW MODULE VERBOSE), the cause of the problem may be due to an inoperational ATM port. To see if the ATM ports on a given module are functioning correctly, use the SHOW MODULE and SHOW PORT commands to display port status. Any of the following types of port status may appear:

- Unknown
- Error
- No Activity
- Not In Service
- Okay
- Okay PVC-Only.

The problem associated with each port status (except for Okay) and the action to take to solve it are described in Table 11.

Table 11 (Page 1 of 3). Diagnosing Problems from a Port's Status

Port Status	Problem	Steps to Take
Unknown	Port status is not available because port is not reachable.	1) Use the SHOW MODULE command to check if the ATM media module is connected to the A-CPSW module.
		2) If the ATM media module is not connected, use the SET MODULE command to set the `network` parameter to `connected`. If the module is connected, reset it using the RESET MODULE command.
		3) The FPGA of the module is not compatible with the FPGA or microcode of the A-CPSW. Check the prerequisites in the release Note..
		4) If the problem persists, replace the ATM media module.
Error	An internal error is detected on the port.	1) Reset the ATM media module using the RESET MODULE command.
		2) If the problem persists, replace the ATM media module.

Table 11 (Page 2 of 3). Diagnosing Problems from a Port's Status		
Port Status	**Problem**	**Steps to Take**
No Activity	No physical layer activity is detected (either there is no cable/fiber attached, or there is no signal on the Receive cable/fiber. (Either there is no cable/fiber attached or there is no signal on the receive cable/fiber.)	1) See if the port is enabled by entering the SHOW PORT command.
		2) If the port is not enabled, use the SET PORT command to set the `mode` parameter to `enable`.
		3) If the port is enabled, make sure that the remote device is operational and that its adapter is securely plugged in.
		4) Make sure that the fiber/cable is securely plugged on the hub.
		5) Enter the WRAP command to perform a wrap test.
		6) If the wrap test result is `K0`, the problem is associated with the hub.
		7) For SC-type connectors, check that the receive and transmit cables/fibers are not swapped.
		8) For SSI ports, make sure that you are using UTP/STP (ATM standard) cables to interconnect between 8260/8285 switches.

Table 11 (Page 3 of 3). Diagnosing Problems from a Port's Status		
Port Status	**Problem**	**Steps to Take**
Not In Service (UNI port)	Physical layer activity is detected (there is a receive signal on the Receive fiber/cable) but the remote device is not responding to ILMI polling.	1) See if the port is enabled by entering the SHOW PORT command.
		2) If the port is not enabled, use the SET PORT command to set the `mode` parameter to `enable`.
		3) If the port is enabled, make sure that the remote device is operational and that its adapter is securely plugged in.
		4) Make sure that the fiber/cable is securely plugged on the hub.
		5) Enter the WRAP command to perform a wrap test.
		6) If the wrap test result is `KO`, the problem is associated with the hub.
		7) The peer device does not support ILMI. Change the UNI port configuration to suppress ILMI.
		8) A PVC with VPI=0 is or was defined on that port. Release the PVC and disable/enable the port.
		9) The transmit wire/fiber of the cable is defective. Replace the cable.
		10) The UNI port is defined with ILMI enabled, but the workstation connected to it has a device driver that does not support the LECS well-known ATM address, and an LECS address in defined in your 8260. Check that you have an LECS address configured in your 8260 with the command SHOW LAN_EMUL CONFIGURATION_SERVER command. If there should not be any LECS address defined, clear it with the CLEAR LAN_EMUL CONFIGURATION_SERVER ALL command.
		11) Take traces from both the hub and the remote device for an IBM service engineer.
Not in Service (SSI Port)	Use the command SHOW PORT slot.port VERBOSE command to determine the problem.	There may be a problem of bandwidth availability on the module. Spread the SSI ports over several modules.

If, after trying to solve the problem, the status of ATM media ports does not change to `OKAY`, perform the Wrap test as described in the *IBM 8260/8285 ATM Command Reference Guide*. If you find that the module is faulty, replace it. For assistance, contact your IBM service representative.

Phase 3: Problems on ATM Media Ports Without ATM Traffic

The problems in this phase occur after the status of all ATM media ports is `NO ACTIVITY` and ATM devices have been attached to ATM media ports. No ATM traffic is started in the hub.

Phase 3 problems occur because one or more ATM media ports are not functioning properly. The aim of the troubleshooting operations in this phase is to:

- Change the status of all ATM media ports to `OKAY` (as shown with the SHOW PORT command) so that ATM traffic can be started in the hub.
- Correct errors in ATM address registration between ATM media ports and attached ATM devices, unless a device is operating in PVC mode.

Phase 3 problems are divided as follows:

- Problems concerning ATM media ports that are attached to ATM devices
- Problems with ATM address registration
- Problems concerning the hardware environment.

If you cannot solve the problem and if ATM media port status does not change to `OKAY`, contact an IBM service representative before starting ATM traffic.

Diagnosing Problems with ATM Ports Attached to ATM Devices

After you attach ATM devices to ATM media ports, the status of the ports may still not change to `OKAY` (ready for ATM traffic). To diagnose this type of Phase 3 problem, follow these steps:

1. Use the SHOW PORT VERBOSE command (described in the *IBM 8260/8285 ATM Command Reference Guide*) to display the status of each port.
2. If the status of an SSI or UNI port is `NOT IN SERVICE`:
   - Refer to Table 11 on page 100.
   - Make sure that the attached ATM device is operating properly (for example, the daemon is running).
   - Check the ATM address registration as described in "Checking ATM Address Registration" on page 105.
   - Perform the the Wrap test as described in the WRAP EXTERNAL command in the *IBM 8260/8285 ATM Command Reference Guide* If the test results show that the port status is `KO`, replace the module.
3. If the status of a port is `NO ACTIVITY` and if a Turboways* 100Mbps workstation is attached to the port, make sure that the device is correctly installed:
   - Refer to Table 11 on page 100.
   - Make sure that the adapter is securely plugged into the port.
   - Make sure that the cable is securely plugged into the adapter.
   - Make sure that the device driver is correctly installed by de-installing it and re-installing a new one.
4. If the status of a UNI port is `Okay PVC-Only`, make sure that the ATM address of the attached device supports the ATM address registration of the UNI port.

   Important: When a port's status is `Okay PVC-Only`, only PVC connections are supported.

   If the UNI port is attached to another 8260 or switch, you may prefer to define the port as an SSI or NNI port, to be able to establish SVCs.

   For SSI ports, the bandwidth allocated must be the same at both ends of the trunk.
5. If the status of an SSI port is `ACN mismatch`, make sure that the hub belongs to the same ATM cluster as the attached device. Enter the SHOW DEVICE command to check the configured ATM address.
6. If the status of an SSI port is `Misconfigured`, make sure that the device is attached to an SSI port.

Checking ATM Address Registration

If you suspect that a Phase 3 problem is due to faulty ATM address registration between an 8260 hub and an attached ATM device, follow these steps:

1. Enter the SHOW PORT command to make sure that the ATM media port is configured with a UNI interface. If not, enter the SET PORT command and specify `uni` for the interface parameter.
2. Make sure that the attached device supports the ATM network prefix used by the 8260 hub.

   To display the network prefix, enter the SHOW DEVICE command and note the leftmost thirteen bytes of the hub's ATM address. (See Appendix C, “8260 ATM Address Formats” on page 147 for more information.)

   Check the ATM network prefix supported by the device. If it is different from the prefix set for the hub, use the SET DEVICE ATM_ADDRESS command to change the hub's ATM address so that its network prefix is the same as the network prefix used by the ATM device. Be sure to reconfigure the ATM address of other 8260 hubs that are also attached to the hub.
3. Make sure that the device supports ATM address registration. To check whether the device registered its ATM address, use the command SHOW ATM_ESI. If, for example, the port on the ATM device is configured as `Okay PVC-Only`, the device supports only PVC connections.
4. Make sure that the device is not using a protocol for ATM address registration that is incompatible with the protocol used by the 8260 hub.
5. Contact your IBM service representative.

Diagnosing Problems in the Hardware Configuration

If you suspect that a Phase 3 problem is due to a problem in your hardware configuration (for example, using a LAN Emulation server, 8282 host, 25Mbps client, and so on), check the following:

- If the attached device is an 8282 host, enter the SHOW PORT command to see if the port's status is `OKAY`. If the status is not `OKAY`, follow the steps in “Diagnosing Problems with ATM Ports” on page 100.
- If a trap or error message is displayed on the client when you start the 8260 hub, enter the SHOW PORT command to make sure that the ATM media port's status is `OKAY`. If the status is not `OKAY`, restart the client.

  If the port's status does not change to `OKAY`, run a trace by entering the SET TRACE and UPLOAD INBAND commands. Then contact your IBM service representative.
- Use the MIB browser or the ATM Campus Manager for AIX Version 1 to make sure that the client addresses are configured in the 8260 hub's ATM address table.

  If the ATM media port's status does not change to `OKAY`, contact your IBM service representative.
- If the attached device is a LAN Emulation server (LES), make sure that it is installed and running properly, and that:
  - The status of the port that connects the LES to the 8260 hub is `OKAY`.
  - The LES is configured with the ATM network prefix used by the 8260 hub.

Phase 4: Problems with Normal ATM Operation

The problems in this phase occur after ATM traffic is started in the network between ATM devices attached to ATM media ports. The ATM port status is `OKAY`.

Phase 4 problems occur in any one of the following situations:

- Ping operation does not work on an IP over ATM connection between two ARP clients.
- Ping operation does not work on an IP over ATM connection between an ARP server and the 8260 hub.
- Ping operation does not work on an IP over ATM connection between an ARP client and the 8260 hub.
- ATM services in an 8260 hub do not work for IP over ATM connections.
- There is no data traffic between two IP devices on an IP connection.
- There is no data traffic in an LES, 8282, or 25Mbps client environment.
- There is no connection between two ATM hubs, two ATM clusters, or two ATM subnetworks.
- ATM cells are lost.

Important: Problems in the normal operation of your ATM subnetwork may occur when the maximum number of virtual connections (VCs) allowed on an 8260 hub or an individual ATM media module is exceeded. The maximum number of virtual connections supported is as follows:

- **3000** per 8260 hub
- **992** per ATM media module (with up to 992 VCs per ATM media port).

The aim of the troubleshooting operations in Phase 4 is to restore normal operation to the network so that ATM traffic can continue.

If you cannot solve the problem after performing the troubleshooting operations described in this section, contact your IBM service representative.

8260 Cannot PING the ARP Servers and Vice-versa

Use the SHOW DEVICE command and look at the Q2931 cause:

Cause **Problem Description and Action Required**

31 The IP address of the hub is not in the same IP subnet as the ARP server.

Change the IP address or IP subnet mask of the 8260.

1 A wrong ARP server address was entered with the SET DEVICE ARP_SERVER command, ot the port of the ARP server is NOT IN SERVICE or NO ACTIVITY status.

Check that the port attached to the ARP server is OKAY, then check that the ATM address shown by the ARP server is exactly the same as the one entered in the 8260 (by entering the SHOW DEVICE command).

3 If the ARP server is in the same cluster (SSI links):

- an SSI port has not enough bandwidth. Having several SSI ports on the module may reach the bandwidth limit.

  Spread the SSI ports over several modules.
- The ATM address of an 8260 located on the PING path has been changed.

  Disable the SSI link and re-enable it.

If the above does not solve the problem, take a TRS dump (with the DUMP TRS command), and contact your IBM representative.

3 If the ARP-server is in another cluster (NNI links):

- The NNI network-side/user-side definition rules have not been applied.

  Check that one side of the NNI link is defined as user, and that the other side is defined as network.
- No logical-link has been defined for the NNI port.

  Define the logical link, using the SET LOGICAL_LINK command.
- The peer logical links do not match (bad vpi match, bad cluster match, bad bandwidth match).

  Check that the logical links on both sides do match, and if necessary, clear those logical links are re-define them.
- No static route has been defined, if the 8260 and the ARP-server are in different ATM subnetworks.

  Define the static routes using the SET STATIC_ROUTE command.
- A static route was badly configured.

  Check the static routes, using the SHOW STATIC_ROUTE command.
- The VP-tunnel is defective.

  Ask your VP-tunnel provider to test it.

8260 Cannot PING an ARP Client

Check if the 8260 can ping the ARP server. If not, then see “8260 Cannot PING the ARP Servers and Vice-versa” on page 108. If it can ping the server:

- The port of the ARP client is not OKAY.

  Check that the port of that ARP client is enabled. If it is enabled, and not OKAY, then the problem comes from the ARP client or from the cable attached to it.

- The ARP client is not registered in the ARP server.

  Check that the ARP client has TCP/IP running, and that the address configured for its ARP server is correct.

- If the 8260 and the ARP client are not in the same IP subnet, there may be a Gateway definition problem.

  Check the Default Gateway addresses in both machines. In general, they correspond to one common gateway.

- The SVC between the 8260 and the ARP client cannot be established.

  Check the Clear-Log Table in the Nways Campus Manager ATM (ATMC) to see the cause of the failure.

8260 LEC Cannot PING another Client and Vice-versa

- Check that the port of the LEC is enabled. If it is enabled, and not OKAY, then the problem comes from the LEC or from the cable attached to it.
- The LEC does not support the same Ethernet type as the 8260 LEC.

  Check that the LEC is emulating IEEE 802.3
  Ethernet frames.
- If the 8260 LEC and the other LEC are not in the same IP subnet, there may be a Gateway definition problem.

  Check the Default Gateway addresses in both machines. In general, they correspond to one common gateway.

ARP Client Cannot PING the ARP Server

The IP address of the client is not in the same subnet as the ARP server.

Re-define the IP address of the ARP client so that it is in the same subnet as the ARP server IP address.

Two Devices Using IP Over a PVC Cannot Ping Each Other

If the PVC is not active, make sure that the PVC is 'in-service' from ATMC or 'active' (from the terminal). If not, then try to re-enable that PVC.

The hardware connections may be failing, in which case replug the cables attached to the devices.

If the source and destination IP addresses are not in the same IP subnet, check both IP addresses. Change them so that they belong to the same IP subnet.

8260 LEC Cannot Initialize to the LES/BUS

Use the SHOW DEVICE command and look at the `subnet lan emulation` status message:

1. `Abnormal Termination: LES connection cleared.  ATM Forum cause xx.`

   The LEC automatically tries to reconnect to the LES/BUS when the connection is lost. It will try to reconnect every 5 seconds, 5 times, and thereafter every 1 minute.

   Cause **Problem Description and Action Required**

   1 A wrong LES address was entered using the SET DEVICE LAN_EMULATION_CLIENT command (`les_atm_address` parameter), or the port attached to the LES is not in service.

   Check is the port status is `UP-OKAY` (via the SHOW PORT command), then check that the LES ATM address is exactly the same as the one entered in the 8260.

   3 If the LE server is in the same cluster (SSI links):

   - an SSI port has not enough bandwidth. Having several SSI ports on the module may reach the bandwidth limit.

     Spread the SSI ports over several modules.
   - The ATM address of an 8260 located on the PING path has been changed.

     Disable the SSI link and re-enable it.

   If the above does not solve the problem, take a TRS dump (with the DUMP TRS command), and contact your IBM representative.

   3 If the LE server is in another cluster (NNI links):

   - The NNI network-side/user-side definition rules have not been applied.

     Check that one side of the NNI link is defined as user, and that the other side is defined as network.
   - No logical-link has been defined for the NNI port.

     Define the logical link, using the SET LOGICAL_LINK command.
   - The peer logical links do not match (bad vpi, cluster, or bandwidth match).

     Check that the logical links on both sides do match, and if necessary, clear those logical links are re-define them.
   - No static route has been defined, if the 8260 and the LE server are in different ATM subnetworks.

     Define the static routes using the SET STATIC_ROUTE command.
   - A static route was badly configured.

     Check the static routes, using the SHOW STATIC_ROUTE command.
   - The VP-tunnel is defective.

     Ask your VP-tunnel provider to test it.

16/31 The connection has been voluntarily rejected the LE server. The reason depends on LE server implementation.

18/102 The LE server is present, but not started.

47 There may be a lack resources on the LE server side preventing connection to it.

2. `LAN Emulation JOIN failed. ATM Forum LE status xx.`

   When this message occurs, the LEC is stopped. To restart the LEC, enter the SET DEVICE LAN_EMULATION_CLIENT ETH command (the additional parameters will automatically retain their previous values). For more information, see the *IBM 8260/8285 ATM Command Reference Guide*.

   Status **Problem Description and Action Required**

   1 The LE version for the LEC is not compatible with the LES/BUS version.

   2 The 8260 LEC parameters are incompatible with the LES/BUS. For example, the emulated LAN type of the 8260 LEC (IEEE 802.3) does not correspond to that of the LES. Change the LES ATM address to reach a LES with the same LAN type (IEEE 802.3).

   4 The same MAC address is already registered to the LES. Change the 8260 MAC address (with the SET DEVICE LAN_EMULATION_CLIENT command), or deregister the LEC with the same MAC address from the LES.

Administrative Problems (Netview/SNMP/Telnet)

This section details problems occuring during the administration of your 8260 (PING,Telnet,TFTP,SNMP/ATMC).

Table 12 (Page 1 of 6). 8260 Administration Problems

Problem	Steps to Take
A) PING: Your 8260 cannot ping your management station.	Since all the management services are running over IP, you have to ensure that your 8260 can ping the destination station where you will run either Telnet, the TFTP daemon (TFTP server), or the SNMP manager (ATMC). If the ping fails, see previous sections on ping failures in Classical IP or LAN emulation networks.
B) Telnet: You cannot Telnet to your 8260 from your management station.	1) If the ping does not work, see previous sections on ping failures.
	2) Someone is already logged on the 8260 by another Telnet session. It is not possible to have more than one Telnet session per 8260. To know from which station the other Telnet session is active, use the ATMC SVC Tracking tool to determine at least which SVCs are connected to the internal port of the 8260 (interface 1). You will then know the ATM addresses of the remote ends, as well as the 8260 ports to which they are connected to. **Note:** It is recommended to set the Terminal Timeout parameter to a non-zero value, to force Telnet sessions to close themselves after some inactivity.

Table 12 (Page 2 of 6). 8260 Administration Problems	
Problem	**Steps to Take**
C) TFTP: Upload fails from your 8260	The upload can be done either from the terminal console (console or Telnet) or from the SNMP Manager (ATMC or MIB Browser). Before performing any upload, make sure that the machine hosting the TFTP server can ping the 8260. When an upload fails, an error code is returned. That error code can be different between the terminal dialog and the ATMC/MIB browser, which is why both return codes are documented. **Note:** When the upload fails from the terminal dialog (console or Telnet), check the return code by using the SHOW TFTP command.
	1) **Error/generic error..Host Access Violation...Access Rights Violation/access-rights-violation...File already exists/file-already exits.**. • The file that you want to upload already exists on the target machine, and is read-only. Change the attributes of the file on the target machine or change the name of the file to be uploaded. • You are trying to upload to a directory that is not uploadable by TFTP. If your target host runs AIX or Unix, use the directory /tmp, or configure the file /etc/tftpaccess.ctl with lines beginning with 'allow:'. (check the documentation of the daemon/server TFTPD. If you use another operating system (OS/2 or others), configure the TFTP daemon on that system to accept uploads in the desired directory. • You are trying to upload a file that can only be downloaded (operational code, boot code, or FPGA picocode). Check the file type of the file to be uploaded.
	2) **Cannot connect to Host/no-response-from-host**. Check that you can ping the host from the 8260. If the ping fails, see the previous sections on ping failures.

Table 12 (Page 3 of 6). 8260 Administration Problems	
Problem	**Steps to Take**
C) (continued)	3) **Connection lost/connection-lost**. The SVC connection between the 8260 and the host has been cleared during the file transfer. Retry the upload. Look at all the Clear Tables of all intermediate 8260/8285s that are on the path between your 8260 and the host. To do that, use the ATMC Control Panel (Statistics) and choose 'node' and 'Call-Logging' for all the intermediate 8260/8285s.
	4) **File not found/file-not-found**. You tried to upload without specifying the name of the file to be uploaded. Specify the name of the file.
	5) **File too big/file-too-big**. There is no space left on the server. Check that space is made available before retrying the upload.

Table 12 (Page 4 of 6). 8260 Administration Problems	
Problem	**Steps to Take**
D) TFTP: Download Inband fails from your 8260	The download inband can be done either from the terminal console (console or Telnet) or from the SNMP Manager (ATMC or MIB Browser). Before performing any download, make sure that the machine hosting the TFTP server can ping the 8260. When an download fails, an error code is returned. That error code can be different between the terminal dialog and the ATMC/MIB browser, which is why both return codes are documented. **Note:** When the download fails from the terminal dialog (console or Telnet), check the return code by using the SHOW TFTP command.
	1) **Error/generic error..Host Access Violation...Access Rights Violation/access-rights-violation...File already exists/file-already exits.**. • The file that you want to download does not have read permission for TFTP. Change the attributes of the file on the host. • You are trying to download to a directory that is not downloadable by TFTP. If your source host runs AIX or Unix, use the directory /tmp, or configure the file /etc/tftpaccess.ctl with lines beginning with 'allow:'. (check the documentation of the daemon/server TFTPD. If you use another operating system (OS/2 or others), configure the TFTP daemon on that system to accept downloads in the desired directory. • You are trying to download a file that can only be uploaded (traces, error-log, dumps). Check the file type of the file to be downloaded.
	2) **Cannot connect to Host/no-repsonse-from-host**. Check that you can ping the host from the 8260. If the ping fails, see the previous sections on ping failures.

Table 12 (Page 5 of 6). 8260 Administration Problems	
Problem	**Steps to Take**
D) (continued)	3) **Connection lost/connection-lost**. The SVC connection between the 8260 and the host has been cleared during the file transfer. Retry the download. Look at all the Clear Tables of all intermediate 8260/8285s that are on the path between your 8260 and the host. To do that, use the ATMC Control Panel (Statistics) and choose 'node' and 'Call-Logging' for all the intermediate 8260/8285s.
	4) **File not found/file-not-found**. • You tried to download without specifying the name of the file to be downloaded. Specify the name of the file. • You tried to download a file that does not exist on the host. Check that you have not misspelled the name (blank spaces are treated as normal characters).
	5) **File too big/file-too-big**. You tried to download an operational code to the boot sector of the 8260. Check the filetype for the download, and check the file name of the file to be downloaded.
	6) **Bad file header/Cannot interpret file/invalid-file-header**. You tried to download a file that is not downloadable. If the source file name is correct, and it was obtained by FTP, it might have been transferred in ASCII mode instead of binary. Check the size of your downloadable file, and compare it with the theoretical size provided by your IBM Service. If the size is correct, contact your IBM representative.
D) (continued)	7) **Checksum Error/Packet error/checksum-error**. • there has been a problem during the transfer. Download the file again. • A byte is corrupted in the source file. either get a new source (re-install the source file from your installation package), or, if it fails again, contact your IBM Service or IBM representative.
	8) **Flash memory failure/hardware-error**. Try to download several times. If it always fails, contact your IBM representative.
	9) **Target Blade Mismatch**. You tried to download FPGA picocode that is incompatible with the target module number. Check the type of module (A4-FB100, A2-MB155 etc.) and the TFTP parameter.

Table 12 (Page 6 of 6). 8260 Administration Problems	
Problem	**Steps to Take**
E) ATM hub cannot restart after a download inband operation is performed and TFTP-supported services are operational.	1) Use the DOWNLOAD OUT_OF_BAND command to load the microcode that was previously active. Then restart the hub.
	2) If the hub still does not start, replace the A-CPSW module in the hub.
	3) Contact an IBM service representative.

Communication Problems in an IBM LAN Emulation Environment

This section details the problems that may occur during the setup of the IBM LAN emulation environment. Such an environment may include concentrators (8282) and bridges (8281), the external IBM LAN Emulation Server (LES), workstations (WS), ATM Workgroup Switches (8285), and the 8260.

Table 13 (Page 1 of 3). Problems in a LAN Emulation Environment

Problem	Steps to Take
A) A workstation/bridge cannot connect to another workstation/bridge.	1) Using the LES monitor, check in the list of registered end stations that both workstation/bridge addresses are present. If you do not know the ATM addresses of your workstation bridge, use the ATMC Interface Configuration panel for the ports attached to your workstation/bridge. If both addresses are registered in the LES, then proceed to point 2). If one workstation/bridge address is missing, then use the Call Status History provided by the LES monitor to get the Q2931 cause of the failing call. The missing station/bridge has probably a wrong LES ATM address defined in its configuration. Check the missing station's configuration.
	2) Both workstation/bridges are registered to the LES, but one cannot call the other one, because the LES is not available any more (port disabled, or not-in-service). The LES does not tell you that it has lost its address, because it only tells that once the connection to the 8260/8285 is returned. Check that the LES cable is well plugged, then check that the LES port is enabled. If it stays enabled and not-in-service, then the LES is faulty. Contact your IBM representative for investigation, or re-boot the LES.
B) LES Monitor Statistics: Default Vccs counter oscillating, too few registered workstations.	the workstation knows its ATM address, but that address has been de-registered at the Switch/Control-point level. This happens when the workstation is behind a concentrator (8282) that has been disconnected from the switch for a short time. **Note:** You can check whether the station is registered in the 8260 by using the command SHOW ATM_ESI. Wait a few minutes for the new registration to take place.
C) 8260/8285 Clear Table: a lot of SVCs were cleared with Clause 31.	A high-bandwidth (100 Mbps or 155 Mbps) workstation or bridge has tried to call a low-bandwidth workstation (25 Mbps). The call was rejected by the low-bandwidth workstation because the bandwidth specified in the Q2931 parameters (even for a UBR call) was too large. This is normal. The source or bridge retried to call the destination station with a lower bandwidth/bit-rate successfully. No action required.

Table 13 (Page 2 of 3). Problems in a LAN Emulation Environment	
Problem	**Steps to Take**
D) Some ATM stations cannot talk to LAN stations behind PARALLEL bridges.	The 8281 bridge has a limitation of 256 ATM connections. One would think that multiplying the number of 8281 bridges (in parallel) would multiply the number of available connections. Doing so will lead to the problem that only 256 stations can immediately establish connections with the bridges. In a configuration with parallel 8281 bridges (those bridges register to the same LAN Emulation Server, and they connect to the same LAN), there may be collisions in terms of connections. Indeed, when an ATM station calls a LAN station behind the 8281 bridges, each 8281 bridge will respond by establishing a connection to the originating ATM station. In a network where the number of ATM stations exceeds 256, which is the maximum number of SVCs per 8281, some stations will not be able to connect until the bridges clear their SVCs that are unused (aging out process). Just wait up to 4 minutes (aging time on the 8281 bridge), or avoid parallel bridging.
E) LES Monitor: after 3 minutes, the workstation is de-registered from the LES (valid only for IBM proprietary LAN emulation).	The workstation did not send the re-registration message within 3 minutes. Ensure that the port for the workstation is connected properly. If not green, ensure that the cable between the 8260 and the workstation is connected properly. Shutdown, then power off the workstation and restart. If the problem persists, contact your workstation/adapter supplier.
F) In a multi Token-ring bridges configuration, a Token-ring bridge cannot register to the LES. (valid only for IBM proprietary LAN emulation).	Different ring numbers are assigned to the ATM ports of two bridges connected to the same LES. Check the ring numbers of the ATM ports of all the bridges attached to the same LES; these numbers should be equal. Change them if necessary.
G) LES Monitor: Bridge is on General Multicast Tree, but not on Bridge Multicast Tree. (valid only for IBM proprietary LAN emulation).	The bridge did not send its route descriptors to the LES. The bridge is faulty. Contact your IBM representative.
H) At workstation reboot: the ATM adapter initialization failed.	The switch (8260/8285) or concentrator (8282) port attached to the workstation is not enabled, or is not a UNI port. From the console, or from the SNMP Manager (ATMC), enable the corresponding port as a UNI port.

Table 13 (Page 3 of 3). Problems in a LAN Emulation Environment

Problem	Steps to Take
I) A station cannot register to an LES located behind a WAN (VP-tunnel).	Some of the connections through the VP tunnel work, but not all, especially the ADD_PARTY to put the stations on the LES Multicast Tree. The 8260/8285 error-log is full of messages like 'Invalid Message Length'. The WAN (public network proving the VP-tunnel) uses the VCI=5 for its own purposes, and there is a conflict with the 8260/8285 which also VCI=5 (ATM-Forum Signalling VCI). Ask your public network provider if they use the VCI=5. If necessary, put an ATM device between the WAN and the 8260/8285 to do the translation of Signalling VCI to a value other than 5.
J) There is no traffic in a client environment.	Make sure that each LES client does not have more than 12 virtual connections.
K) **Other Problems** General method of investigation (valid only for IBM proprietary LAN emulation).	When you have a problem between two LAN-emulated stations, or between a LAN-emulated station and a LAN station located behind a bridge, use the following steps to investigate the problem.
	1) For performance problems, first consider the frame sizes defined at the workstation level and at the bridge level.
	2) For connection problems, first consider the Nways Campus Manager (ATMC) and LAN emulation server, which can provide you with a lot of information through the LES monitor. a. if you know neither the emulated MAC addresses of the stations nor the ATM addresses of these stations, use the ATMC Interface Configuration panel to get their ATM addresses. b. Once you know either the ATM addresses or emulated MAC addresses of the stations, look at the Registered End-systems window of the LES monitor and check that your stations are registered. c. Once you know which station is NOT registered, record its ATM address and look at the Call Status History window of the LES monitor. You should find a recorded call from that ATM address that failed for a certain 'cause X, reason Y'. The cause X shows you the Q2931 cause of the failure. Refer to “Q.2931 Error Codes for Clear Causes” on page 152. d. If you not find any call from that ATM address, that station has not been able to reach the LES. Use the ATMC Statistics Control Panel to open the Clear Table of the 8260/8285 directly attached to the failing station (select 'Node' and 'Call Logging'). That table should have entries with a source ATM address being the one of the failing station. You will get a Q2931 cause of the failure. Refer to “Q.2931 Error Codes for Clear Causes” on page 152.

Other Problems

Table 14 (Page 1 of 2). Other Problems

Problem	Steps to Take
A) Impossible to create a PVC between two 8260/8285s located in different clusters.	This is normal. The 8260.8285 does not allow the creation of PVCs over network-to-network (NNI) links. You have created two different PVCs, each one ending at the NNI port. **Note:** Make sure that the VPI used by the PVC on the NNI port corresponds to the one of the logical link defined on that port.
B) ATM server/token-ring client's applications fail: frames are lost. Token-ring clients located behind a Token-ring/ATM bridge can connect to an ATM server, but the applications/sessions keep failing, while clients connected directly to ATM have no problems.	The frame size on the ATM server is larger than the maximum frame size allowed by the bridge. Change the MAX_FRAME_SIZE on the ATM server to the maximum value allowed by the bridge (8281 max frame size should be 8939 bytes). **Note:** You may have to change the MAXDATARCV parameter of the OS/2 token-ring NETBIOS clients to 4168 in the PROTOCOL.INI file.
C) 8260/8285 Terminal/Telnet very slow or Ping to 8260/8285 very slow.	The 8260/8285 is congested by Signalling Calls. size allowed by the bridge. • If you cannot be in front of the 8260/8285, perform a remote login on the 8260/8285 using Telnet. First make sure that the trace is not active, then disable the ports one at a time until the Telnet session gives a normal response time. The last port that you disabled should be the one through which the congesting calls were coming. • If you can be in front on the 8260/8285, log on to the console, make sure that the trace is not active, then if the ATM switch is an 8260, look at the traffic LEDs and disable the for which the traffic LED is constantly lit. If your ATM switch is an 8285, disable the high-bandwidth port. When there is congestion, it is often due to the failure of a major ATM component (ARP server, LAN emulation server, switch down, public network down, file server down). You have to determine which of these ATM components failed.

Table 14 (Page 2 of 2). Other Problems

Problem	Steps to Take
D) Problems of ATM connections/performance through a WAN (VP tunnel).	To determine the reason why communication through a WAN (VP tunnel), execute the following steps.
	1) Check the Switch configurations at both sides: • check that the VPI corresponds to the VPI provided by your network provider. • check that the bandwidth is lower or equal to the Maximum Peak Rate negotiated with your network provider. The actual bandwidth used by your media modules is the maximum one (155 Mbps for an A2-155 module, 100 Mbps for an A4-FB100 module etc.), even if a lower value is specified with the SET_LOGICAL_LINK command. • check that one NNI port on one side is defined as 'network-side' and that the NNI port on the other side is defined as 'user-side'. • if you are using single mode A2-MB155 modules, you probably have to define the clocking as external, using the SET PORT command (the clock is usually provided by the WAN). In addition, if you have an 8285 or an 8260 with a microcode version greater than 2.0, you have to specify the type of network (SONET or SDH) at the end of the SET PORT command.
	2) If the previous steps did not help, then you require an ATM Analyzer for the following tests: • Hardware wrap test through the WAN up to the media module, install the ATM Analyzer at one side of the WAN, and the 8260/8285 at the other. Disable your NNI port, and enter the command WRAP slot.port REPLY_MODE ENABLE. Your NNI port is now redirecting Received Cells to the transmit side. Now, from the ATM Analyzer, generate traffic on the VCI=5, and compare the outgoing cells with the incoming cells. If some cells are lost or corrupted, contact your public network provider. When you are finished, enter the command WRAP slot.port REPLY_MODE DISABLE. • Hardware wrap test through the WAN up to the media module, install the ATM Analyzer at one side of the WAN, and the 8260/8285 at the other. Enable your NNI port, and create a PVC from the VCI=x to a VCI=y on the same port, using the command SET PVC. Check that the PVC is active using the command SHOW PVC ALL. Now, from your ATM Analyzer, generate traffic on the VCI=x, and compare it with the received cells on the VCI=y. If some cells are lost or corrupted, contact your IBM representative.

There is No Connection Between Two ATM Hubs in the Same Cluster

When there is no connection between two ATM 8260 hubs in the same cluster, follow these steps:

1. Use the SHOW PORT command to:
   - Make sure that the ATM media port at each end of the connection is configured with an SSI interface. If not, use the SET PORT command and specify `SSI` as the interface parameter.
   - Make sure that the the status of each port is `OKAY`. If not, follow the procedure described in "Diagnosing Problems with ATM Ports Attached to ATM Devices" on page 104.
2. Make sure that the bandwidth specified is the same at both ends of the trunk.
3. Contact your IBM service representative.

There is No Connection Between Two ATM Clusters in the Same Subnetwork

When there is no connection between two ATM clusters in the same subnetwork, follow these steps:

1. Use the SHOW PORT command to:
   - Make sure that the ATM media port at each end of the connection is configured with an NNI interface. If not, use the SET PORT command and specify `NNI` as the interface parameter.
   - Make sure that the status of each port is `OKAY`. If not, follow the procedure described in "Diagnosing Problems with ATM Ports Attached to ATM Devices" on page 104.
2. Use the SHOW DEVICE command to:
   - Make sure that the ATM address of each hub is configured with the same Routing Domain number (RDN).
   - Make sure that each boundary hub is configured with a different ATM Cluster number (ACN).
3. Use the SHOW LOGICAL_LINK command to make sure that the logical link settings of the ATM media port on each boundary hub are correctly configured.
4. Contact your IBM service representative.

There is No Connection Between Two ATM Subnetworks

When there is no connection between two ATM subnetworks, follow these steps:

1. Use the SHOW PORT command to:
   - Make sure that the ATM media port at each end of the connection is configured with an NNI interface. If not, use the SET PORT command and specify `NNI` as the interface parameter.
   - Make sure that the status of each port is `OKAY`. If not, follow the procedure described in "Diagnosing Problems with ATM Ports Attached to ATM Devices" on page 104.
2. Use the SHOW LOGICAL_LINK command to make sure that the logical link settings of the ATM media port on each boundary hub are correctly configured.
3. Use the SHOW DEVICE command to make sure that the network prefixes and logical ATM cluster number are correctly configured for the boundary hub in each subnetwork.
4. If the connection is over a VP service provider, refer to your contract with the VP service provider to make sure that certain settings (for example, VP identifier) are correct.
5. Contact your IBM service representative.

Using A-CPSW Trap Messages

A trap message is sent to the A-CPSW local console when a configuration change is made or when an error occurs in the ATM subsystem.

For example, if an ATM module is removed from an 8260 hub, a message describing this change is sent to the console. A sample message is shown here:

```
****************************************
Change trap on module 2
****************************************
```

The first field in the trap message is described in Table 15. The other fields of information that can appear are self-explanatory and depend on the type of trap received.

Table 15. A-CPSW Trap Messages

Field	Contents
Enterprise Specific Trap	One of the following messages appears: • `Configuration Change in System` • `Configuration Change in Module X` • `Configuration Change in Port X.Y` • `Hello` • `Authenticity Failure from Manager X`

Contacting an IBM Service Representative

To get technical help to solve installation and operation problems with the ATM subsystem in an 8260 hub, call your local IBM Customer Support center. Depending on the phase in which the problem occurs, an IBM service engineer will ask you to write down all or parts of the information listed in the following sections.

Troubleshooting Phase 1 and Phase 2 Problems

To troubleshoot Phase 1 and Phase 2 problems, an IBM service engineer needs the following information:

- Types and slot numbers of all modules installed in the hub, displayed by entering the SHOW MODULE ALL VERBOSE command (if possible).
- 8260 hub information configured using Distributed Management Module (DMM) commands and displayed by entering the SHOW DEVICE, SHOW HUB, SHOW MODULE ALL, and SHOW MODULE VERBOSE commands (if possible).
- 8260 hub information configured using A-CPSW commands and displayed by entering the SHOW DEVICE, SHOW HUB (if DMM module not installed), SHOW MODULE ALL, SHOW MODULE VERBOSE, and SHOW PORT ALL commands (if possible).
- Type and characteristics of each ATM device attached to the hub.
- ON/OFF condition and color of the LEDs on each module installed in the hub.
- Last A-CPSW commands entered from the local console
- Error log information uploaded to the host by entering the UPLOAD command. In order to upload the error log, you must use a TFTP file server in IP over ATM or LAN emulation mode. See the *IBM 8260/8285 ATM Command Reference Guide* for more information.

Troubleshooting Phase 3 Problems

To troubleshoot Phase 3 problems, an IBM service engineer needs the information listed in this section. In order to record trace information, follow these steps:

1. Use a TFTP file server in IP over ATM or LAN emulation mode.
2. Reproduce the problem and activate the trace by entering `set trace main_trace on` or `set trace trs_trace on`, as requested by the IBM service engineer.
3. Stop the trace by entering the SET TRACE command and specifying `off`.

   For more information on the SET TRACE command, see the *IBM 8260/8285 ATM Command Reference Guide*.

- Types and slot numbers of all modules installed in the hub, displayed by the SHOW MODULE ALL VERBOSE command.
- 8260 hub information configured using Distributed Management Module (DMM) commands and displayed by entering the SHOW DEVICE, SHOW HUB, SHOW MODULE ALL, and SHOW MODULE VERBOSE commands.
- 8260 hub information configured using A-CPSW commands and displayed by entering the SHOW DEVICE, SHOW HUB (if DMM module not installed), SHOW MODULE ALL, SHOW MODULE VERBOSE, and SHOW PORT ALL commands.
- Type and characteristics of each ATM device attached to the hub.
- ON/OFF condition and color of the LEDs on each module installed in the hub.
- Last A-CPSW commands entered from the local console.
- Error log information uploaded to the host by entering the UPLOAD command.
- Trace information uploaded to the host by entering the UPLOAD command.
- Q.2931 error code for the clear cause in the SVC.

For more information on the UPLOAD command, see the *IBM 8260/8285 ATM Command Reference Guide*.

Troubleshooting Phase 4 Problems

To troubleshoot Phase 4 problems, an IBM service engineer needs the information listed in this section. Note that in order to record trace information, perform dumps, and upload the error log, you must use a TFTP file server in IP over ATM or LAN emulation mode.

For information on how to record trace information, see “Troubleshooting Phase 3 Problems” on page 131. For information on how to upload the trace or error log file, see “Uploading and Downloading Operations” on page 83.

- Types and slot numbers of all modules installed in the hub, displayed by the SHOW MODULE ALL VERBOSE command.
- 8260 hub information configured using Distributed Management Module (DMM) commands and displayed by entering the SHOW DEVICE, SHOW HUB, SHOW MODULE ALL, and SHOW MODULE VERBOSE commands.
- 8260 hub information configured using A-CPSW commands and displayed by entering the SHOW ATM_ESI, SHOW DEVICE, SHOW HUB (if DMM module not installed), SHOW LAN_EMUL CONFIGURATION_SERVER, SHOW LOGICAL_LINK, SHOW MODULE ALL, SHOW MODULE VERBOSE, SHOW PORT ALL VERBOSE, and SHOW STATIC_ROUTE commands.
- Type and characteristics of each ATM device attached to the hub
- ON/OFF condition and color of the LEDs on each module installed in the hub.
- Last A-CPSW commands entered from the local console.
- Error log information uploaded to the host by entering the UPLOAD command.
- Trace information uploaded to the host by entering the UPLOAD command
- Dump information uploaded to the host by entering the UPLOAD command
- The following reports generated from ATM Campus Manager for AIX Version 1:
  - atmSvcTable from the atmSw MIB
  - atmSvcClearTable from the atmSw MIB
  - interfaceTable from the atmSw MIB
  - atmfAtmAddressTable from the ILMI MIB
- Q.2931 error code for the clear cause in the SVC.

Appendix A. A-CPSW Technical Specifications

General Specifications

Feature code	5000
Connectors	One RS-232 DB-9 connector (topmost on front panel) for **Console** port connections.
	One RS-232 DB-9 connector (bottommost on front panel) for **Auxiliary** port connections.
Processors	MC 68EC040 and MC68EN360 used in companion mode.
Memory	32 Kbytes nonvolatile RAM
	256 Kbytes static RAM
	4 Mbytes Flash EEPROM (eight modules of 512 Kbytes each)
	8 Mbytes Dynamic RAM (two modules of 4 Mbytes).
Special circuits	ATM dedicated chip sets
	Realtime clock with 32 Kbytes NVRAM.
Modem support	For 100% Hayes-compatible modems
	Baud rates up to 19.2 Kb supported.
Packet switched module	16 ports
	DATA_IN: 8 bits; DATA_OUT: 8 bits.

Feature code	5100
Connectors	One RS-232 DB-9 connector (topmost on front panel) for **Console** port connections.
	One RS-232 DB-9 connector (bottommost on front panel) for **Auxiliary** port connections.
Processors	MC 68EC040 and MC68EN360 used in companion mode.
Memory	32 Kbytes nonvolatile RAM
	256 Kbytes static RAM
	4 Mbytes Flash EEPROM (eight modules of 512 Kbytes each)
	16 Mbytes Dynamic RAM (2 modules of 8 Mbytes).
Special circuits	ATM dedicated chip sets
	Realtime clock with 32 Kbytes NVRAM.
Modem support	For 100% Hayes-compatible modems
	Baud rates up to 19.2 Kb supported.
Packet switched module	16 ports
	DATA_IN: 8 bits; DATA_OUT: 8 bits.

Electrical Specifications

Power consumption	45W @ +5V 3.5W @ +12V
Fuses	Two 1A (+12V) for the Control Point and Switch cards (one for each card). Two 7A (+5V) for the Control Point and Switch cards (one for each card).

Environmental Specifications

Operating Temperature	0° to 50° C (32° to 122° F)
Humidity	Less than 95% (non-condensing)
BTU/hr	55.

Mechanical Specifications

Dimensions	2.0 in. (5 cm) W x 10.7 in. (27 cm) L x 15.2 in. (38.5 cm) H
Weight	5.3 lbs. (2.3 kg)
In hub	Each A-CPSW occupies two dedicated slots (9-10 for primary module, 11-12 for backup module).

Appendix B. RS-232 Cable and Modem Requirements

This appendix describes:

- How to attach a console, modem, or server to the A-CPSW module
- RS-232 cable pin assignments used for connecting a console, modem, or server to the A-CPSW module.
- Requirements for using a modem with the A-CPSW module.

Attaching a Console, Modem, or Server

When attaching a console, modem, or server to the A-CPSW module, use the RS-232 cable and the two adapters provided in the package provided with the 8260 hub and follow these steps:

1. Plug one end of the RS-232 cable into the 9-pin Console port (the topmost RS-232 port) on the front panel of the A-CPSW module. For the exact position of the Console port, see Figure 6 on page 23.
2. Plug the other (9-pin or 25-pin) end of the cable into the appropriate port on the device.

"RS-232 Cable Requirements" on page 138 describes the pin assignments for console, modem, and server attachments.

RS-232 Cable Requirements

Table 16 displays the cabling requirements for connecting different devices to the RS-232 Console port.

Table 16. RS-232 Cable Requirements

Device	RS-232 Cable	Part Number
Console	Female-to-male cable Female-to-male interposer (null modem) Gender changer	59G0278 58F2861 58G4422
Modem	Female-to-male cable	59G0278
Server	Refer to the documentation supplied with the server.	

Part numbers 59G0278, 58F2861, and 58G4422 are shipped with the IBM 8260 Nways Multiprotocol Switching Hub.

RS-232 Connector

The RS-232 connector is the 9-pin female connector on the A-CPSW that attaches to an EIA 232 cable. Table 17 lists the signal name associated with each pin on this connector, and Figure 13 shows how the pins are numbered.

Table 17. EIA 232 Connector-Pin Signal Assignments

Pin Number	Signal Name	Description
1	DCD	Data Carrier Detect
2	SIN	Receive data
3	SOUT	Transmit data
4	DTR	Data terminal ready
5	—	0 volt
6	DSR	Data set ready
7	RTS	Request to send
8	CTS	Clear to send
9	—	—

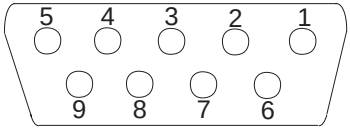

Figure 13. RS-232 Connector

:

9-Pin/9-Pin Cable

Figure 14 shows the pin assignments for the 9-pin to 9-pin RS-232 cable used to attach a console to the A-CPSW Console port:

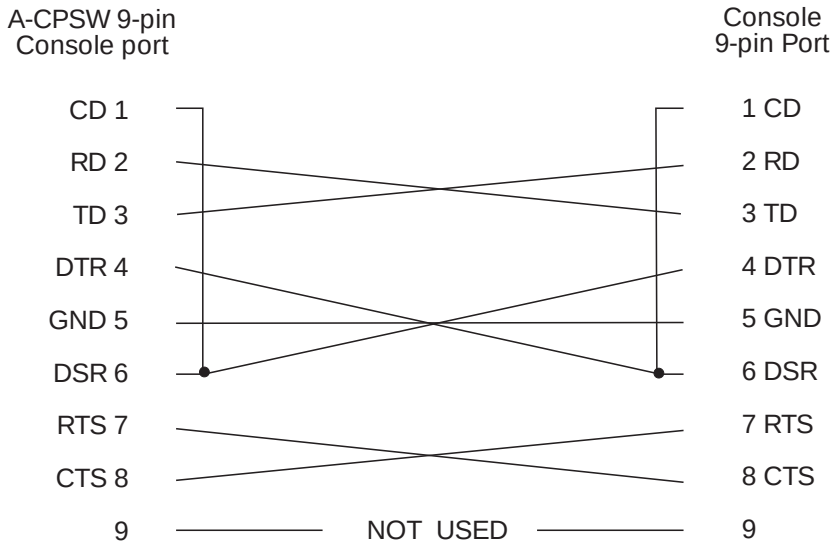

Figure 14. Console Attachment: 9-pin to 9-pin RS-232 Cable

Note: **CD** (Carrier Detect) is a synonym for **RLSD** (Receive Line Signal Detect).

CTS (Clear To Send) is a synonym for **RFS** (Ready For Sending).

9-Pin/25-Pin Cable

Figure 15 shows the pin assignments for the 9-pin to 25-pin RS-232 cable used to attach a console to the A-CPSW Console port.

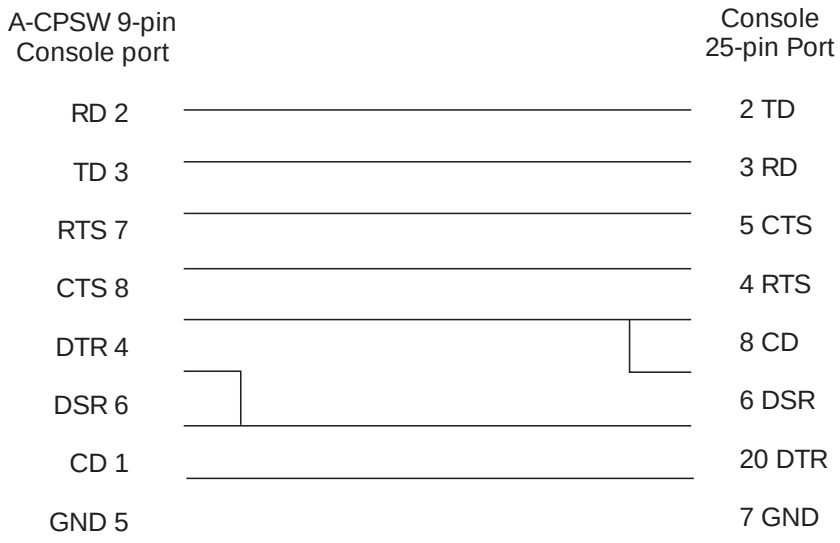

Figure 15. Console Attachment: 9-pin to 25-pin RS-232 Cable

Null-Modem Interposer

Figure 16 shows the pin assignment of the interposer (null modem) used for a console attachment. The RS-232 interposer (Part Number 58F2861) is shipped with the 8260 hub.

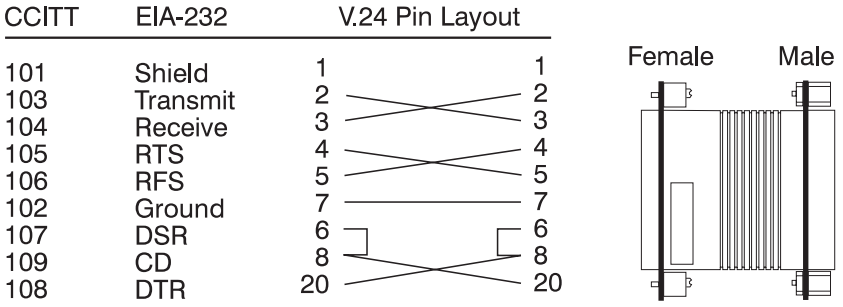

Figure 16. Pin Assignment: RS-232 Interposer

After attaching a console to the A-CPSW RS-232 Console port, make sure that the console is set up for asynchronous serial communication.

Modem Attachment

Figure 17 shows the pin assignment for the RS-232 cable used to attach a modem to the A-CPSW Console port.

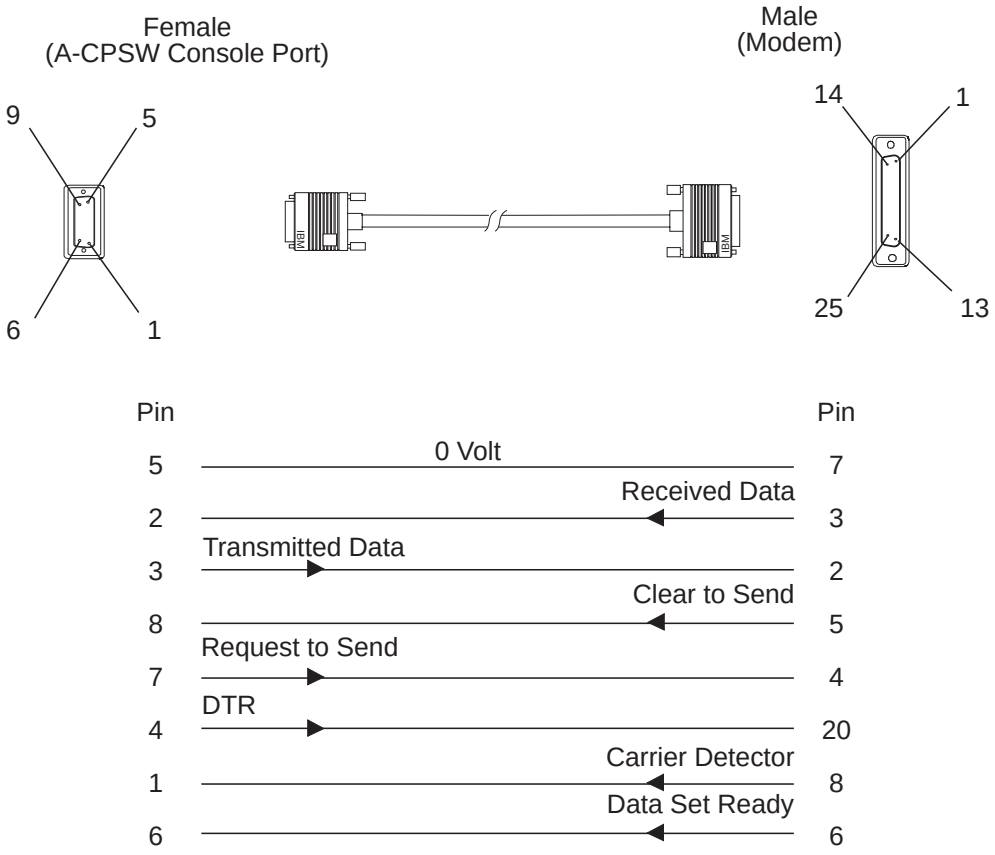

Figure 17. Pin Assignment: RS-232 Modem Cable

The RS-232 modem cable (Part Number 59G0278) is three meters (10 feet) long.

After connecting a modem to the to the Console port, configure the modem by following the procedure in “Modem Requirements” on page 144.

Modem Requirements

The A-CPSW module supports the use of dial-in modems with the following requirements:

- **The modem must be 100% Hayes-compatible.**
- Any valid baud rate (300, 1200, 2400, 9600, 19200) may be used. 2400 and 9600 are recommended.
- The modem must be set to Dumb/Auto Answer mode.

Modem Configuration

To configure a modem, enter the following commands from the console to which the modem is attached:

1. Type `at&F` and press Enter (to restore the factory default settings).
2. Type `at&d0` and press Enter (to ignore changes in DTR status).

   If you have enabled automatic modem hangup with the SET TERMINAL HANGUP ENABLE command and want to keep this setting, enter `at&d2` and press Enter. This sets the DTR parameter so that hangup remains enabled when DTR switches from ON to OFF.
3. Type `ats0=1` and press Enter (to auto-answer on the first ring).
4. Type `ats0?` and press Enter (to verify the auto-answer if 001 is returned).
5. Type `atq1` and press Enter (to ignore the result codes).
6. Type `at&W` and press Enter (to save the configuration changes).
7. Type `at&Y` and press Enter (to define the configuration as the new default).
8. Set the modem to Dumb mode (with command recognition disabled) by following the instructions in the modem's user guide.

An example of an IBM 7855-10 modem configuration is shown in Figure 18 on page 145.

```
DTE Interface
    Data Type         Idle/Data ASYNC   Async Format.8N1  XmitClock 7855
    Async DTE Speed   DTS Speed..TELCO  Connect Char.YES
    Async Data Path   Direct Path...NO
    Escape Sequence   Asynchronous  <ESC>...YES  <ESC>...043  <ESC>(/50)...050
    Signals  7855 to DTE
                      RFS(106)          RFS On....ALWAYS
                      RLSD(109)         RLSD On...ALWAYS
                      DSR(107)PSN       DSR On....ALWAYS
          DTR(108)Drop      Polling...NO  DTR Off...V24  DTR Delay...000
          Break Signals     From DTE...QUICK  From Telco.QUICK
    Commands,Results
          Async Characters  <CR>.........013  <LF>...010  <BS>...008
          Async.Cmd Echo    Cmd Echo......ON
          Async Speed Msg   Rate used..TELCO
          Messages          Messages.....OFF
          ECL Message       Messages.....OFF
    DataFlow Control
               To stop DTE       7855 using...RFS
               To stop 7855      DTE using...NONE
               Char Pass-thru    Flow Pass.....NO
Telco Interface
    PSN Telco Speed   PSN bps..9600 TC
    LL Telco Speed    LL bps...9600 TC
    Type of Network   Network......PSN
    DataFlow Control  Telco Flow....NO
    Adaptation
          PSN
                    Dialing           Dial Mode...TONE
                    Dial Delays       First Delay..007  Other Delay..001
                    Calling Tone      Call Tone....V25
                    Call Process      Detect.......ALL
                    Calling Timer     Call Abort...060
                    Answering         Auto Answer..YES  Rings........002
                    Attachment        PSN Level..FIXED  Guard Tone..1800
                    Disconnect
                       From TELCO line  Disconnect RLSD  CD loss(/10).015
                       To TELCO line    Call End..REMOTE
                       Inactivity       On Hook......YES  No Data(min).03
          General
                    Receiver          Echo Adapt....NO  Receiver Setup.0
                    Transmitter       Preemphasis....2
                    Modem to Modem    Handshake...BELL  Fast Train...NO
          LL
                    Receiver          LL RLSD dBm..-43
                    Transmitter       LL Signal....DTR - - - - - - - - -
    Automatic Change
          Retrain           Retrain....SHORT  Trigger (dBm)..6
          Speed Change
                    Allow 7200 bps    7200 bps......NO
                    Fall Back         FallBack......NO
                    Fall Forward      Fall Forward..NO
          Change Timing  For FF and SNBU  Check Line...YES  Check(x5min).024
          LL Change to PSN  SNBU.........NO
User Interface    ECL Control
          Starting        ECL Start.ACCEPT  Accepted.CONNECT
          Operating       Compression...YES  Block Size...64  Protocol..NORMAL
```

Figure 18. Example: IBM 7855-10 Modem Configuration

Appendix C. 8260 ATM Address Formats

The 8260 ATM subsystem supports the addressing scheme defined by the ATM Forum for addressing end-points in private ATM networks. The scheme is modeled after the format of the OSI Network Service Access Point (NSAP) as specified in ISO-8348 (CCITT X.213).

As shown in Figure 19, the A-CPSW supports the three initial domain identifier (IDI) formats specified by the ATM Forum:

- DCC (Data Country Code)
- E.164 (Specific Integrated Service Digital Network Number).
- ICD (International Code Designator)

Each of the three ATM address formats is 20 bytes long and consists of two main parts:

- Network Prefix (13 bytes)
- End System Part (7 bytes).

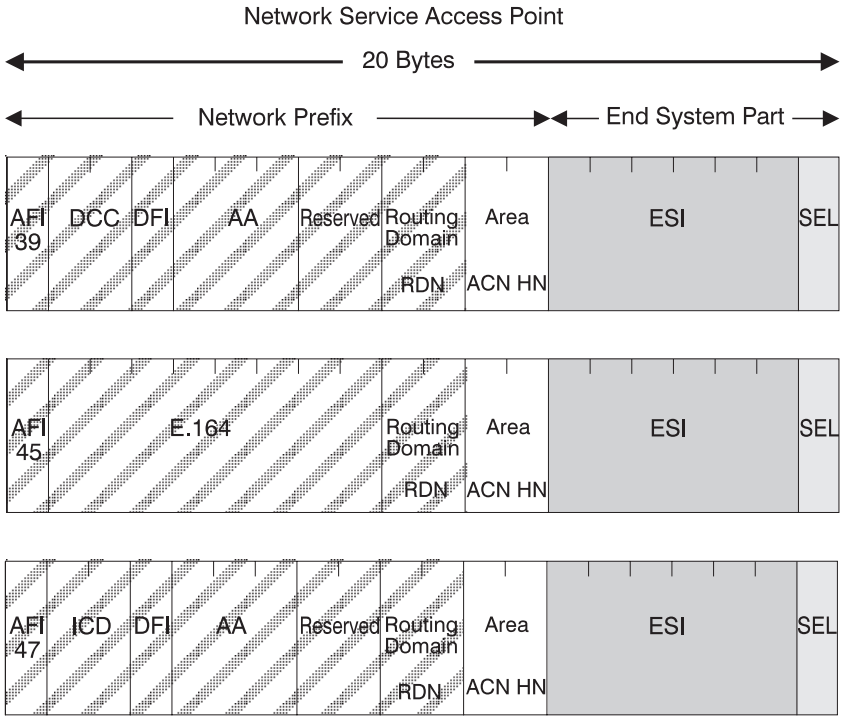

Figure 19. NSAP Address Formats Supported in the 8260 ATM Subsystem

Network Prefix

The fields that make up the Network Prefix part of an ATM address include:

AFI The one-byte AFI identifies the authority allocating the portion of the address that follows. It defines the structure of the NSAP format. The AFI values accepted by the 8260 ATM subsystem are as follows:

- 39 (ATM format of the Domain-Specific Part)
- 45 (ATM format of the E.164 Initial Domain Identifier)
- 47 (ATM format of the International Code Designator).

DCC Data Country Code (2 bytes)

Specifies the country in which the address is registered. The codes are given in ISO-3166.

This value is handled as a bit mask and is not checked by the ATM subsystem.

DFI Domain-specific Format Identifier (1 byte)

Specifies the structure, semantics, and administrative requirements for the remainder of the address.

This value is handled as a bit mask and is not checked by the ATM subsystem.

AA Administrative Authority (3 bytes)

Identifies the organizational entity that allocates addresses for the remainder of the domain-specific part.

This value is handled as a bit mask and is not checked by the ATM subsystem.

E.164 E.164 IDI (8 bytes)

Specifies the international addressing format used by B-ISDN public transport providers and is up to 15 digits long (BCD syntax). This field is padded with leading '0000' semi-bytes to reach the maximum length. A closing semi-byte '1111' is used to obtain an integral number of bytes.

This code is handled as a bit mask and is not checked by the ATM subsystem.

ICD International Code Designator (2 bytes)

Identifies an international organization. Values and codes (BCD syntax) are assigned by the ISO-6523 registration authority.

This code is handled as a bit mask and is not checked by the ATM subsystem.

Reserved 2 bytes set to binary zero.

RDN Routing Domain Number (2 bytes)

Specifies a domain that is unique within one of the following:

E.164
DCC/DFI/AA
ICD/DFI/AA

and that allows for the same addressing scheme and administrative authority to be used.

Area Area (2 bytes)

Specifies an area unique within a routing domain for the purpose of hierarchical routing and efficient use of resources based on topological significance.

In an 8260 ATM subsystem, this value consists of two 1-byte subfields:

ACN The ATM Cluster Number

HN The Hub Number

End System Part

The fields that make up the End System part of an ATM address are:

ESI End System Identifier (6 bytes)

Identifies an end system unique within an area or within any larger addressing structure such as the IEEE MAC address space. Not used for routing within the ATM network.

SEL SELector (1 byte)

Has local significance only within the end system.

Appendix D. Error and Information Codes

This appendix contains explanations of the error and information codes displayed for the Q.2931 protocol, the codes issued from Maintenance Mode, and the IBM LAN Emulation Server error codes.

Q.2931 Error Codes for Clear Causes

Table 18 lists the error codes from the Q.2931 protocol for clear causes generated by 8260 hubs and other ATM devices in an 8260-based ATM network. For a detailed explanation of each cause, see the *ATM User-Network Interface Specification - Version 3.0 and Version 3.1*.

The decimal and hexadecimal values of the codes are both given below. The terminal dialog issues the codes in hexadecimal format.

Table 18 (Page 1 of 2). Q.2931 Error Codes for Clear Causes in 8260-based ATM Networks

Error Code (decimal)	Error Code (hex)	Meaning of Clear Cause
1*	0x01*	ATM address not defined/assigned.
2	0x02	There is no route to the transit network.
3*	0x03*	There is no route to the destination.
10*	0x0A*	VPI/VCI is unacceptable.
16	0x10	Normal clearing (UNI 3.1)
17	0x11	User is busy.
18*	0x12*	No user is responding.
21	0x15	Call has been rejected.
22	0x16	ATM address has changed.
27*	0x1B*	Destination is out of order.
28	0x1C	Invalid ATM address format (address incomplete).
30*	0x1E*	Response to STATUS ENQUIRY.
31*	0x1F*	Normal, unspecified (UNI 3.0)
35*	0x23*	Requested VPI/VCI is unavailable.
36	0x24	VPI/VCI assignment failed (on user side) (UNI 3.1).
37	0x25	User cell rate not available (UNI 3.1).
38*	0x26*	Network is out of order.
41*	0x29*	Temporary failure.
43	0x2B	Access information has been discarded.
45*	0x2D*	No VPI/VCI is available.
47*	0x2F*	Resource is unavailable, unspecified.
49*	0x31*	Quality of Service is unavailable.
51*	0x33*	User cell rate is not available (UNI 3.0).
57	0x39	Bearer capability is not authorized.
58	0x3A	Bearer capability is not available.
63*	0x3F*	Service or option is not available, unspecified.
65	0x41	Bearer capability is not implemented.

Table 18 (Page 2 of 2). Q.2931 Error Codes for Clear Causes in 8260-based ATM Networks

Error Code (decimal)	Error Code (hex)	Meaning of Clear Cause
73*	0x49*	Unsupported combination of traffic parameters.
81*	0x51*	Invalid call reference value.
82	0x52	Identified channel does not exist.
88	0x58	Incompatible destination.
89*	0x59*	Invalid end-point reference.
91	0x5B	Invalid transit network selection.
92*	0x5C*	Too many pending add-party requirements.
93*	0x5D*	AAL parameters cannot be supported.
96*	0x60*	Mandatory information element is missing.
97*	0x61*	Message type does not exist or is not implemented.
99*	0x63*	Information element does not exist or is not implemented.
100*	0x64*	Invalid information element contents.
101*	0x65*	Message is not compatible with call state.
102*	0x66*	Expiry of recovery on timer.
104*	0x68*	Incorrect message length.
111*	0x6F*	Protocol error, unspecified.

Note: Q.2931 codes generated by the 8260 hub are shown with an asterisk (*).

Maintenance Codes

The following table explains the prompts that can be displayed in Maintenance Mode.

Table 19. Maintenance Codes and Meanings

Code	Meaning
>>0020>>	The NVRAM diagnostics failed, the battery may be low.
>>0021>>	Bad checksum, the loading or de-compression of the operational code failed.
>>0023>>	After 3 retries, the A-CPSW FPGAs did not initialize properly.
>>0030>>	The initialization or the diagnostics failed for the switch, the SPU (Switch Processing Unit), or the serial link.
>>0031>>	The ATM wrap test from the control-point board to the switch board failed.
>>0032>> >>0033>> >>0034>>	The initialization of the operational code was halted due to insufficient memory.
>>00BA>>	Maintenance mode is running with the backup daemon.

IBM LAN Emulation Server Error Codes

Table 20. IBM LAN Emulation Server Error Codes

Error Code	Meaning
1	Network cause
2	Internal cause
3	Memory exhausted
4	Network is down

Appendix E. Configuring AIX for Download and Upload Operations

If you are uploading or downloading ATM software to or from a server running AIX, you must first configure AIX for the TFTP file transfer before entering the DOWNLOAD INBAND or UPLOAD command. To do so, follow these steps:

1. Log on as a root user.
2. Edit the **/etc/inetd.conf** file that is stored on AIX and make sure that the TFTP line is **not** commented out.
3. Start the TFTP subserver by entering the following commands in this order:
   - smit
   - Processes & Subsystems
   - Subservers
   - Start a Subserver
4. From the list displayed, select TFTP by entering the command:

   ```
   startsrc -t'tftp'
   ```

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.

AAL. ATM Adaptation Layer

ac. Alternating current.

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

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

address mask. For internet subnetworking, a 32-bit mask used to identify the subnetwork address bits in the host portion of an IP address. Synonymous with *subnet mask* and *subnetwork mask*.

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

AFI. Authority and Format Identifier (1 byte) in an ATM address.

AIX. Advanced Interactive Executive.

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

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

ARP. Address Resolution Protocol.

ASCII. American National Standard Code for Information Interchange.

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 ATM subnetworks interconnected by network node interfaces (NNIs). See also *network node interface (NNI)*.

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

ATM subnetwork. A set of ATM subsystems interconnected by ATM interfaces (UNI, SSI, NNI).

ATM subsystem. The ATM components in an &genatm. 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.

Authority and Format Identifier. One byte in an ATM address.

B

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

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

BER. Bit error rate.

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

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

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

broadband. A frequency band divisible into several narrower bands so that different kinds of transmissions such as voice, video, and data transmission can occur at the same time. Synonymous with *wideband*.

broadcast. Simultaneous transmission of data to more than one destination.

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

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

BUS. Broadcast and Unknown Server.

byte. (1) A string that consists of a number of bits, treated as a unit, and representing a character. (T) (2) A binary character operated upon as a unit and usually

shorter than a computer word. (A) (3) A string that consists of a particular number of bits, usually 8, that is treated as a unit, and that represents a character. (4) A group of 8 adjacent binary digits that represent one extended binary-coded decimal interchange code (EBCDIC) character.

C

C. Celsius.

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

CBR. Constant bit rate.

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.

CLP. Cell loss priority.

community. An administrative relationship between Simple Network Management Protocol (SNMP) entities.

community name. An opaque string of bytes identifying a community.

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

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

connection. (1) In data communication, an association established between functional units for conveying information. (I) (A) (2) 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) (3) In SNA, the network path that links two logical units (LUs) in different nodes to enable them to establish communications. (4) In X.25 communication, a virtual circuit between two data terminal equipments (DTEs). A switched virtual circuit (SVC) connection lasts for the duration of a call; a permanent virtual circuit (PVC) is a permanent connection between the DTEs. (5) 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. (6) The path between two protocol functions, usually located in different machines, that provides reliable data delivery service. (7) A logical association between a call participant (party) and a switch. A party's connection represents that party's participation in a telephone call.

CPE. Customer premises equipment.

customer-replaceable unit (CRU). An assembly or part that a customer can replace in its entirety when any of its components fail. Contrast with *field replaceable unit (FRU)*.

D

daemon. A program that runs unattended to perform a standard service. Some daemons are triggered automatically to perform their task; others operate periodically. Synonymous with demon.

data communication. (1) Transfer of information between functional units by means of data transmission according to a protocol. (T) (2) The transmission, reception, and validation of data. (A)

data 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). (1) One tenth of a bel. (2) A unit that expresses the ratio of two power levels on a logarithmic scale. (3) A unit for measuring relative power. The number of decibels is 10 times the logarithm (base 10) of the ratio of the measured power levels; if the measured levels are voltages (across the same or equal resistance), the number of decibels is 20 times the log of the ratio.

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. (1) A mechanical, electrical, or electronic contrivance with a specific purpose. (2) 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.

Disk Operating System (DOS). An operating system for computer systems that use disks and diskettes for auxiliary storage of programs and data.

DMM. Distributed Management Module.

DOS. Disk operating system.

dump. (1) 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) (2) Data that has been dumped. (T) (3) To copy data in a readable format from main or auxiliary storage onto an external medium such as tape, diskette, or printer. (4) To copy the contents of all or part of virtual storage for the purpose of collecting error information.

E

EIA. Electronic Industries Association.

EEPROM. Electrically erasable programmable read-only memory.

electrically erasable programmable read-only memory (EEPROM). A PROM that can be erased by a special process and reused. (T)

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.

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.

field. On a data medium or a storage medium, a specified area used for a particular category of data; for example, a group of character positions used to enter or display wage rates on a panel. (T)

field-replaceable unit (FRU). An assembly that is replaced in its entirety when any one of its components fails. In some cases a FRU can contain other FRUs; for example, a brush and a brush block that can be replaced individually or as a single unit. Contrast with *customer-replaceable unit (CRU)*.

file. A named set of records stored or processed as a unit. (T)

File Transfer Protocol (FTP). (1) In TCP/IP, an application protocol used for transferring files to and from host computers. FTP requires a user ID and possibly a password to allow access to files on a remote host system. FTP assumes that the Transmission Control Protocol is the underlying protocol. (2) In the Internet suite of protocols, an application layer protocol that uses TCP and Telnet services to transfer bulk-data files between machines or hosts. See also *TFTP*.

FRU. Field-replaceable unit.

FTP. (1) File Transfer Protocol. (2) Foiled twisted pair.

G

gateway. A device and its associated software that interconnect networks or systems of different architectures. The connection is usually made above the reference model network layer. For example, a gateway allows LANs access to System/370 host computers. Contrast with *bridge* and *router*.

GFC. Generic Flow Control.

H

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

header. The portion of a message that contains control information for the message such as one or more destination fields, name of the originating station, input sequence number, character string indicating the type of message, and priority level for the message.

HEC. Header Error Control.

host computer. (1) The primary or controlling computer in a multi-computer installation or network. (2) In a network, a processing unit in which resides a network access method. Synonymous with *host processor*.

Hz. Hertz; frequence in cycles/second.

I

I/O. Input/output.

ILMI. Interim Local Management Interface.

InARP. Inverse Address Resolution Protocol.

input/output (I/O). (1) Pertaining to input, output, or both (A). (2) Pertaining to a device, process, or channel involved in data input, data output, or both.

interface. (1) 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) (2) Hardware, software, or both, that links systems, programs, or devices.

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.

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). (1) 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. (2) 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.

J

jumper cable. Synonym for *patch cable*.

K

Kbps. Kilobits per second.

kilobit (Kb). (1) For processor storage, real and virtual storage, and channel volume, 2^{10} or 1024 bits. (2) For disk storage capacity and communications volume, 1000 bits.

kilobyte (KB). (1) For processor storage, real and virtual storage, and channel volume, 2^{10} or 1024 bytes. (2) For disk storage capacity and communications volume, 1000 bytes.

L

LAN. Local area network.

LE. LAN emulation.

LEC. LAN emulation client.

LECS. LAN emulation configuration server.

LED. Light-emitting diode.

LES. LAN emulation server.

local. (1) Pertaining to a device accessed directly without use of a telecommunication line. (2) Contrast with *remote*.

local area network (LAN). (1) 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) (2) A network in which a set of devices are connected to one another for communication and that can be connected to a larger network. (3) See also *Ethernet* and *token ring*. (4) Contrast with *metropolitan area network (MAN)* and *wide area network (WAN)*.

M

m. meter

MAC. Medium access control.

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.

MB. Megabyte; 1 048 576 bytes.

medium access control (MAC). In LANs, the sublayer of the data link control layer that supports medium-dependent functions and uses the services of the physical layer to provide services to the logical link control (LLC) sublayer. The MAC sublayer includes the method of determining when a device has access to the transmission medium.

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

MIB. Management Information Base.

mm. Millimeter, millimeters.

multimode optical fiber. (1) A graded-index or step-index optical fiber that allows more than one bound mode to propagate. (E) Contrast with *single mode optical fiber*. (2) 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. (1) A configuration of data processing devices and software connected for information interchange. (2) An arrangement of nodes and connecting branches. Connections are made between data stations. (T)

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

network node interface (NNI). The interface between two network nodes.

NNI. Network node interface.

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

NSAP. Network Service Access Point.

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.

OSPF. Open Shortest Path First

output device. A device in a data processing system by which data can be received from the system. (I) (A) Synonymous with *output unit*.

output unit. Synonym for *output device*.

P

Packet Internet Groper (PING). (1) In Internet communications, a program used in TCP/IP networks to test the ability to reach destinations by sending the destinations an Internet Control Message Protocol (ICMP) echo request and waiting for a reply. (2) In communications, a test of reachability.

parameter. (1) A variable that is given a constant value for a specified application and that may denote the application. (I) (A) (2) An item in a menu or for which the user specifies a value or for which the system provides a value when the menu is interpreted. (3) Data passed between programs or procedures.

parity. (1) 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. (2) 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. (1) In a network, any route between any two nodes. (T) (2) The route traversed by the information exchanged between two attaching devices in a network.

PC. Personal computer

permanent virtual connection (PVC). (1) In X.25 and frame-relay communications, a virtual connection that has a logical channel permanently assigned to it at each data terminal equipment (DTE). Call-establishment protocols are not required. Contrast with *switched virtual connection (SVC)*. (2) The logical connection between two frame-relay terminating equipment stations, either

directly or through one or more frame-relay frame handlers. A PVC consists of one or more PVC segments.

PING. Packet Internet Groper.

port. (1) An access point for data entry or exit. (2) A connector on a device to which cables for other devices such as display stations and printers are attached. Synonymous with *socket*. (3) A PHY entity and a PMD entity in a node, together creating a PHY/PMD pair, that may connect to the fiber media and provide one end of a physical connection with another node.

POST. Power-on self-test.

power budget. Synonym for *fiber budget*.

power-on self-test (POST). A series of diagnostic tests that are run automatically by a device when the power is switched on.

protocol. (1) A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication. (I) (2) In SNA, the meanings of and the sequencing rules for requests and responses used for managing the network, transferring data, and synchronizing the states of network components. (3) A specification for the format and relative timing of information exchanged between communicating parties.

PS/2. Personal System/2.

PVC. Permanent virtual connection.

Q

QOS. Quality of service

quality of service (QOS). A set of communication characteristics required by an application. Each QOS defines a specific transmission priority, level of route reliability, and security level. Each QOS also defines whether the sessions are interactive.

R

rack. Synonym for *equipment rack*.

RAM. Random access memory.

random access memory (RAM). A computer's or adapter's volatile storage area into which data may be entered and retrieved in a non-sequential manner.

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

remote. (1) Pertaining to a system, program, or device that is accessed through a telecommunication line. (2) 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.

RFC. Request for Comments.

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*.

routing. (1) The assignment of the path by which a message will reach its destination. (2) In SNA, the forwarding of a message unit along a particular path through a network, as determined by the parameters carried in the message unit, such as the destination network address in a transmission header.

RS-232. In data communications, a specification of the Electronic Industries Association (EIA) that defines the interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE), using serial binary data interchange.

RX. Receive.

S

server. (1) A device, program, or code module on a network dedicated to providing a specific service to a network. (2) On a LAN, a data station that provides facilities to other data stations. Examples are a file server, print server, and mail server.

session. (1) In network architecture, for the purpose of data communication between functional units, all the activities which take place during the establishment, maintenance, and release of the connection. (T) (2) The period of time during which a user of a terminal can communicate with an interactive system, usually, elapsed time between logon and logoff.

SFTP. Screened and foiled twisted pair.

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. (1) 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*.

SLIP. Serial Line Internet Protocol.

SNMP. Simple network management protocol.

SMIT. System Management Interface Tool used on RISC System/6000.

SSI. Switch-to-switch interface.

station. (1) A communication device attached to a network. The term most often used in LANs is an *attaching device* or *workstation*. (2) An input or output point of a system that uses telecommunication facilities. (3) An addressable node on an FDDI network capable of transmitting, repeating, and receiving information. A station has exactly one SMT, at least one MAC, at least one PHY, and at least one PMD.

STP. Shielded twisted pair.

subnet. (1) In TCP/IP, a part of a network that is identified by a portion of the IP address. (2) Synonym for *subnetwork*.

subnet address. In Internet communications, an extension of the basic IP addressing scheme where a portion of the host address is interpreted as the local network address.

subnet mask. Synonym for *address mask*.

subnetwork. (1) A group of nodes that have a set of common characteristics, such as the same network ID. (2) Synonymous with *subnet*.

SVC. Switched virtual connection.

switch-to-switch interface (SSI). The interface between A-CPSW modules in 8260 hubs.

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.

token ring. A network with a ring topology that passes tokens from one attaching device (node) to another. A node that is ready to send can capture a token and insert data for transmission.

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

trace. (1) A record of the execution of a computer program. It exhibits the sequences in which the instructions were executed. (A) (2) A record of the frames and bytes transmitted on a network.

transceiver. Any terminal that can transmit and receive data.

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. (1) A physical carrier of electrical energy or electromagnetic radiation. (2) The physical medium that conveys data between data stations; for example, twisted-pair wire, optical fiber, coaxial cable. (T)

transmit. (1) The action of a station in generating a token, frame, or other symbol sequence and placing it on the outgoing medium. (2) The action of a station that consists of generating a frame, token, or control sequence, and placing it on the medium to the next station.

trap. Trajectory analysis program.

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.

TRS. Topology Routing Service.

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 multi-user 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.

variable. (1) In computer programming, a character or group of characters that refers to a value and, in the execution of a computer program, corresponds to an address. (2) A quantity that can assume any of a given set of values. (A)

VBR. Variable bit rate.

VCC. Virtual channel connection.

VCI. Virtual channel identifier (in ATM cell header).

VPI. Virtual path identifier (in ATM cell header).

W

WAN. Wide area network.

wide area network (WAN). (1) 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) (2) 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. (3) 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. (1) A functional unit at which a user works. A workstation often has some processing capability. (T) (2) One or more programmable or non-programmable devices that allow a user to do work. (3) A terminal or microcomputer, usually one that is connected to a mainframe or to a network, at which a user can perform applications.

Bibliography

For additional information on the functions and technology in the *ATM Control Point and Switch*, please refer to the following documents:

IBM 8250 Multiprotocol Switching Hub, IBM 8260 Multiprotocol Intelligent Switching Hub *IBM 8285 Nways ATM Workgroup Switch, Planning and Site Preparation Guide*, GA33-0285.

IBM 8260 Multiprotocol Intelligent Switching Hub, IBM 8285 Nways ATM Workgroup Switch, ATM Control Point and Switch, Command Reference Guide, SA33-0385.

IBM 8260 Multiprotocol Intelligent Switching Hub, Installation and Operation Guide, SA33-0251.

IBM 8260 Multiprotocol Intelligent Switching Hub, Distributed Management Module Commands Guide, SA33-0275.

IBM 8260 Multiprotocol Intelligent Switching Hub, Distributed Management Module User's Guide, SA33-0259.

Case, J., Fedor, M., Scoffstall, M., and J. Davin, *The Simple Network Management 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*.

Index

D

E

F

Q

R

S

T

U

V

W

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

IBM 8260 Nways Multiprotocol Switching Hub
ATM Control Point and Switch Module
Installation and User's Guide

Publication No. SA33-0326-01

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) 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
SA33-0326-01

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

SA33-0326-01

Cut or Fold
Along Line

Printed in Italy.